



ADVERTISEMENT.

AS I think myself obliged to make some apology for the uncommon form in which the following observations are offered to the public, I beg leave to detain the reader a few moments, in giving him a short account of my father's design in making and collecting them, with the method he pursued in it, and the reasons that induced me to print them in the manner they now appear.

To enter into a detail of the author's life and character would, in my opinion, be no ways necessary to this work, nor could I perhaps say many things I know of him, without drawing some imputation of vanity on myself. It may be sufficient therefore to take notice, that he settled at Crux-Easton in Hampshire, as far as I can collect, about the 27th year of his age, and in 1693, or 4, where he immediately determined to make the study of agriculture one of the chief amusements of his life.

In pursuance of this resolution, not only at the place, and in the neighbourhood where he lived, but in his journies either to Dorsetshire, where he had concerns, or to Leicestershire, in visits to his father-in-law, Sir Ambrose Phillipps of Garenton, or to his own estates in Wiltshire and the Isle of Wight, and to other parts of the kingdom, he made it his business to search out the most reputable farmers, and get the best informations he could, in all the branches of husbandry that were known and practised in those countries. His constant method was to note down the opinions and advices he thought might be useful to him, and afterwards to add occasional remarks on them from his own experience. For many years, I believe, he had no other drift, in employing himself after this manner,

than merely his own information and improvement; but about the year 1713, he seems to have entered into a design of making his observations public; for I find he had begun an index, and had thrown together some thoughts, as an essay towards an introduction, dated at that period. Though his other studies however, which were chiefly in divinity, in which he has left a very long and laborious work; his frequent attendance on the business of his neighbours in the capacity of justice of the peace, and the care of a numerous family (for he had no less than twenty children, of whom seventeen survived him) hindered him from pursuing this his intention, yet they did not interrupt his first design, but he continued writing down his inquiries and experiments to the time of his death, which happened in the year 1722.

As these observations therefore were left in such disorder, as to require no small pains and application to regulate and digest them, and as all his sons, except the eldest, were bred to professions, and those very foreign to that of agriculture, and had neither leisure nor inclination for an undertaking of this nature, they would, in all probability, have been entirely suppressed, had not I accidentally communicated them to some farmers of my acquaintance, as likewise to some gentlemen, who amuse themselves in husbandry, who were all of opinion they might be of use to the profession, and encouraged me to collect them under their several heads, and put them into the order in which they are here published,

Some of his readers will smile, no doubt, to see the names of many of our English farmers mingled together with those of the antient Romans, Varro, Cato, Pliny, Columella, and Palladius, and with those also of our own writers, Lord Verulam, Evelyn, Ray, Grew, Boyle, and Mortimer; but, had I thrown them out, I must have given an entire new form to the whole, and when I had done all this, the reader, in my judgment, would have owed me no thanks for my pains: it would have robbed the work of an agreeable simplicity, and made it appear less
genuine

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genuine. I was inclined therefore to print it as I found it, and was pleased to find this inclination seconded by the advice of many of my friends.

For the stile, I think, I need make no apology, for what correctness can be expected in observations hastily penned down, and those oftentimes from the mouths of common farmers? In a book intended for the instruction of husbandmen ornaments would be misplaced: it is sufficient if the language be intelligible; nor is it at all my wish, that the author should be esteemed a fine writer, but a useful observer.

The reader must not expect a compleat body of husbandry in these papers. Some things are but slightly touched on, as hops and rye, and some others not mentioned at all, as hemp, flax, &c. and many useful observations might perhaps be added, even in those matters that are treated on at large, and in which the author was most conversant; for such is the extent and variety of the subject, that, according to his remark in the introduction, it is never to be exhausted. Every day produces new inventions and improvements in agriculture, but perfection is unattainable; and, I believe, there is no farmer, of whatsoever industry, age, judgment, and experience, that is not often deceived, and that will not acknowledge himself deficient in many particulars relating to his profession.

Nor is the knowledge of husbandry to be acquired by reading without practice. Books may give valuable hints to those who have judgment to make use of them, but, to learn the first rudiments of this art, it is necessary to serve an apprenticeship to it as to other trades. Many, and indeed the chief part, of these observations therefore are not calculated for the instruction of mere novices, but to assist those, who are already practitioners; to shew them the opinions of others in doubtful and disputed cases, the rules laid down by the antient and modern writers, and the usages of distant counties in this kingdom; to encourage them

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them in making trials; to caution them against many errors, and oftentimes save them much labour and expence, by communicating experiments already made to their hands.

As Mr. Lisle however began his collection at a time when he was but young in the business, and that purely for his own information, there are some rules in it, without doubt, that experienced farmers will have no need of, and some perhaps that may be thought of too little importance to enter into a work of this kind; but however common and unnecessary they appear to some, they may be new and useful to others. Whatever imperfections there are of this nature, I must submit to take them on myself, and freely acknowledge, I know not how to separate the chaff from the corn. I intreat the reader's favour therefore, that whatever such faults he finds, he would impute them to my ignorance in this art or science, and not to the author, who died without revising, or putting his observations into any form, and who probably would have made them better worth the public view, had it pleased God to have continued the blessing of his life to his family.—Such as they are, they are all copied from his manuscript, not scraped together from other books for the sake of gain, and would never have seen the light, had I not thought they would be of benefit to my countrymen; and, that I may be the more readily believed, I assure them, except a few copies to present to my friends, I reap no kind of profit from the publication.

Burclere, Hants;
Sept. 1, 1756.

THOMAS LISLE.

THE
A U T H O R'S
I N T R O D U C T I O N,
M D C C X I I I.

IT may be looked on, in my opinion, as one of the chief misfortunes of this age, that we have not such honourable conceptions of a country life, as might engage our gentlemen of the greatest abilities in parts and learning, to live upon and direct the management of their estates. It is what I have in my most serious reflections often lamented, not only as a considerable disadvantage to themselves, but a great loss to the public. Among the Greeks the knowledge and estimation of agriculture was at the greatest height in their best times; among the Romans their senators ploughed; and the great examples they gave of virtue and industry laid the foundation of all their after-greatness; but as agriculture decreased in their esteem, luxury took place, and soon put a period to their power.—I would recommend it to our English gentlemen to consider how much this may be our case at present; to look round them, and see how many fine estates are daily mortgaged or sold, and how many antient and noble families destroyed by this pernicious and almost epidemic turn to idleness and extravagance. The yeomanry of England, who in former times were the flower of our militia, and the boast of our nation, have always continued to be of great consequence and use to us, and a very necessary link in the chain of government, as having an immediate connection with the gentlemen on the one side, and the labourer on the other. Being distributed among the several parishes, and fitted for various offices, under the ecclesiastical and civil jurisdiction, as of church-wardens, overseers, headboroughs, and the like, which will not hereafter be so worthily filled, they carried a respect with them, and were of especial

service in keeping the meaner people to their duty; add too, that, being men of substance, they were of wonderful advantage to the neighbourhood they dwelt in, by employing the poor, by affording them comfort and assistance in their sickness or misfortunes, in advising them in their family concerns, and in composing differences among them; and also to the commonwealth in general, in keeping up a spirit of liberty in the country without licentiousness, in withstanding corruption and oppression, in maintaining the laws, and in asserting the privileges of a free people. These too however have caught the infection, and will be mimicking the manners of their betters: it is a melancholy truth, but I speak it knowingly; I see old reputable families in my neighbourhood every day falling away to nothing, and may take upon me to prophesy, pass but a few years, this race of veterans will be lost in the kingdom. Nor can the gentry with like management, be long able to survive them; they must one way or other return to their original, the plough; if they will not do it by choice, and for their own advantage, they will hereafter be necessitated to do it for the advantage of others; for we seem to be forming ourselves apace after the French model, here and there a great man, the rest all vassals and slaves. As this threatens to be the case, I should think it no small happiness, and myself no inconsiderable patriot, if I could contribute any thing towards raising the reputation of husbandry among the gentlemen of this kingdom. It is an undertaking, I acknowledge, that affords but little prospect of success; for so far are we now from esteeming it either honourable or gainful, that we will not suffer it to be ranked among the liberal arts, and that we look on it as the high road for a gentleman to be undone; nay, it is become so decried, and out of fashion, that the writing on the subject seems to render me accountable for an apology. I am satisfied notwithstanding, if gentlemen would use such proper methods to attain a skill in this, as they must do to be masters of any other art or science, they would soon find an entertainment in it not unworthy the most exalted genius. It was the method of life that our Creator first designed us, and that to a farther end than our temporal good alone. Other worldly business carries our minds off from God, whereas in this we draw nearer to him, not only as the country life gives the greater opportunity vacare Deo, but as the business of husbandry is of that nature, as must often raise in us good reflections, and turn our thoughts towards him. Every season, and every change of weather in the season, awakens in us the consideration of his providence, and a more than common sense of our dependence on his blessing, from the perpetual occasions we have of observing and reflecting how he gives us our daily bread. A man cannot be busied in the offices of husbandry (they consist of so
great

great variety) but many things will come under his observation, from which divine, moral, and philosophical conclusions are so natural and obvious, that, if he will avoid making them, he must shut his eyes against the light of the sun. It is a great mistake therefore in those gentlemen, who consider husbandry as too narrow and mean a business for a person of parts and education to employ himself in: Can they propose a nobler entertainment for the mind of man than he would find in the inquiries, he must make into all the powers and operations of nature wherein husbandry is concerned? The subject is so vast it can never be exhausted; could he live, and spend ages in agriculture, he might still go on in his searches, and still make fresh discoveries, that would excite afresh his admiration of the riches of God's wisdom. Add too, that scene of nature, which the country lays before us, has I know not what charms to calm a man's passions, and so to compose his mind, and fix his thoughts, that his soul seems to be got clear of the world; and the farther his education enables him to carry his inquiries, the higher are his reflections raised. In the fields methinks God is walking, and, it is to be hoped, when he finds man so virtuously employed, in the way of his own designation and appointment, he may be pleased so to visit him with his grace, as to give more light and warmth to the good thoughts at that time in his mind, and to fix a deeper impression of them on his heart.

If we consider husbandry in regard to our temporal good, provided it be carried on with industry and judgment, it is a sure way to improve our fortunes, and indeed the only way the landed gentleman can take; it were to be wished therefore they would exhort their children early, particularly their eldest sons, to think of it with emulation, and to enter into it as a school of profit and education; whereas it is rather looked on as a purgatory for the disobedient, a scene of punishment, to which a son, who answers not his father's expectation, is to be abandoned; or a condition of life of which none would make choice, but such whom fortune has not in other respects favoured. If the country-gentlemen therefore frequently consist of persons, who are either rusticated by their parents in anger, or who, making a virtue of necessity, settle on their estates with aversion or indifference, it is no wonder the comedians exhibit them on our stage in so despicable and ridiculous a figure; but this is the fault of the persons and not of the art. Were they properly initiated in the study of agriculture, and pursued it as they ought, it would be so far from excluding them from useful knowledge, and bringing them into contempt, that I may venture to assert, they would find it the best school of education, and the fittest to prepare them for the service of their country in the two houses of parliament of Great-Britain.

It

It is not only an employment, whereby the health and constitution is established, which is very necessary for the attendance on, and the discharge of that great duty, but the business of husbandry, if they will not mispend their precious opportunities, brings them acquainted with the condition and mystery of all sorts of inland trades. inasmuch as, for the most part, they depend on, and have relation to the plough, or produce of the land, and their interests are mutually interwoven with the husbandman's; nor can a discouragement fall on husbandry, either by bad seasons, or an ill timed act of parliament, but the meanest artisan, the merchant, and even the sovereign on the throne must feel it. Thus we see it is a vast field of science the husbandman is exercised in, and undoubtedly it must be a very great advantage to him, and give him weight in either of those assemblies, by furnishing him with solid arguments, and enabling him to deliver his opinion clearly and confidently on what he thoroughly understands and knows. It is a general observation, that they speak best, and are best heard, who are more of an active than bookish life; the infirmities of the latter leading them oftener to adorn themselves than the subject, and to take a compass, to shew rather what they have read than what is only pertinent to the debate: men of business are concise in words, and choice in matter; men of small experience and great reading voluminous in both kinds.

Again, it is surely no small recommendation to husbandry, that it is productive of long life and health. The nerves and all the solids of the farmers and labourers bodies are much stronger than those of gentlemen, who live an idle and unactive life, their fluids much purer and unmixed; their bones consolidate easily; their strained ligatures return soon, and with small help to their tones; their blood circulates better, and opens the channels of the vessels in bruised places of it's own accord, sooner than in a gentleman by the assistance of oils and plaisters; and ordinary medicines work more successfully on their diseases than the most sovereign specifics on persons of higher quality. As they are less passive therefore in their constitutions, they often arrive at their fulness of years, which citizens, and gentlemen who are not exercised in country employments, seldom reach.

From what has been here observed of the strength and athletic condition of the countryman's body, it is easy to conceive how a greater share of health should be his portion; and here I take upon me to affirm, that I have made myself acquainted with the diseases of the farmers and labourers in my neighbourhood, and have hardly found one who is subject to either gout, stone, or cholick,

cholick, or indeed to any chropical distemper; nor do they lie under that common infirmity of the gentry, arising from ill habits of body and mind, called vapours, which is such a drawback from life, as to ballance it's value, and render it little preferable to death. Their senses also seldom fail; but they enjoy a comfortable use of them throughout their old age. Their appetites to their food are much keener, and they receive much more nourishment from it than the idle part of mankind would do from the same in quality and quantity, or indeed from the richest soups and sauces; for their bowels are faithful stewards of what they are entrusted with; they strain it to the last drop, and sling away nothing to waste. I have observed in their death-bed sickness they have kept a sound memory and understanding, within a few minutes of their last extremity; for their nerves, having not been vitiated in their tones by debauches, are strong; and the juices of their bodies not being depraved by viscid, grumous, and inflamed materials, the diseased matter is not so fiery as to affect them with such sad delirious symptoms as the fevers of the gentry are commonly attended with.

The husbandman's death's blow is generally from a great cold, to catch which he probably took a method sufficient to have killed the strongest animal. For the most part I have found it proceeded from imprudence, in standing still without his cloaths, or drinking a great quantity of small beer, when in a violent sweat, by which the cold has struck so deep as to coagulate the blood and juices, and deaden the tones of all the solids; so that the difficulty has been to set the wheels again in motion, and to open obstructions by giving a spring and hurry to the blood. But even in this his last and dying state, as I have said, his complaints are few, in comparison to what I have seen those of higher condition labour under; and his brain is not disturbed like theirs in the common malignant cases; and this is no small advantage and comfort to our husbandman, who is hereby enabled to settle those worldly affairs he had before neglected, to recommend himself to the divine mercy, and, like a patriarch, to bestow his dying blessing on his children. Before I leave this article concerning health, let me in particular recommend the consideration of it to men of letters. I make no great question, if they would plough one day, that is, busy themselves as husbandmen usually do, and study the other, they would improve the state of learning far beyond what they now do or can. My meaning is, they would probably live longer, enjoy much greater health, and more active spirits; whereas the studious inquirers after knowledge, for the most part, bring early decay on themselves, for want of free use of air and exercise, and relaxations of the mind; and, tho' moderate in other respects,

respects, yet, through the common irregularities incident to bookish people, by the time they arrive to a little more than the middle age of man, they are under complicated distempers, of an irreparable and broken constitution, and the remaining part of their lives is spent in nursing their infirmities, and pursuing knowledge in a sickly and ungrateful manner.

But, among all the advantages arising to a gentleman from the employments of a country life, the principal is, that of doing good, of which no one, in a private station, has greater opportunities. If he applies himself to the variety of country business as he ought, he will not only give bread to a great number of indigent and industrious people, but his actions also are on the stage; his light is not buried under a bushel. The characters of those who live in a great city, where they have few transactions with their neighbours in the same street, are lost by their dispersed dealings, at distant places, and among people unknown to each other; an excellent person therefore cannot in this situation be proposed for a public example, to attract the veneration of his neighbourhood. His secret admirers are strangers to one another, and to the inhabitants near him, and perhaps know but single instances of such a gentleman's worth; whereas it is the uniformity that gives the great lustre to his actions, and renders them most amiable. With the gentleman, who is engaged in country affairs, it is far different. He must unavoidably concern himself with the families of the farmers and labourers round about him, and with the tradesmen of the neighbouring towns and villages; and, if he be of shining virtues, I cannot conceive but he must be a great blessing to the parishes within the knowledge of him. By his frequent dealing with, and employing the inhabitants, he will of course have some cognisance of their lives and conversations, and, having an opportunity of knowing them, may encourage them as they seem best to deserve from God and man. They too, in their turn, even the lowest labourers, from frequent and intimate views, will conceive a noble idea of their master, which will be heightened by their concurrent testimony when they meet together: by his actions and sentiments they will quadruple their own; and, if he be of a piece, and uniform through all the parts of a good and prudent life, he is mistaken much, if he thinks the benefits of his virtues confined to himself only: he is observed and imitated by this ordinary sort of people, and it is they too, for the chief part, that will fix the character he must bear. The discourse on their master is the sauce to their bread and cheese, when two or three at breakfast or dinner-time sit under a hedge; nay, their work by the task also shall loiter, but some remark they will make on the conduct of one gentleman

man or other; and we cannot be ignorant that every person of this station in the country has acted a part, either good or bad, sufficient to occasion a general talk in the neighbourhood; his speech and behaviour in all his dealings are reported again, though but one witness present, and how just or how disagreeable his sentiments or actions were in any case that happened is canvassed amongst them, and judgment is passed on his wisdom, virtue, and religion; and the labourer's wife must hear the tale over again when the husband comes home. * In a word, there is no action so minute in a gentleman but it is worth the gazing on; and though it be of a nature indifferent, yet the manner of doing it may carry an unaffected beauty and grace with it, which if it does, be assured, these country people will see a great way into it, and secretly revere the person according to his merits. Nor is this all, for the respect they bear him shall influence their thoughts, crush their evil imaginations, lest he, if they proceed to action, should have the knowledge of it; so that a country gentleman, especially if in commission of the peace, shall in this station do a world of more good in preventing evil by his example, than by punishing it. If, in the course of country business, he determines differences without humour and peevishness, shews a displeasure without anger or swearing, sets a mark of distinction according to justice and equity, the common people are sensible enough of the right judgment: he sows wisdom and goodness in their hearts, and the increase may certainly be expected amongst them.

I have but one word more to add to the advantages of husbandry already enumerated, which is, that of all professions there is none more innocent or more pleasant. The business of it goes on, in a known and certain course, from season to season, from year to year; the gains from it are most satisfactory to a scrupulous conscience, because our goods are sold in an open market, are set up together with those of our neighbours, and of the same kind and species, whereby the ignorant may make the better comparison of their worth; we do not grow rich by jobbing, or by buying and selling again, the profit of which too often consists in outwitting and preying on one another, but our advantages arise from the gifts of our beneficent mother, the earth, whose gratitude generally requites the tiller's care, and by whose increase we hurt nobody; our dependence, next to God's blessing, is on our own industry and skill, and, though the season disappoints us sometimes, yet that disappointment is neither so often, so great, nor so fatal as the disappointments of those in other professions, whose trust and dependence is more on man. What miserable calamities fall out from the necessary trust in trade one
citizen

citizen must give to another, and to his customers, whereas the farmer sells for ready money: he may thrive also without supplanting his brother, which the courtier can rarely do.—Certainly that person must live a pleasant life, whose death every one desires to die; and there are very few, of any art or employ, but who propose to themselves, if they are able, a country retirement, with at least some little of husbandry, in the last stage of their lives. If so, tho' other occupations may be in themselves innocent, yet this almost universal desire in men to quit them before they die, looks as if they found it difficult to discharge their consciences in them: they must be sensible, they can make no great figure as husbandmen, but there is some delight even in negative virtue, in being awake, and doing no ill.

To conclude; as I have had some taste and relish of these pleasures, I am desirous to propagate the sense of them as universally as I can, and it would greatly add to my own satisfaction to have partakers with me in the enjoyment of it.

OBSER-

OBSERVATIONS

IN

HUSBANDRY.

ARABLE LAND.

§. 1. **P**ALLADIUS has laid down the following rule, Of the by which we may make a judgment of the good quality of or bad quality of land^a. Dig a ditch, or hole in land, and the ground; and if, on casting in the earth again, how to there is too much to be contained in the place it judge of came from, this shews it to be a rich soil; if the hole would have^{it} taken a greater quantity, it is a mark of poor soil; but, if it just holds it, the soil is of a midling quality.

It is an indication of a good soil, says Pliny, if the crows and other birds flock eagerly to the new-turn'd-up earth, and follow close on the plough-man's heels^b. I doubt not indeed but the sorts of beetles, which lay their maggots in the ground in autumn, and are to be produced in spring, (such as the rook-worms) are so wise as to lay them in rich ground, that they may be the better nourished, as other insects do also chuse the tenderest plants to lay their brood on. Worm-earths also abound most in the richest land.

If

^a Pinguem terram sic agnoscis, scrobe effossâ et repletâ, si superaverit terra, pinguis est; si defuerit, exilis; si convenerit æquata, mediocris est. Pallad. fol. 51.

^b Est indicatio bonæ terræ, si recentem exquirunt improbæ alites vomerem comitantes, corvique aratoris vestigia ipsâ rodentes. Plin. lib. 17. ch. 5.

If you observe any ground to bear a light crop of corn, and at the same time to be grassy, it is to be presumed the ground, thus running to, and bearing grass, would have born corn also, if it had been well manag'd, and that such ground is in good heart; but, if ground bears little corn, and no grass, it is very suspicious that such ground is poor.

Mr. Evelyn observes, there are diverse indications, by which we may know good mold or earth, as, among others, an infallible one is its disposition to melt, and crumble into small morsels, not turn to mud and mortar upon the descent of gentle showers, how hard soever it seemed before, and if in stirring it rise rather in granules than massy clods. As the kind of its natural plant is, says he, you may prognosticate for what tillage, layer, or other use the ground is proper: thyme, strawberries, and betony direct to wood; and Sir Francis Bacon takes notice, as have others also, that camomile (I suppose he means may-weed) shows a land is disposed to corn, burnet to pasture, mallows to roots; but moss, rushes, wild tansy, sedge, flags, fern, yarrow, and where plants appear withered and blasted, shrubby and curled, (which are the effects of immoderate wet, heat, and cold interchangeably) these are natural auguries of a cursed soil.—When there is any vein of ground that breaks up iron mold, no corn will grow there.

§. 2. ^cThe ancient writers agree, that a deep and moist soil, and Palladius adds a chalky also, is most suitable to wheat, and a light dry soil to barley, which will be killed, they say, if sown in wet muddy ground; (and so indeed barley might very well be in their countries, where it was sowed in November) that wet ground agrees best with peas and beans, which, if committed to dry soil, will perish in the earth, or, if they are not absolutely killed, will come up in a sickly starved condition; that the rest of the leguminous kind will bear a dry soil, but thrive most in a wet one: of all these however I shall treat under their several distinct heads.

Of loam. §. 3. Mr. Evelyn does not reckon loam among the clays, though it seems to be but a succulent kind of argilla, imparting a natural

^cSpissa, et cretosa, et humida terra bene far et triticum nutrit, hordeum agro soluto delectatur et sicco; nam in lutoso sparsum moritur. Pallad. lib. 1. fol. 53. Hordeum in terra non humida sed valde arida potius ferere oportet, frumentum vero in lutoso et humida terra seminandum est; in tali enim magis augetur: fabus autem et pisum in lutoso ferere convenit; in arida enim conciduntur priusquam enascuntur, et pereunt; quæ vero non conciduntur degeneres fiunt: reliqua legumina sustinent quidem in arida terra sationem, verum meliora etiam ipsa fiunt et generosiora in irrigua seminata. Leontius in Geopon. fol. 43.

A R A B L E L A N D :

a natural ligament to the earth, where you mix it, especially the more friable, and is therefore of all other the most excellent mean between extremes; fastening and uniting that which is too loose and stony, cooling that which is hot, and gently entertaining the moisture.

§. 4. I see plainly by the temper of a field this year (1706) Of strong (sown with barley on wheaten fallows) which is mixt land, and clay-lands. also by the temper of my clay-lands, [sown after a whole fortnight of dry and hot weather, at the latter end of March, and three weeks cold drying windy weather following in April] that lands of the vales of England, or strong clay-lands, such as they are forced to ridge round, cannot but be moist enough to bring up the corn, even in the driest summers.

At Oxford (anno 1708) in discourse with Mr. Bobart, about the best methods to tame harsh, churlish, obstinate clay, he said, by experience he had found the best way was to sling it up in ridges in the winter, and after the first frost, when it thaws and molders, to sling and temper amongst it ashes or chalk, or whatsoever you have to qualify it; for the time being nickt, wherein you can catch the clay corpuscles under the greatest disunion and separation, is the time for keeping them so, by mixing these other lighter bodies amongst them, which will the longest prevent them from their re-union: this I think to be good advice. Id. and of taming them.

§. 5. If some sorts of stiff and binding land be sown dry, and a sharp scudd of rain falls before the earth has time to settle, it is observed that the crust of such land will bake, so that the corn cannot come through, to the great damage of a crop; this evil happens not, if after such a scudd of rain cool cloudy weather ensue, and not hot sun-shiny; for then the earth will not lie so hollow as to be baked. The best way I think to prevent this, when one has such land to deal with, is, to roll it immediately after sowing, which fastens the earth together, whereby the sun has not that power of piercing into it, and consequently not of baking it. To prevent land baking.

§. 6. I have a field that is very apt to bind, if rain comes soon after it is sowed with spring-corn, and a hot gloom on it, that the corn cannot come through; therefore I advise that such ground, a stiff clay, be sowed, as often as conveniently may, with winter-corn, such as wheat and vetches; for though wet comes then, the sun is not strong enough at that time of the year to scorch the ground up and to bind it; and it is observed that this ground has been always lucky for vetches, which I suppose is for the reason above. What grain to sow on baking or binding land.

§. 7. "A land that eateth up the inhabitants thereof," Numb. xiii. 32. may very properly be applied to some of our chalky hill-country-land, which, in return for ploughing and all charges, brings the farmer out of pocket.

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Some

A R A B L E L A N D.

Some of my neighbouring farmers coming to see me, one of them asked me if I intended to sow a certain field with wheat this year (1707); I said, Yes. He replied, he thought it would not bear twice ploughing, being white land, and having lain still but two summers; and, said he, for one earth it had better lie still three years. I asked him why; he seemed to be at a loss about a reason; I told him, I thought the reason of what he said depended on the firmness and fatness of the ground; for, said I, if white land, that is lay, is loose at top, and not very close and well settled, then it is too early to sow it on one earth, because the bottom that is turned down will be loose, and the bottom with the harrows will be loose, and consequently will not hold rain well enough, but it will run through too soon. Said he, You say well; but my reason is, because this field is apt to have redweed; and if such land with us is ploughed up under three years, and sowed to one earth, we observe it runs much to weed. If that holds, said I, the reason must be, because the seed of the redweed being turned under the earth, where there is not a fastness it grows through, whereas, where the land is fast, it is choak'd; but this field seeming to me a fast and well settled white ground, the reason will not hold in either case.

Note, it is common with farmers to say, that generally their whitish land, unless a very barren mortar-earth, produces as good wheat and barley, and fuller bodied, than their clay-land and stronger earth: but I doubt the reason of it is, because the lighter whiter earth needs not more tillage than they give it, and is not much damaged with unseasonable ploughing; whereas the clay-land is seldom ploughed enough by them, and that often unseasonably, by which it much suffers.

Of black,
spungy
land.

§. 8. About the middle of a field near me, there runs a vein of black, coary, spungy, and yet dry earth, of the colour of Bagshot-heath, only dry; in this land the farmer never had good corn in his life-time, but here and there a tuft; therefore he never more sows it. In Woodcot-down there is such a piece of land abutting to this field; the farmer burn-bak'd it, notwithstanding I told him he would have no corn; and he had none.— Note, In these sort of grounds the rook-worms are bred; and where rook-worms breed argues a rotten loose earth, but not always fit for corn, notwithstanding my former remark on the sagacity of those insects; this black land to many strangers would promise more than any other land on the farm.

Of red,
sandy land.

§. 9. A red, sandy, ferny ground, not worth twelve pence per acre, should be managed thus: the sward of the ground is not to be killed under two or three crops, if you winter fallow for summer corn; and such ground will be so beggar'd as to bring but pitiful grasses after two or three crops, which crops also are likely

to

A R A B L E L A N D.

5

to be very mean; therefore I propose that such ground should be *midsummer* fallowed to rot the roots of the grafs, and stir'd in the winter, and ploughed and sowed with black oats and rye-grafs early in the spring, and sowed very thick, so as to bind the ground by such means; this ground will be in good heart to bear the rye-grafs, and hold it a year or two, or longer; then this ground is to be ploughed up, and managed again in the same manner; for such ground will pay best to be laid down to grafs.

§. 10. Some of my grounds are subject to blight, for which Of land reason I would never plough such a ground to white oats or barley, subject to though never so good; for barley and white oats must be sown blights. later than other corn, and consequently will not have so much time to be settled in the ground, for which reason such a ground will be more subject to blight; black oats therefore, and wheat, I hold the properest grains for such ground, and do believe in such ground the black oats should be drag'd in.

I sowed *barley* the second and third days of May, anno 1703; I had a great burden of rath-ripe barley, but thin and blighted for the most part; for indeed clay-land is so slow in forwarding corn, especially if it lies to the north, and has a hedge-row to the south to shade it, and a wet summer to boot, as there was *this year*, that 'tis not to be expected it can carry a full bodied corn; therefore such ground ought to be sowed earlier. I observed on the north side of the hedge-row, where the head-land was, the corn seemed riper than any in the field, but very thin of flower, which I take to be because it had so little sun, that nature could not carry it on to its perfection, consequently, having done it's utmost, the corn soon withered and grew dry.

Our white land at Crux Easton, though poor, is said to bear the best bodied corn, which I am satisfied, according to the common way of management, it does in wet or dripping summers; but if the summer proves very dry, as this year (1704) was, I find the barley, especially before it begins to ripen, shrinks and runs to a brown colour, and blights, the ground not being able to nourish it any longer; when the clay-land shall better support it's barley, and produce a fuller and finer rin'd grain: the leaves on trees in white land in such years shall soon decay and turn yellow.

The reason why those grounds which hang from the horizon to the east are most subject to mildew, and to blasting, may be (as I judge) from the sun drawing these vapours towards it, just as a great fire in a room draws the air towards it; so the sun having set these in motion, but not having strength enough to draw them into the middle region, to form them into a cloud, yet draw them till he is below our horizon; then these dews tend to the earth from whence they were taken, and in their

motion to the west do fall on that ground which hangs eastward, at right angles; therefore offensive to them most. Cook, fo. 8. —This seems to hold in corn land also.

Of side-lands. §. 11. The side-lands in the hill country are always the poorest, because the good grete, or mold, is washed down by rain.

Of head-lands. I was observing the great difference between the lower head-land of my wheat and the other parts, the head-land being much the best wheat: this must be occasioned by the horses much treading on the turns, whereby the head-land was laid so close, that it kept in the moisture better than the lighter parts, which soon burnt up.

I observe the head-lands of all corn are first out in ear, not only on account of their being generally better in heart, but because, lying under the hedge, the corn lies warmer.

Of light moldering land. §. 12. Light land is said to be the best and kindest land for corn, whilst it will hold it, and that may be for three years; but strong clay-land, though it will bring the lets crops, will hold it longest, and endure ploughing possibly for six or seven years.

We have in the hill-country of Hampshire a light moldering ground, especially on the side-lands, which the countrymen think not fit to plough up for a wheaten crop till it has laid still five or six years, and got a sward, but will then plough it to a barley and wheaten crop: the very life of these grounds, when sowed, consists in holding the seed fast together, which girt it cannot have, being moldering, without a sward; therefore they are out who will sow it beyond a wheaten crop (which is sowed on one earth) the ground after a wheaten crop being too loose; I hold it best therefore to lay it down upon the wheaten crop, sowing rye-grass with it, which will not only grow up with the wheat, and keep the top of the ground firm against moldering in summer and winter, but by the strength of the fold on the wheat will give good burthens of grass till to be ploughed to wheat again.—The best husbandry for all light barren ground seems to be, to sow it to rye-grass, and so to plough it up to corn once in four or five years, and sow it again on the first crop to rye-grass. Such ground is to be valued only on account of it's grass, but, if sowed to hop-clover, it will not at every two years end be strong enough to carry corn.

Situation of a farm. §. 13. ^d Cato, in the situation of a farm, advises his countrymen to choose a southern aspect; of so great consequence was the nearer neighbourhood of the sun even in those hot countries, and therefore not to be despised in these colder; for it is plain to me,

^d Cato scripsit, optimum agrum esse, qui sub radice montis situs sit, et spectet ad meridianam cœli partem. Varro, fol. 31.—In meridiana spectet. Cato, f. 1.

me, that the corpuscular bodies of the sun injected not only into our bodies, but into all vegetables by it's heat, are in their influences prodigiously more powerful towards fructifying all sorts of plants, than any other manner of heat, or other rich manures whatsoever; for soot, nitre, ashes, blood, artificial salts, or other manganisms and compositions Glauber has made, though they may perform wonders in our cold countries, yet cannot produce above a fifth part of the increase the earth shall do, without these arts, in those countries nearer the sun, as Africa, and the West-Indies. And the heat of the sun is, I doubt not, so corporeal a body, as to have fixed in the earth of those countries it's minutest particles so far, that, if we were to bring from thence a bushel or two of their earth, it would for some time do wonders in our cold country, till the treasures, the sun had by it's activity injected, were exhausted; and according to the above notion is the great benefit of summer fallowing to be accounted for: the often turning the earth in the summer grinds it into *small mellow* parts, each of which receives those subtle luminous emanations of the sun in a more abundant manner, when it's parts are so loosened by the plough and spade. And I doubt not but in the hot climes, in their rainy or wintry seasons, by reason of the richness of the soil, made so by the corpuscles of the sun so plentifully injected, that the trees strike roots much deeper than with us, and that corn does so also, though possibly the straw may not exceed the length of ours, because the sun checks it's growth, and confirms the fibres and stalks of the leaves too fast.

A field of mine has a hedge-row to the south-west, on a rising ground: this hedge-row keeps off the sun from it a great part of the day; it is a very good clay piece of land, through which the whole flock of sheep pass as often as they move from one ground to the other; the corn here runs much into halm; to shew the land is good, but produces a very thin grain: and the same proportion does a farm hold with this land, which lies shelving from the sun to the north; for the same reason all headlands fenced from the sun must be treated accordingly, and sweetened, not with dung, but chalk, ashes, &c. and such land is to be concluded always sour: for the same reason such lands are easily over-ploughed.

I have in the former observation taken notice of the sun's checking the growth of straw, and confirming the fibres and leaves too fast, which is the reason I have assigned, why the straw may not in hot countries exceed the length of ours: this however may perhaps be no hinderance to the increase of the grain; for from what I have remarked of this field, and also from other observations, I am inclined to think Dr. Woodward's

ARABLE LAND.

ward's hypothesis not improbable.—The vegetative particles of the earth, which are particularly adapted for nourishing the seed of a plant, may possibly consist of a much more subtilized body than the other particles of earth, that nourish the straw, leaves, &c. and this body may require longer time to be so rarified, concocted, and digested, probably by the sun and air working on it, that by such means it may be assimilated; for dung laid on very barren ground does not, by experience, consist of abundance of these refined particles, and may therefore produce abundance of straw, in our cold climate, but not of corn.—If this be the case, it seems probable also, that in every plant, among the innumerable tubes, which pass thro' the stalk (supposing of wheat) to the ear, some peculiar tubes or fibres may be appointed by the All-wise Creator, which run from the root upwards to the summit, and are much finer and straiter than the other tubes of the plant, for receiving and conveying to the seed the similar and seminal parts and juices; consequently, where earth does not abound in these parts, poverty ariseth in the increase, tho' the earth may abound in the more gross vegetative parts, allotted for nourishing the stalk. From hence it may be, that after one crop of peas you may have the next crop of peas full in halm or straw, but never in kids; from hence we find, that often stirring the earth, subtilizing it's parts, and turning it up to the air and sun, is exceedingly conducive to the multiplying of grain, though the length of straw may not be much increased by it: this may probably give a reason why ashes, soot, &c. may have such copious vegetative particles in them, as to force so strongly the growth of plants; for the fire having separated and loosed the heterogeneous parts, which clogged each other, the vegetative particles are thereby enabled to be more active, and, being reduced into their minuter corpuscles, do ascend in greater numbers up the tubes of plants. Nor is it to be objected, that by fire these vegetative particles should be destroyed, seeing they are supposed to be solids. The proper alimental juices being thus prepared by nature, and the different tubes being fitted to receive them, vegetation appears to be performed in plants no otherwise than by the rising of juices up the tubes by the heat of the sun, in the same order and manner as the dissimilar juices and spirits rise in an alembic; the orifices of the tubes, conducting either to the straw or seed, being fitted to receive the juices appropriated to either*. This order is however sometimes interrupted, by

* The common opinion, maintained by Mr. Evelyn and others, is, that every plant exhausts it's own proper nutriment, leaving that which is appropriated to the other plants quiet and undisturbed. Dr. Woodward not

by reason that the atoms of heterogeneous juices will sometimes shoot themselves up in different angular stirias from what are adapted to the orifices of the tubes; whereas in an alembic, where the

not only subscribes to this notion, but adds, That there are very many and different ingredients to go to the composition of the same individual plant; of which ingredients every part of the plant has one allotted to it for it's separate and peculiar use. Our author, though he asserts nothing, yet, in this supposition, that the straw and seed may be nourished by different kinds of juices, received at different orifices, and conveyed from the root upwards by different tubes, seems not to dissent from Dr. Woodward's opinion. The doctor reasons from the vast variety of tastes, smells, colours, forms, and solidity, that it is impossible one homogeneous matter of the same substance, constitution, magnitude, figure, and gravity, should make up all this variety; and concludes, that there want not good indications, that every kind of vegetable requires a peculiar and specific matter for it's formation and nourishment; Yea, saith he, each part of the same vegetable doth so. The former part of this conclusion is assigned by the doctor as the cause of the necessity of frequently changing the species of vegetables. But Mr. Tull, in his 14th chapter of Horse-hoeing husbandry, treats the doctor's arguments with great contempt, and in contradiction to them advances the three following propositions,

Of change
of species.

1. *That the plants of the most different nature feed on the same sort of food;*
 2. *That there is no plant but what must rob any other plant within it's reach;*
 3. *That a soil which is proper for one sort of vegetables once is, IN RESPECT TO THE SORT OF FOOD IT GIVES, proper to it always;*
- And concludes, that if any one of the propositions are true, there is no need to change the species of vegetables from one year to another, IN RESPECT TO THE DIFFERENT FOOD THE SAME SOIL IS, THOUGH FALSELY, SUPPOSED TO YIELD.

In support of these propositions he argues, that, if in this series, of crops each sort were so just as to take only such particles as are particularly proper to it, letting all the rest alone to the other sorts to which they belonged, then it would be equal to them all which of the sorts were sown first or last. But let the wheat be sown after the barley, peas, and oats, instead of being sown before them, and then it would evidently appear, by the starved crop of wheat, either that some or all of those other grains had violated this natural probity, or else that nature has given to vegetables no such law of meum and tuum. Again, if all plants did not feed on the same sort of food, they could not rob one another, as they are allowed to do; a charlock could not rob a turnip, and starve it more than several turnips can do, unless the charlock did take from it the same particles which would nourish a turnip, and unless the charlock did devour a greater quantity of that nourishment than several turnips could take. Flax, oats, and poppy could not burn or waste the soil, and make it less able to produce succeeding crops of different species; unless they

the passage of rising is free, the apothecary can call for the order he knows his spirits will rise in.—What these alimantal juices consist of, it is not easy to say: Sir John Floyer, in his *Touchstone of Medicines*,

they did exhaust the same particles which would have nourished plants of different species; for, let the quantity of particles these burners take be never so great, the following crops would not miss them, or suffer any damage by the want or loss of them, were they not the same particles, which would have nourished those crops, if the burners had left them behind, quiet and undisturbed. Neither could weeds be any prejudice to corn, if they did draw off those particles only that suit the bodies of weeds; but constant experience shews, that all sorts of weeds, more or less, diminish the crop of corn. These are his principal arguments, and as a confirmation of the fact, that plants of the most different nature feed on the same sort of food, he produces this experiment. At the proper season, tap a birch-tree in the body or boughs, and you may have thence a large quantity of clear liquor, very little altered from water; and you may see, that every other species of plants, that will grow in water, will receive this, live and grow in it as well as in common water. Having thus given his objections to Dr. Woodward's hypothesis, concerning the cause of the necessity of frequently changing the species of plants, he proceeds to propose his own. One true cause of a crop's failing, saith he, is want of a quantity of food to maintain the quantity of vegetables which the food should nourish. When the quantity of food is sufficient for another species, (that requires less) but not for that which last grew, to grow again the next year, then that other is beneficial to be planted after it; for the constitution of plants are different; some require more food than others, and some are of a stronger make, and better able to penetrate the earth, and forage for themselves. Therefore oats may succeed a crop of wheat on strong land, with once plowing, when barley will not, because barley is not so well able to penetrate, as oats, or beans, or peas are. Long tap-rooted plants will not succeed immediately after those of their own or any other species of long tap-roots, so well as after horizontal-rooted plants; but horizontal will succeed those tap-roots as well or better than they will succeed horizontal; for the food at a greater depth has already been exhausted by the one, and chiefly that which lies nearer the surface by the other. The reader must observe here, that these causes, to which Mr. Tull imputes the necessity of changing the species of plants, are causes only in the common way of husbandry; for by his new method of constant tillage, he tells us, he prevents their effects. For example, wheat is not, in the common way, (especially on any strong soil) to be sown immediately after wheat; for the first wheat standing almost a year on the ground, by which the ground must grow harder, and wheat seed-time being soon after harvest in England, there is not space of time to till the land, after having been thus exhausted, so much as a second crop of wheat requires; but wheat, in his new method, may be sown immediately after wheat; for by keeping the ground in constant tillage he procures a sufficient quantity of food for his plants, and strengthens their constitutions:

Medicines, is of opinion, that plants only spread their roots in the common earth, but draw their nutriment from the rain water, impregnated with the sulphureous acid of the air; but Dr. Woodward by many experiments has confuted this, and the like opinions delivered by other authors, and sufficiently proved, that the watery part imbibed, and running up the tubes, is only the vehicle to a certain vegetable terrestrial matter, which gives nourishment and increase to plants. These minute, atomical, imperceptible bodies arise up thro' these watery tubes with wonderful swiftness, according to the rules of levity and gravity, by how much their atomical parts are lighter than the water, or have a figure serviceable to that speed; and the water thrusting still forwards at the extremity, these minute parts are forced to the side of the tube or pipe, and every minute part helps to the increasing and lengthening it.

MANURE and MANURING.

§ 1. **M**R. Evelyn has given us an account of the various manures, either experienced by himself, or in use in his time, or of which he had conceived a good opinion; of these I shall present the reader with the following abstract. Amongst his composts, he says, cold and dry winters, with store of snow, is one which I reckon equal to the richest manures, being impregnated, as they are, with celestial nitre. fo. 312.

Mr. Evelyn's catalogue of manures. Of nitrous salts.

'Tis salts, which entice roots to affect the upper and saline surface of the earth, upon which the nitrous rains and dews descend,

constitutions: if ground therefore be managed according to the rules prescribed in his book, he asserts, there is no necessity of ever changing the species. I think it may be objected to this assertion of Mr. Tull's, that it is not only the farmer but the gardener also who complains, that his ground is grown tired of such and such a plant; and finds himself under a necessity of changing it for another species; and yet in his hands the hough and the spade are in constant use, and he is perpetually manuring, turning, and pulverizing his ground; and, if what Mr. Lisle has taken notice of be fact, that after one crop of peas you may have the next crop of peas full in halm or straw, but never in kids, it seems to follow that the seed and straw require different juices for their nourishment. See article Peas, title, Land sowed to peas will not bear peas well again for six years. §. 12. also § 11. Upon the whole however, which of these two gentlemen is in the right, or whether either of them is so, I must leave to the determination of those who have busied themselves in these inquiries.

☞ Of the order in which the species should be changed, see the author's remarks at the end of the article Sowing.

and

and are the cause that some plants the most racy, and more charged with juice than any other, such as the vine, thrive so well amongst rocks and pumices, and in whatever maintains this vital pickle. fo. 312.

'Tis salt which makes all cover'd and long shaded earths abound in fertility, *ib.*—Observe therefore, how under corn and hay-reeks corn grows; but yet it seems in meads, grass comes not up well under hay-reeks, because possibly the ground may be too rich, or salt, for perennial grass, tho' not for annual corn.

Salt sown in gravel-walks (as I have experienced it) for a time burns the earth, so that nothing will grow upon it; but when the rains have once diluted it, it springs up more wantonly than ever; for which I have left it off. fo. 314.

He has a wonderful opinion of nitre. fo. 315.—But, for ought I find, he is strangely confounded about the principles of vegetation, what they are.

Woad and §. 2. Woad and hemp are said to destroy the vegetable virtue
hemp. where they grow. fo. 316.

Human §. 3. He is against the use of human dung, unless it be well
dung. ventilated and aired, notwithstanding Columella. fo. 317.

Dung of §. 4. Aquatick fowls dung is too fiery, and therefore not to be
water-foul laid on ground, till the volatile salts have their mordicant and
piercing spirits qualified. *ib.*

Manures §. 5. If gravel be wet and cold, lime is preferable. fo. 304.

for differ- §. 6. Arenous and sandy earths want ligature; and besides,
ent soils. consisting of sharp and asperous angles, wound and gall, curl and
Gravel. dwarf our plants, without extraordinary help to render the passages
Sand. more slippery and easy; therefore relenting chalks, with calcina-
tions of turf, are profitable fo. 305.

§. 7. Sand, being of an open and loose contexture, is apt to put forth a forward spring, as more easily admitting the solar rays, but it does not continue; this is an infirmity which may be remedied with loam, which unites it closer. *ib.*

Cold clay. §. 8. With a hungry, or weeping, or cold sort of clay, lime is not to be mixt, which being slack'd is raw and cold. fo. 307. —To these laxatives are best, such as drift sand, small gritty gravel, saw-dust with marl, or chalk, and continual turning it with the spade and plough. fo. 307.

Chalk is healing, and therefore proper for clay, cold, and spewing grounds.

§. 9. Scouring of pond; or ditch-earth, is a most excellent
Pond- manure for light land. fo. 309.

Swine's- §. 10. Lands that are hot and burning allay with swine's dung,
dung. or neats-dung. fo. 309.

§. 11. Horse-dung, the least pinguid and fat of any, taken as it Horse-falls, being the most fiery, excites to sudden fermentation above dung. any; wherefore 'tis then fit only for the hot-bed: but for fields it had need be well rotten, lest it bring a couch, and pernicious weeds; the seeds of hay and other plants of which the horses eat come oftentimes entire from them: such vegetables do commonly spring up from the soil of cattle, of which they chiefly eat, as long knot grafs from horse-dung; short, clean, and sweet pasture, from the dung of sheep and cows; the sonchus or sow-thistle from swine. fol. 317.

§. 12. Neats-dung universally of all others is most harmless, Neats- and the most useful; excellent to mix with sandy and hot grounds, dung-lean, or dry. fo. 318.

§. 13. Sheep's-dung is of a middle temper between cows-dung Sheep's- and pigeons-dung; profitable in cold grounds. fo. 318. .dung.

§. 14. Pigeons-dung and that of poultry is full of volatile salts, Pigeons-hot and fiery, and therefore most applicable to the coldest dung- ground. Be this observed as a constant rule, that the hotter composts be early and thinly spread, and contra the colder. fo. 318.—Very efficacious is the dung to keep frost out of the earth. ib.—As the effect of this dung is sudden, so it lasts not long, and therefore must be the oftener renewed. fo. 319.

§. 15. Blood is excellent with any soil where fruit is planted; Blood: and, as to it's improvements of corn-land, he tells you a strange story of the battle in Badnam fields in Devonshire. fo. 319.

After the battle of Badnam fields in Devonshire, says he, where Lord Hopton had a signal victory, the blood of the slain did so fertilize the ground, that most of the wheat stalks bore 2, 3, 4, yea to 7, and some to 14 ears; a thing almost incredible, but assuredly reported by diverse eye-witnesses, fol. 319.—I have given my opinion of this and the like tales under the article, corn in general—see—Of many ears on one stalk—He adds, that the blood and flesh of animals is much more powerful for the enriching of land than their dung and excrements, and is computed at twenty times the advantage, and to the same advance above this is hair and calcined bones; and so the dung of pigeons and poultry feeding on corn does as much exceed that of beasts, which feed on gross vegetables, and one load of seed contains as much virtue as ten load of dung.

§. 16. Wood-ashes are fit for wet ground: in the East-Indies, Wood-burning trees to ashes is the only improvement, of which they ashes. strew not above a bushel to an acre; it likewise kills the worms; but in ground that is subject to over-heat and chap much, ashes and burning composts do but increase the fever, and therefore contrary remedies should be sought, such as neat's and swine's-dung;

dung; but not so, when lands are naturally or accidentally cold. fo. 320.

Dung should not lay exposed to the sun and air.

§. 17. He disapproves of laying dung in heaps in the field, exposed to the sun, rain, and drying winds, whereby all the spirit and strength is carried away; and pretends to put us in a better method of managing our dunghills.—Let the bottom or sides of a pit, says he, be about four feet deep, paved so with small chalk or clay at the bottom, that it may hold water like a cistern; direct your channels and gutters about your house and stables to it. The pit must be under covert, so that the down-right rains at least may not fall into it. Lay a bed of dung in it a foot thick, on that a bed of fine mold, on that another bed of cyder-mere, rotten fruit, and garden offal, on this a couch of pigeons and poultry-dung, with more litter, and beds of all other variety of soil; upon all this cast water plentifully from time to time: as for fresh dung, such as sheep make when folded, 'tis good to cover it with mold as soon as possible from the sun. fo. 326.

Manures used by the ancients.

§. 18. He accounts the warmth of the woolly fleeces of sheep an improvement to land as well as their dung, fo. 308; and the very breath and treading of cattle, and their warm bodies are comfortable, and marvellously cherishing. ib.—Thus far Mr. Evelyn.—There is no great matter to be collected from the antient writers on husbandry in respect to this article of manuring. † Pliny prefers cow-dung to horse-dung; and, if the cows, or cattle that chew the cud, feed on as good meat as horses, without doubt the dung, by reason of such chewing, will be the finer. ‡ Columella gives a like reason for preferring asses dung to that of any other beast; because, says he, the ass is a long time in grinding his meat, by which means it is more thoroughly digested, and fit to be laid on the ground immediately, as soon as made. Hogs-dung he esteems the worst of all.—^h Varro and Pamphilus agree, that the dung of geese, and all aquatick fowls, is of a bad kind; but the latter of these assigns a different cause for it from that given by our English writer: he attributes it only to it's too great humidity, whereas Mr. Evelyn reports it to be

† Inter fimos bovum præfertur antequam jumentorum. Plin. lib. 17. c. 9.

‡ Inter pecudum sterco optimum existimatur quod asinus facit, quandoquidem id animal lentissime mandit, ideoque facilius concoquit, et bene confectum atque idoneum protinus arvo fimum reddit. Deterrimum ex omnibus suillum habetur. Columella, lib. 2. c. 14.

^h Malum est sterco anserum, et aquaticarum volucrum, propter humiditatem. Pamphilus in Geponicis, fol. 5.

be of a fiery quality.—¹Columella joins with ²Varro in giving great commendations to pigeons-dung, beyond that of all other birds, on account of it's fermenting heat, and in advising to sow it on the ground before the corn is harrowed in; but, if this is not to be procured, he directs us to make use of goats-dung in it's stead. ³Pliny recommends earth that is salt, as preventive of, or destructive to insects; and this may be one of the great advantages from lime, foot, pigeons-dung, and often tilling the ground: ⁴It is agreed on, says he, by every one, that there is no manure more profitable than lupines, ploughed into the ground before they have kidded.

§. 19. The maintenance corn must depend on is the innate Dung, it's digested salts of the earth, and well concocted juices, which are insufficient to be obtained by the præcocious way, the same year the land is dung'd; dunging is but a weak support for very poor land to depend on; 'tis a good sauce to the noble juices, which are before in the land, to heighten them: but if you think dung alone a sufficient nourishment, where the land is before poor, you will find, that in such case the corn will run out to a straw, and the grain into a thin body with little flour; and that very poor land shall be as little able to bear good dunging, as a poor man, whose blood is poor, much strong drink: the very quintessence in earth, which improves grain, seems to depend very much on the air, sun, and rains incorporated with the earth, which seems principally to give birth and life to vegetables; for the receiving of which principles the dung has not had time, which is newly deposited on the earth: how much is to be attributed to these principles is easy to be seen, if Mr. Ray, Grew, and Malpigi be consulted.

§. 20. In discourse with farmer Sartain of Broughton in Wilts, and other farmers, I was saying, that the tails and the improvement of the dung of cattle was answerable to the food they feed on

Dung of cattle good in proportion to the goodness of their food.

¹Antequam farrias, more feminantis, ex aviariis pulverem stercoris per segetem sparge; si et is non erit, caprinum manu jacere, atque ita terram sarculis permiscere, ea res lætas segetes reddit. Columella, lib. 2. fol. 108.

²Stercus optimum est volucrum, præter palustrium et nantium; de hisce præstare columbinum, quod sit calidissimum, et fermentare possit terram: id ut semen aspergi in agro oportere. Varro, lib. 1. sect. 43.

³Salsæ terræ multo melius creduntur, tutiora a vitis innascentium animalium.

⁴Inter omnes constat nihil esse utilius lupini segete, priusquam siliquetur, aratro vel bidentibus versa. Plin. lib. 17. c. 9.

☞ Mr. Miller remarks, that in Italy, to this day, they cut down the narrow-leaved tall turnips, when in flower, and plough them into their ground as manure.

on, and gave several instances of it; to which farmer Sartain replied, They were sensible also, that, when they foddered with the best meadow-hay, it made their grounds quite another thing in goodness, than when they foddered with a coarser hay.— Farmer Stevens of Pomroy assented to this, and added, that the sheep sate in the common of Pomroy was of so rowety, wet, and poor a grass, that the tails of the sheep that fed on it would do land no good: to confirm his report, he led me to a good healthy ground, which he had sowed to wheat, and which he had folded with these sheep, so rich in appearance, that no ground could be seen for the trundles, and yet by the corn there was no sign of the good effects it had on the land; and the trundles, if you broke them, were as coarse as rabbit-dung. This makes therefore for the improvements by grass-feeds in poor lands, forasmuch as the sheep gain not thereby a good belly-full only, but also their dung has greater virtue.

Of dung- § 21. If you divide the poorer part of a ground from the better, leave two or three lugg in depth of the poorer ground within the hedge of the better ground; because the cattle love to creep to the hedge-side, and will improve that poorer part by their dunging on it.

Horse § 22. That part of my barley, which had been dunged with dung preferable to cow-dung horse-dung the year before for wheat, was twice as good as that part which the same year was dunged with cow-dung, though that part dunged with cow-dung was rather the better land.

Horse- § 23. Horse-dung being laid on wheat-land just before it is dung, when to lay it on. sowed, and then ploughed in, and sowed on one earth, (which is often done in the hill-country, where the land is light) is apt through the fire of the dung to run out the corn faster than the digestion of the stalk can be made; and so the parts being loose and hollow in the texture, when the winter comes, the cold pierces it so, that it withers and dies; whereas dung should either, on such land, be laid and spread a month before the ground is ploughed and sowed, or else should be ploughed in a fortnight before the ground is sowed.

Dung of § 24. Lord Shaftsbury complained to me, that he did not find fattening beasts preferable to that of milch-cows. feeding his grounds with cows improved them. I told his lordship, the reason I believed was, because his cows were milch cows, not fattening beasts; for the dung of milch cattle cannot improve lands like the dung of fattening beasts, the milking them solliciting the fat and nourishment of the creature to follow the current of the milk, whereby the dung is much the poorer; and why weather-fold is worse than ewe-fold, I conceive to be, because the nourishment of the weather goes into his growth.

§. 25.

§ 25. I asked a Wiltshire man what the tails of a hundred sheep might be worth, if one was to hire them. He said, that sometimes he had known sheep to be let out, and they have had 12d. per night for lending a hundred sheep to fold, which is looked on of as good a value as a good load of pot-dung. Note, in Leicestershire one may have the fold of two hundred for 12d. per night.

§ 26. Mr. Davers of Causum in Wiltshire assures me, that no table countrymen have told him, that in dividing the ewes from the weathers, in folding the same ground, they have had much the better corn where they have folded the ewes. Mr. Davers that thought it was from the lambs, because their dung must be richer from the milk they sucked from the ewes. I have given my sentiments on this point in a former observation; but quære whether the soil of all gelt creatures is not less generous and rich than that of others. I told Mr. Davers, that I had been assured, if cattle had poor mean hay given them, the soil of them would do the ground little service, to which he assented; and he said further, that horses dung when they were at grass rather impoverished than bettered the land, whereas what came out of the stable was otherwise.

§ 27. Carry out horse-piss, cows-piss, hogs-piss, when they are frozen and in ice.

Many husbandmen sling layers of malt-dust into the houses, and, when it is well covered, sling another layer, and sow it mix'd thus together on their grounds, and find, they say, great advantage in it. I have not as yet had experience of it, but have heard it greatly recommended, and believe it to be a good way.

§ 28. Sharrock says, fo. 91. For cold land, pigeon and poultry dung is very useful, which abound in volatile salt; these are only sowed by the hand, for fear of burning the corn in the chitting of the grain.—I have observed where these dungs have been over plentifully laid, that the place bore no corn at all, whereas in other places, where it was moderately strewed, the crop was exceeding great; the same effect there is in urine and soot, from the very eager spirit, and volatile salt, and therefore the same caution is to be had in their use: horse-dung, if not rotten, lying thick will do the same.

§. 29.

▪ Mr. Miller says, the dung of pigeons, hens, and geese are great improvers of meadow or corn-land; the first of these being the best superficial improvement that can be laid on meadow or corn-land; but, before it is used, it ought to have lain abroad out of the dove-house some time, that the air may have a little sweetened it, and mollified the fiery heat that is in this dung.

Quantity of pigeons-dung on an acre. § 29. Mr. Putching of Leicestershire says, They commonly sow two quarters of pigeons-dung on an acre, (which is sixteen bushels) and their method of sowing it is, to sow it after the corn, and before the corn is harrowed in: in meadows he supposes eight bushels on an acre is enough.

Pigeons-dung preferable to poultry-dung. § 30. It may be judged that pigeons-dung is better than poultry-dung, from Mr. Evelyn's view of them by a microscope; for he says, that pigeons-dung is constituted of a stiff glutinous matter, easily reducible to a dust, of a grey colour, with some husky atoms after dilution; but the dung of poultry was so full of gravelly small stones and sand, that there appeared no other substance, save a very small portion both of white and blackish viscous matter, twisted up together, of all the other the most fætid and ill smelling. Evelyn, fo. 295.

Pigeons-dung, price and manner of sowing it. § 31. Sir Ambrose Phillipps sells his pigeons-dung for 4d. per bushel, which is 2s. 8d. per quarter; one Gimson bought it, and laid it on light sandy land, and, it proving a hot summer, he thought it did his barley rather harm than good. Mr. Putching is very fond of this dung, and buys it for 2s. 6d. per quarter, and sows two quarters, and sometimes three on an acre, which he thinks is best: he sows it after his barley is in the ground, before harrowing, and harrows in both together: he also sows it in the same manner on his wheat-land, and in case a wet and cold spring comes upon his barley, so that he is like to have little in his furrows, he flings about a sack on an acre, between the furrows, and finds it to strengthen and comfort the cold land so, that he has as good corn there as on the ridges: he bad me but try, and I should have as good an opinion of it as he had. Mr. Clerk of Ditchly told me afterwards, that Sir Ambrose sowed commonly five quarters on an acre.

To manage pigeons dungs § 32. The gentlemen mention'd in the preceding observation agreed, that the best way to manage pigeons-dung in a dove-house, was often to lay a layer of straw upon it; but then it will be amass'd to so great a bulk, that it must often be removed to some place, where it may lie from the power of the weather.

Soot and pigeons-dung. § 33. Sharrock tells us, fo. 134. Soot and pigeons-dung abound much in volatile salt; and I have this year (1703) on a cold and moist clay seen excellent advantage on the grass thereby, fit being only strewed thin on the grass before spring; but of the two soot was the best.

Soot to kill mosfs. § 34. Cook says, fo. 19. Soot is good to kill mosfs; its heat kills the roots, for they lie on the top of the earth.

Soot to lay on green wheat. § 35. I find in Leicestershire many do fling soot on their green wheat in February, so as to blacken the land with it; therefore I need not fear burning my wheat with it, at that time at Easton. The soot from the sea-coal is esteem'd the best.

§. 36.

§ 36. A notable farmer told me, that he had tried all ways of Coal-ashes managing French grafs, by dung, and fold, &c. and had found good for coal-ashes the only, or beft improvement.—Qu. Therefore why not beak-land burnt? and why may not thefe be the beft improvements, becaufe they will not create and encourage a rowety grafs to arife, to choak the French grafs, as Mr. Methuen had obferved dung to do?

It feems to me, that afhes may be propereft to French grafs, Id. the inafmuch as they kill the natural grafs, from the fame reafon as the falt of brine does, or urine thrown on gravel-walks; and afhes have a ftrong falt in them; yet this falt is beneficial to the roots of the French grafs, becaufe it has a tap-root, which runs deep, and the falt of the afhes is very well qualified before it finks down to the roots of the French grafs.

§ 37. J. Mortimer, Efq; F. R. S. fo. 380. reckons rotten wood of hedges and coppices to be a great improver of the foil where it drops, and instances the earth where faggot-piles have been ufed to ftand.

§ 38. Quinteney fays, the dung of leaves thoroughly rotten is hardly fit for any thing but to be thrown over new fown beds, to hinder the rains, or waterings, from beating too much on the furface, and fo hinder the feeds from rifing;—and no doubt 'tis the fame with corn. Part 1. fo. 5.

§ 39. Martin of the Western ifles fays, the manuring with fea-ware is an univerfal husbandry throughout thofe iflands, fo. 53, &c. In the ifle of Altig, he reports, that, by manuring healthy ground with fea-ware, many ftalks had five ears growing on them, fo. 140; and in the ifle of Skie, by an improvement of marle, 35 fold increafe was had, and many ftalks carried five ears of barley; and he affures us this account was given him by the then poffeffor of the land; fo. 132.° But I have in another place given my opinion, that thefe fupercatations are not probable.

§ 40. King of Ilfley in Berkfhire fays, that the malt-duft fowed on barley-land did very little good laft fummer (anno 1699) by reafon of the drought; for, no rain falling from fowing-time till the feed was come up, the ftrength of the duft was not washed into the land.

He faid, it was common in thofe parts of Berkfhire to lay malt-duft on wheat-land, and to fling it on at the time they fow the wheat, and harrow it in together, and a very good improvement it was; but, faid he withal, I have heard husbandmen argue that point, and hold, that malt-duft is better for fummer-corn than for wheat, and they give this reafon for it; the winter-corn

• Vid. Corn in general.

ter-corn lies a whole year in the ground, and the malt-dust will have spent it's strength by the time the winter is over, and not hold up the corn in heart all the summer: they sow with the wheat two quarters of malt-dust to an acre, which makes four quarters of corn-measure.

Farmer Ratty assured me, that malt-dust went beyond dung on clay-land; for 'tis on such land, not on light land, that he has had the experience of it; and that farmer Hawkins knows this very well, though he does not care others should, lest the price should grow dearer: he says, he lay twenty sacks on an acre, of the ordinary four-bushel-sacks, which he buys at Whitchurch at 1s. per sack. He sows on his wheat-ground, not dunged nor folded, about February, and he says the wheat will surpass the dunged wheat, and the ground will produce a good barley-crop afterwards, tho' supposed to the contrary.

Mr. Thomson of Loughborough assures me, that malt-dust laid on cold grass-grounds makes a great improvement: he says, he lays after the rate of four quarters on an acre, on such ground, but 'twould be better to lay six or seven. Note, five quarters on an acre is a peck on a lugg-square; $7\frac{1}{2}$ quarters is a peck and an half. It seems it would be agreeable on our cold clay-meadows.

I have observed of dungs, and lime, and strong beer, that they afford no spirits, or vegetable salts, till they have passed a fermentation by fire, whereby their spirits or salts are raised and secreted; so I look on the same observation to hold good in malt and barley; ground barley being of little profit to land if laid on it; whereas ground-malt laid on land, (though it would be madness to do it) as we may judge by the malt-dust, would yield a great produce.

Mr. Clerk says, he uses the kiln-dust of the malt himself, viz. that dust which comes through the hair-cloth, which he looks on to be better than the other: he laid (he said) ten quarters upon an acre, both on his grass-ground and barley, about January or February. I asked him if it would not be apt to burn the ground, not being laid on earlier; he said, one shower of rain he thought washed the heat out of it. As to the largest tail-dust of the malt, he sold it for 4d. per bushel, to people to feed pigs with.

Woollen
Rags.

§. 43. In discourse with King on the subject of woollen rags, he assured me of strange effects from them, which improve to four or five crops. He said they might be bought at London for 2s. or 2s. 6d. per hundred weight, 112lb. to the hundred; old people might be hired to cut them on a block, which would cost about 6d. per hundred. Lay of these chopt small, to an inch or two square; sow them by scattering them out of the seed-lip at the second ploughing or earth, about the latter

MANURE and MANURING.

21

latter end of July : being thus covered, they will grow sinnowy or moldy by seed-time ^P.

^P Beside the manures spoken of by our author, there are two others much commended by Mr. Miller, which are rotten tanners bark, and rotten vegetables.—Oak-bark, says he, after the tanners have used it for tanning of leather, when laid in a heap, and rotted, is an excellent manure, especially for stiff cold land ; in which one load of this manure will improve the ground more, and last longer, than two loads of the richest dungs. It is better for cold strong land than for light hot ground, because it is of a warm nature, and will loosen and separate the earth ; so that where this manure has been used three or four times, it hath made the land very loose, which before was strong, and not easy to be wrought. When this manure is laid on grass, it should be done soon after Michaelmas, that the winter rains may wash it into the ground ; for, if it is laid on in the spring, it will burn the grass, and, instead of improving it, will greatly injure it for that season. Where it is used for corn-land, it should be spread on the surface before the last ploughing, that it may be turned down for the fibres of the corn to reach it in the spring ; for, if it lies too near the surface, it will forward the growth of corn in winter ; but in the spring, when the nourishment is chiefly wanted to encourage the stems, it will be nearly consumed, and the corn will receive little advantage from it. Rotten vegetables of most sorts also greatly enrich land ; so that, where other manure is scarce, these may be used with great success. The weeds of ponds, lakes, or ditches, being dragged out before they seed, and laid in heaps to rot, will make excellent manure, as will most other sorts of weeds. But where-ever any of these are employed, they should be cut down as soon as they begin to flower ; for, if they are suffered to stand until their seeds are ripe, the land will be stored with weeds, which cannot be destroyed in two or three years ; nay, some kinds of weeds, if they are permitted to stand so long as to form their seed, will perfect them after they are cut down, which may be equally prejudicial to the land : therefore the surest method is to cut them down just as they begin to flower ; at which time most sorts of vegetables are in their greatest vigour, being then stronger, and fuller of juice, than when their seeds are farther advanced ; so that at that time they abound most with salts, and therefore are more proper for the intended purpose. In rotting these vegetables it will be proper to mix some earth, mud, or any other such like substance with them, to prevent their taking fire in their fermentation ; which they are very subject to, where they are laid in large heaps, without any other mixture to prevent it ; and it will be proper to cover the heaps over with earth, mud, or dung, to detain the salts ; otherwise many of the finer particles will evaporate in fermenting. When these vegetables are thoroughly rotted, they will form a solid mass, which will cut like butter, and be very full of oil, which will greatly enrich the land.—He commends likewise sea sand, shells, and corals, especially for a strong loam, inclining to clay ; but adds, as these bodies are hard, the improvement is not the first or second year, because they require time to pulverize them, before their salts can mix with the earth to impregnate it.

Worms good for drawing long dung into the ground.

§. 44. It is a common and well approved of method in husbandry, at Litchfield in Hampshire, and the neighbourhood thereof, to carry out long dung, and lay it on lay-ground, that is light and whitish, and to let the worms draw it in, being laid early; then to plough it up and sow it on one earth; but it must not be strong land, because that can't be sowed on one earth.

Dung, time of laying it on.

§. 45. It is a frequent practice in the hill-country to pot-dung land, run to grass and to a sward, in July, and to plough in the dung, and sow it on one earth with wheat, the latter end of August, or a week in September; and true it is, that, though the ground be grassy and swardy, as it will be in our hill-country by two years lying to grass, and tho' the spring be very dry, as also the summer, yet in April and May, when the sun gets strength, and warms the ground, the spirits of the dung will be drawn out of the ground upwards, as will plainly appear by the good deep colour of the wheat, and the thickness and thriving condition of it: however 'tis plain by several experiments I have made this way, that the mellow and looser the ground is, you thus manage, the better the spirits of the dung will be drawn upwards, through the earth, to the roots of the corn, as has appeared to me, both by the thickness and colour; therefore the husbanding land this way, which is run to a matted sward, ought, as much as can be, to be avoided. Corn thus husbanded will thrive very little during the winter, nor until warm weather comes: from hence it may seem, that to carry out dung on such land the beginning of June, and plough it in whilst the sun is hot, and has a good season to hold so, is better husbandry than to defer it till August; for the sun will exhale upwards the spirit of the dung. In poor ground it seems proper to me to summer-fallow it, (if lay-ground run to grass) and stir it in the winter, in order to sow it at spring with oats or barley and French grass, in order to feed the French grass with cows during the summer, after the roots are well established; and such feeding will not kill the French grass in such poor ground; for there can be no danger of such exuberancy of sap, that the root should fall under a plethora: in autumn it may be fed a little with sheep without prejudice.

From the above observation, how the dung plough'd in under furrow is drawn up to the roots of the corn by the strength of the sun, may be explained, in the same manner, how grass in the hottest summers comes to have most goodness and spirit, as is experimentally proved by deer, sheep, and other cattle thriving by it (tho' plenty of rain does most contribute to increase of growth) the effluvia, which lie deep, being so exhaled to the roots.

Mr.

Mr. Bissy and Mr. Slade being with me, when in the month of July or August I was carrying out my dung to lay on land that was swardy, in order to spread it, and turn it under furrow, they did not approve of that husbandry; Mr. Slade said, he found it a much better way to carry it out in the spring, i. e. about May, to lay on ground not apt to run to grass, and let it be wash'd in, which will mellow the ground, and hollow it; and then turn it in at Mid-summer, and sow it on one earth. Mr. Bissy said, he found it always the best way, if dung was free from weeds, and short, such as ox-dung and horse-dung that would spit, to carry it out on the ground plough'd up to sow on one earth, a little before you sow it, and drag it in: he said, he always found the best corn by such husbandry, and would have persuaded me to try it.

§. 46. It seems to me, that the grounds near the house ought to have the dung, in regard of the cheapness of carriage, and in regard that three loads of corn may be carried in from thence, instead of one from a farther distance; and if such grounds consequently by rich crops of grass-seeds maintain a treble stock, *what matter* is it whether the grounds at a distance have the dung at the first hand or second, I mean by the tails of sheep? Besides, the richer the grounds near to your backside are, the more they will answer in the produce of grass, and in being of more general conveniency, as in maintaining lambs at lambing-time, in fattening hogs by broad clover, in maintaining horses and mares with food, in bringing good goar-vetches, in the easy carting of a good burthen of grass-feed-hay; and, if not folding, other methods may be used in manuring grounds at a distance, such as ploughing in goar-vetches, liming, rags, sowing to French grass, watering, &c.—The farmers however argue from experience, that we must sometimes change our manure from the fold to pot-dung, and not always fold on the same land.

To lay pot-dung near home.

§. 47. They who are curious in sowing seed-corn will not allow a load of corn or dung at harvest to come through their wheat-fallow.

§. 48. If dung lies near the corn-carting, and not carried out before harvest, so many sorts of corn will be littered in it, which will not have time to rot, that you must expect a crop foul with trumpery.

Dung should not lie near the corn-carting. Mold, to lay it on.

§. 49. I hold it much the better way, if earth be carried out as a soil to land, not to spread the earth on the land till the last earth be given for the corn, and then to spread it, and harrow it in with the corn with new harrow-tinings or drags; hereby the earth will not be buried.

§. 50. One of my labourers was going to turn the dung for me into heaps in the foddering barton; he asked me, if he should stir it all; he said, 'twas best to turn it all, and not lay the mixture

Of turning dung. he

be flung up on the top of the rest; for though 'twas something more charge, yet 'twould rot the better. Farmer Elton, coming by, told me, I did well in it, for 'twas much the better way.

Straw, to manage it for dung. §. 51. If straw, not half dung, be carried out into the fields, and laid in heaps, and after rains turned, it will become dung in good time.

Mr. Raymond of Puck-Shipton in Wiltshire visiting me, I told him, I intended to dig my farm-yard deep into holes, whereabouts the kine foddered, that in those holes I might let the wet into my dung, that it might rot the better. He immediately disapproved much of it, and said, that way the dung would never rot; for straw was like weed, and other things, which lying always wet would never rot; but that which would make straw rot was to let it lie often wet and often dry; therefore, said he, we always covet as dry a farm-yard as we can get, for the rains will wet the straw often enough; or, if it chance to be a very long dry season, you may wet it by throwing water on it.—I have since found by experience, that if dung lies always wet, it will not heat well, nor rot, and that it wastes itself and its strength by the wet; therefore no better husbandry than to fling it into a heap.

1701 was a mighty corn-year, and a year which ran much to harm; so that the beasts could not eat up their straw, but it lay in the barton not half dung; I proposed carrying out the straw or longish dung, and laying it on my wheaten lay; a layer of straw, and a layer of wet and rottenish dung, thinking the wet and tolerably digested dung might rot the straw; but John Stephens of Ashmonsworth, and farmer Cross said, the long straw had better lie in the barton to take some rains, and then being well wetted, and carried forth, it might by the wheat-feed-time be dung, but, according to the way I proposed, by that time it would produce nothing but finnowy or moldy straw.

§. 52. Columella advises to keep dung in a heap till it is a year old, and no longer; for after that age, says he, it loses its strength.

Age of dung.

That new dung on cold land will run corn into straw, and make a great shew of corn, I doubt not; but I do believe, the dung of one year old will produce the fuller bodied corn.—Using dung however of only a year old, to dung a wheaten crop, seems to be the occasion of the great produce of weeds in our corn-land in England.

Time and manner of laying on dung. §. 53. For three or four years they were very fond at Husborne in Hampshire of laying their dung on the land, and spreading it after the corn was sown and harrowed; but they grew weary of it; for their land was pretty light of itself, and the worms working up for the dung made it too light.

I was

I was going from Holt through Tilshade to Salisbury; Tilshade is on the downs; I observed the village was carrying out long dung, which being in or about October (as I thought it an improper season) it invited me to ask the reason. They told me, it was to lay on their ground sowed to vetches, and that they did not sow their vetches till the middle or latter end of October, when their wheat-land was sowed. Quære farther of this husbandry; for it seems to me, where land is sowed late, it must be good husbandry, and bring the vetches forward, and warm, and comfort them, especially where land is light and weak, as it is generally about Tilshade, being a fine barley-land.

Farmer Elton advised me always, when I carried my dung out into the ground, to spread it immediately; it will, said he, make the ground kernal and fallow better, whereas to leave it in the heaps will rather hurt the corn, and make it lodge and grow up rank.—But, said Oliver afterwards, when I was talking to him of it, we often lay it in heaps on the ground; and in such case, when we carry it on the land, we dig away from the mixen the earth underneath about half a foot.

I was observing to farmer Biggs, that farmer Bond of High-clear flung no dung, in the spurning or spreading it, into the furrows, but carried a spit all along from the heap, and spread it near to the brink of the furrows, and so spurned to it. John Biggs said, he never saw it done, but that doubtless 'twas a very good way; for to fling dung into the furrows was to double dung them, by reason that on each side the furrow a furrow was veered in on the furrow—[†] Prudent husbandmen, says Columella, choose to lay their dung on the upper ground rather than on the lower (or to dung the ridges rather than the furrows) because the rains will wash down the richer particles.

Quære, if ploughing in dung at stirring time may not be best, because of making the weeds grow, which are ploughed in at sowing the wheat.

Columella advises to plough in dung as soon as it is spread, that it's strength may not be exhausted by the power of the sun, and that the ground may be mellowed and enriched by thus lying mixed with it; therefore, adds he, you ought not to spread more dung than you can plough in a day[‡].

[†] Prudentes agricolæ etiam in aratis collem magis quam vallem stercorant, quia pluvizæ semper omnem pinguiorem materiam in ima deducunt. Columella, lib. 2. ch. 18.

[‡] Disiectum protinus fimum inarari, et obrui convenit, ne solis habitus vires amittat, et ut permixta humus prædicto alimento pinguescat; itaque, cum in agro disponentur acervi stercoris, non debet major modus eorum dissipari, quam quem bubulci eodem die possint obverere. Columella, lib. 8. fo. 100.

METHOD of manuring different LANDS.

Of dung-
ed land in
a wet year.

§. 54. Dunged land, in a wet year, bears the worst corn, especially if it be low stiff land; for dung then holdeth the moisture, and the ground, being then wet withal, commonly doth produce a great many weeds, which can digest the spirit of the earth and water better than the corn can, because they grow much quicker. Cook, fo. 31.

Of dung-
ing land
that is
hard
ploughed.

§. 55. Ground hard ploughed is apt to run to weeds, and dunging it, or folding on it early will make it more subject so to do; for that will promote and forward the natural produce of the ground.

The best
ground
ought to
be most
and prin-
cipally im-
proved.

§. 56. When we go on the improvements of land by dung, fold, or other manures, it ought first to be considered, what return we expect of profit; upon which consideration, I think, the gentleman, who undertakes the management of his own land, ought first to apply his manures in improvements to his clay-arable and mixt-arable; because the same expence shall double the value of such lands, and thereby render an acre of 10s. per ann. to be worth 20 s.—Whereas the same expence on poor white land, or poor sandy land, &c. of perhaps no more than 1 s. per acre, though it augments the value of the acre four times, is an improvement but of 4s. per acre per ann. and then the improvements on such poor lands are not so lasting. 'Tis true however, there is one sort of manure always to be applied to white, sandy, or poor light lands from the first entrance into husbandry, which is your marles and strong earths, from whencesoever they are removed. From hence it may be inferred, that those do not best, who, when they build farm-houses, choose the situation on the most barren parts; for, if their grounds be healthy, and not worth above 10 s. per acre per ann. 'tis more profitable to have the situation of a farm there.

Land that is worth 5 s. per acre, and land that is worth 10 s. per acre, and land that will bear two quarters per acre, and land that will bear four quarters per acre, do differ vastly in proportion of value; for, whereas the land that is worth 10 s. per acre is only double the value of that which is worth 5, the land that will bear four quarters may very well be worth ten times the value of the land that will bear but two quarters; because the price of feeding, dunging, folding, sowing, ploughing, weeding, mowing or reaping, &c. of the four quarters per acre barley is no more than of the two quarters per acre barley.

§. 57. Palladius tells us, that a wet soil requires more dung than a dry one ^{Wet ground to be dunged more than dry.}

§. 58. Monsieur de Quinteny's observation, abridged by London and Wise, fo. 29, is as follows, viz. Since the great defects of earth are too much moisture, coldness, and heaviness, as also lightness, and an inclination to parching, so amongst dungs some are fat and cooling, as the dung of oxen and cows; others hot and light, as sheep, horses, and pigeons-dung: and whereas the remedy must have virtues contrary to the distemper it is to cure; therefore hot and dry dungs must be used in cold, moist, heavy earths, and open and loose dung, in lean, dry, light earths, to make them fatter and closer. ^{Of suiting your dung to your soil.}

§. 59. If you lay dung on a sandy or rocky ground, where it will be weeping away, the oftener, and less at a time you lay, so much the better; for if one lay treble the quantity, it will as soon pass through as a less quantity. ^{Dung on sandy ground, how to be laid on.}

§. 60. It seems to me, that he who sows whitish land to wheat, and dungs it, ought to dung it early in the year, and plough it in, that so the earth may have time to drink it up; for, if white land be dunged late, being of a dry nature, the wheat will have little goodness from it: I experienced this to my cost. ^{Time of dunging whitish land.}

§. 61. I had been to view a neighbouring farmer's black, moorish earth, which was truly of the nature of black heath: I asked him, what manure he found best for such land; he answered me, to fling pigeons-dung or malt-dust upon the surface of it; nay, said he, if I dung it, I fling dung upon it after 'tis sowed. And truly I think this is the best way to manage such land; for hereby the dung will be kept longest in the ground, which is too apt to run downwards, and to be lost in ploughing it in, and to wash away; and if such ground was never sowed but one crop at a time, and laid down to grass, and the goodness of the surface turned in, for a second crop, it would I believe be best; and if it was refreshed again by a sprinkling of pigeons-dung, whilst the crop is growing, it would not be amiss. ^{Manure for black, moorish land.}

§. 62. The wet spewy clays about Holt in Wiltshire (of which sort, as well as in other places, there are abundance) are observed by the most experienced persons in husbandry not to answer the designs of those who pretend to improve by dung; the reason of which I fully observed this spring; (anno 1707); for being here (at Holt) in the month of March, when the wind was very busy, every lugg square of the ground cleft many thousand ways, so that there was not a piece of earth to be seen, on which one might set the sole of one's foot, but it had large gapings in it. ^{Cause why wet spewy clays are not improved by dunging.}

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* Ager aquosus plus stercoreis quærit, siccus minus. Pallad. lib. 1. sect. 6.

The same also it suffers in the heat of summer ; from whence it is plain, that though these lands are of a strong clay, which generally pay for their manure the best, yet being in this case too obstinate, and clung so that they could not easily dry, without splitting just like green boards, the moisture of all manures must needs be washed down, when rains come, through many hiatuses, which in a most hungry manner seem to gape for the vital substance of the earth ; and so the soil is immediately carried down below the roots of all vegetables.

Whether to lay dung on the lay-land or fallows. §. 63. Discourfing with several farmers about the best way to lay dung on the ground, whether on the lay-land or fallows, they seemed in general to agree, that the best husbandry was to lay it on the wheat-fallows, and then to stir it lightly in, if the land be strong lay-ground ; for if it be laid on the lay, and then ploughed in, it will be apt to break up so deep, and thereby the dung be so covered, that it will hardly turn up in the other stirrings afterwards.

When to dung meadows. §. 64. I found by experience this year (1701) that the earlier dung, or especially pond-mud, and coal-ashes, are laid on the meads, so that they may be washed in, the better the grass may be mowed.

Benefit of dunging them. §. 65. To dung meadows and make them very rich in our hill country, is excellent husbandry, not only for the greater quantity of hay they produce, but because thereby they yield a good bite of grass at lambing-time, which is to be valued according to the occasion, and with which we cannot be supplied for money : the after-mass also, which is much the greater, for it lessens the consumption of corn by horses, and makes a halt cow fat, with neither of which one can be supplied but at unreasonable rates.

When to dung them. §. 66. In March this year (1706) I folded at lambing-time part of a mead, and fed the whole mead that year ; but both cows and horses neglected that part that had been folded, and suffered it to grow up to great rankness ; whereas the other part of the mead, especially the sideling piece, which had ashes laid on it in the winter, they eat very bare ; by which I do infer, all sorts of dung ought to be laid on in October, that the heat of them may be wasted by spring, and not taint the juices of the grass, and that ashes make the sweeter grass.

Straw, lay it on the meadows in winter. §. 67. I had farmer Biggs, Bachelour, and Crap, three excellent farmers, with me.—In our discourse about the improvement of meadows, they all allowed of the bringing straw thereon in the winter, for the worms to draw it in, to be very exceeding good husbandry ; and farmer Bachelour said, he knew of nothing better than old thatch so drawn in upon meadows.

Dung for barley land. §. 68. I believe that fine mortar-earth or mixed mold, which is excellent good soil for barley, carries the finest barley for being dung'd ;

dung'd ; for the dung mends the deficiency of such ground, which is inclinable to be too poor ; but I do believe, on coarse clay-land, whereon the barley runs naturally coarse, dung rather makes it the coarser ; for the infirmity of such ground is to be too rank, and coarse, and is still coarser for the dung.

§. 69. They never dung oats nor barley in Hants. In the hill-country oats do well without dung, and barley has the strength of the dung sufficiently after the wheaten crop.

Oats and barley not dunged in the hill-country. Of dunging lynchets. * Mold.

§. 70. I was telling an experienced farmer, that I had ploughed down the lynchet of a certain acre ; and that my bailiff foretold me, I should have the poorest wheat on that lynchet ; which I wondered at, in regard of the richness of the ground ; his reason was, that the harrows would draw down all the good * grete on the half lugg-lands-breadth below. The farmer said, 'twas very true, that in about three years ploughing 'twould be so, but not in one year, as he knew by experience ; therefore the brows of the lynchets are to be well dunged. This argues, to dung a lynchet you must lay the heaps above it.

§. 71. Though I approve not of dunging French grass, nor clover, for reasons given in another place, yet it is proper to dung rye-grass ; for thereby the roots of it will tillow and mat more on the ground, and will consequently occasion the greater destruction and suppression of the couch-grass.

Of dunging rye-grass.

Of CHALK and chalking LANDS.

§. 72. Pliny tells of the custom of the Britons to chalk their lands to great improvement, which, he says, lasted their lives. lib. 17. c. 8.

§. 73. It is said in general, that chalking is better for the father than the son ; however, others agree, it is as good an improvement for twenty years as dung ; and that the clay-land has been always the better for it.

Different opinions about chalking.

§. 74. Farmer Farthing, farmer Wey, and divers others of the Isle of Wight, all agree, that chalk should not be ploughed in too deep, but kept above ground as long as possible ; for it would be apt enough of itself to sink down and be buried ; on which farmer Farthing took occasion to say, that Col. Flemming, in moving and grubbing up wood, had to his knowledge found whole beds of chalk, an half spit thick, half a yard or near a yard deep in the ground, which, without doubt, was nothing else but the chalk laid in the ground before it was made coppice ; for the chalk was of that nature, that it would sink downwards till it became a bed of chalk : to this they all agreed, but seemed to talk of it, as if it sunk in whole bits and pieces ; but I told them, the truth of the case could be no other than this ;

Chalk not to be ploughed in deep.

this; the rain washed continually the chalk off by a white water, the sediment of which, when it came to the clay, there settled, and became a vein or bed of chalk, and then settled into a solid body; but in that solid body it never did sink, for that was impossible: chalk, however, by being ploughed in, without giving it time to waste, may perhaps be turned down and buried too deep, and being laid at the bottom of the furrow may not be ploughed up again.

How
chalk im-
proves
land.

§. 75. Chalk is not an improver to land in the same way as dung, which gives virtue to the land, and improves it by a fat, salt, nitrous quality, and by communicating to it the very principles of vegetation; but chalk is rather an improver to land, as it is a great sweetener to soil, but more especially as it opens the pores and particles of the land, and enables it to give up all its strength, even till it is a caput mortuum; so that chalk is not like dung, rich in its own nature, but only mellows the land, so as to loosen the parts, thereby enabling every particle of it to communicate its vegetative principle; for which reason, it is true, that land abused by over-ploughing after chalking, or ploughed as long as it would carry corn, will be laid down to grass in a poorer condition than land can be when only dunged; for it is almost impossible to draw out the goodness of such land, inasmuch as without chalk 'tis impossible to loosen its parts, and unlock every clot, to let its virtue fly out; so that, properly speaking, chalk is rather a midwife to deliver the land of its fruitfulness, than what gives the fruitful principles of vegetation to it.

Chalk im-
proves
most the
land that
lies far-
thest from
it.

§. 76. Chalk is commonly the greatest improvement of those lands that lie farthest from it; because the lands that lie near it, partake and have too much of the nature of the chalk in them: they commonly lay twelve or fourteen loads of chalk upon an acre, where they lay it single, which will upon some lands cause extraordinary crops of corn for fourteen or fifteen years together; and, where 'tis laid on grass-grounds, it will not so much increase the bulk of it, as it will make the grass sweet, so as to cause cattle to eat speedily, and cows to give thick milk. J. Mortimer, Esq; F. R. S. fo. 70.

In the Isle of Wight they sometimes lay twenty-five waggon loads of chalk on an acre; their chalk is of a fat soapy kind, and they call it marle. The farmers in the hundreds of Essex bring their chalk as far as from Gravesend, but lay not so much on an acre by half as those in the Isle of Wight.

Chalk,
when to
be laid on
the
ground.

§. 77. If chalk be dug out of the pit, and lie a summer before it be scattered, it will be so hardened and dried, that it will not easily flat or dissolve; therefore it should be dug at the beginning of winter, and laid on the ground forthwith; it cannot however
be

be so well carried in winter, the days being short, and, being more fat and clammy at that season, you cannot load it so fast as in summer.

§. 78. Mr. Worlidge in his art of gardening, fo. 13, says, that Chalk, an you may deal with chalky-land as with clay-land, tho' in a mode- improve- rate way ; for chalky-land is naturally cold, and therefore requires ment to warm applications ; it is also sad, and will the better bear with hot light light composts, which is the reason that chalk is so great an im- land. prover of light, hot, and dry grounds, especially having suffered a calcination.

§. 79. If chalk be laid on clay, it will in time be lost, and the Chalk ground again return to it's clay ; and if clay be laid on chalk, in sinks thro' time the clay will be lost, and the ground return again to it's clay, and chalky substance. Many people think the land, on which the vice ver- other is laid for a manure, being predominant, converts the ma- fa. nure into it's own soil ; but I conceive in both cases the chalk and clay is filtrated through the land on which 'tis laid by time, and, being soluble by rains into small corpuscles, is washed through the land on which 'tis laid ; for neither of these manures is able to unite in it's finest corpuscles with the corpuscles of the land on which it is laid, so as to make so stri& an union and texture with it as the land doth with it's self, and is therefore liable to be born downwards with rains, till no sign of it be left.

§. 80. I was arguing with Dr. Heron how beneficial it was to Chalk on chalk meadows, even in the hill-country : he assured me, that meadows. some of the notable husbandmen of Woodhay in Hampshire had told him, 'twas a common practice with tenants, three or four years before they left their farms, to chalk their meadows ; whereby 'tis true they would for three or four years sling out a great crop of grafs, but then they would be much the worse for it ever after ; and this seems to carry some reason with it ; for the chalk so mellows and opens the pores of the meadow, that it enables the land to exhaust it's strength in all parts : for chalk does not carry so much fatness as dung does to the land 'tis laid on ; but it disposes the land to bear such crops by it's sweetness, and well disposing of, and correcting an ill quality the land had before : but still I see not that this is any objection to chalking of meadows, provided, whilst by virtue of the chalk they are bearing such burthens, you see they be refresh'd with dung.

Though chalk laid on meadows enables them to give a great Id. and on crop for three or four years, and will then impoverish them, yet pasture. I take it to hold quite contrary in pasture ; for the grafs being thereby so much sweetened and increased, keeps constantly so much the more stock, by which it is maintained always in the same vigor.

§. 81.

Chalk good for sandy and clay-land, and the reason.

§. 81. I do suppose that chalk laid on sandy, or woody-seary ground laid up for pasture, may wash, and sink in, and fill up the interstices, and thereby consolidate and mend the texture of such ground, and sweeten it, as it is a great alkali; and tho' by time most of the chalk may be washed downwards, so that the ground may lose the virtue, yet I do suppose the strength of the ground may still continue much the better, by reason that such manure having made the sward of the grass come thicker and sweeter, the good pasturage on both accounts enlarges the quantity, and betters the quality of dung the cattle leave on it, which in return maintains a better coat and surface to the ground: and as chalk fills up the vacuities of sandy, or wood-seary ground, so on the contrary, it insinuates it's particles into obstinate clay and strong land, and divides it, by making in a manner a scissure, thereby hollowing and mellowing it; so the two contrary extremes are cured by chalk.

Chalk improves hop-clover and rye-grass.

§. 82. Chalk laid on hop-clover and rye-grass is a mighty sweetner, and improver of those grasses, being laid upon it after harvest, at the beginning of winter, or whensoever one can best tend it; it will quickly shew the benefit, especially if the ground be of a four clay, and apt to run to coarse grass.

Of LIME and liming LANDS.

§. 83. All sorts of flints will make an extraordinary lime, but they are hard to burn except in a reverberatory kiln, because they are apt to run to glass. Mortimer, fo. 70.

Of a lime-kiln and burning lime in Leicester-shire.

§. 84. December 9th 1699, I went to Gracedieu, and discours'd with the person who rents the lime-kilns of Sir Ambrose Phillippis; and, two or three of his workmen being present, I with them took the measures of the kilns, which was $2\frac{1}{2}$ yards high from the very bottom to the top, one yard lengthwise in the bottom, and two feet wide: they told me, that I must take care not to widen it too much at top, not exceeding two yards, by reason of the greater consumption of coals; for the more gradual the widening is, the better: there was a layer of bricks run within side of the kiln, a-cross, between the two vent-holes where they draw out the lime, for the better support of the lime from tumbling down too soon. They burnt with culm, or coal-slack, which they accounted as well, or better than the other coal, and costs but 1 s. per load, whereas the fine coal would cost 6 s.—The kiln had five air-holes, two on each side of the bottom, and two on each side of the top, and one in the middle, of about a brick thickness wide; the stone is very hard, and they said, three quarters of coal would only burn seven or eight quarters of lime; the larger the kiln the more profitable. There was

was a stone that laid the length of the kiln to keep up the walls from falling: the wall of the kiln against the bank was but the thickness of a brick, but the opposite side a brick length in thickness. This kiln would burn twelve quarters of lime in twenty-four hours.

Farmer Farthing, (of the Isle of Wight) when I view'd his lime-kiln, told me, I must not set up a kill to burn above eighty quarters at a time; he burns but sixty; that the kiln must be made to belly like a stone-mug, that the flame may be beat down by the narrowness of the top, and check'd from flying out too fast. The kiln will be two days and two nights burning. The chalk must be arch'd over the fire like an oven, and carefully laid, lest it tumble in.—In his kiln, to burn sixty quarters, he used to consume two hundred furze-faggots; but now, as a great improvement in the price of liming, he uses peat in heating the kiln, and furze-faggots afterwards, and can heat his kiln with two thousand of peat, and burn it off to lime with five hundred furze-faggots. Of their country peat, he says, one may bring a thousand in a waggon. Note, the design of the peat (being a slack fire) is only to dry the marle or chalk by degrees, in order for the furze-faggots to burn it off to lime; for if the fire be not slack and gentle, the chalk or marle drying too fast will fly, and the arch with the chalk fall down; therefore when they used all furze-faggots, and no peat, he used not to put the furzes at first into the oven of the kiln, because the fire would then be too fierce, but only put the ends lighted to the mouth of the oven, and slack'd the fire as he saw occasion, by it's beginning to fly, which was a great trouble, and made a great waste of the furzes, whereas the peat is all put into the oven. When the kiln is fit for the furzes to be lighted, one may try by seeing whether the marle or chalk will bear their blazing without flying, and, when the furzes are set on fire, one may know when the lime is thoroughly made by the flame issuing out at top; for the flame will break out of the kiln for three or four hours red; but when the topmost chalk is lime (and then of course the undermost is so) the flame will be pale, like the flame of a candle. He thinks what I make lime of, being chalk, and not a chalky marle, as theirs is, may be perfected with less fuel than theirs, which is of a moist nature.—As soon as ever it is burnt he carries it out, and, when it is slack'd, spreads it. It must be carried out, tho' never so wet, otherwise it will give with wet weather, and run together to a plaister, that it cannot be dug up without great difficulty with mattocks; this must be done, tho' it is very troublesome to remove it in wet weather; for it will burn the mens hands, and blister them. He lays a bushel and half on a lugg-square, which is about thirty quarters on an acre. It must be spread the first

Id. in the
Isle of
Wight.

first still day, as soon as slack'd, and very carefully, for in the true spreading of it is a great advantage, and stirr'd shallow in.—Two men must attend the burning, who have each 12 d. per day, and 12 d. per night, and victuals :—the man who lays the chalk in has 2 s. 6 d. for doing it.—*Quære*, If bean-stalks well dry'd may not make a fire almost as good as furze.—I was afterwards telling Mr. Thomas Beach in Wilts, that I thought the way of burning lime with peat was not practicable with them, because they made it of a hard stone, which the peat could not work on : but he said, he was of another opinion ; for in the north, he knew very well, they burnt the iron-ore, and melted it with peat ; therefore he was sure, 'twould be a fire strong enough to burn the lime-stone.—Four or five hundred faggots less will burn a kiln, where the chalk is dry ; therefore it is of consequence to have your chalk dug a week before, that it may dry.

Lime to be ploughed in as soon as flatted.

§. 85. Morris, my tenant in the Isle of Wight, and brick-burner, who came to burn lime for me, assures me, that in the island they have tried all sorts of ways of burning lime, and using it ; and that by experience they have found it the better way, when they have covered the heaps of lime with earth, to plough it in, and spurn or spread it immediately as soon as it is flatted fit for spurning, rather than to let it lie long covered with the earth in heaps ; and that the best way of all, they have found, is, not to carry it out into the field till the third earth that they plough for sowing their wheat, and then on the first flating they have spurned it ; and tho' the ploughing-in in such case has burnt the hair off their horses heels, yet it has not hurt the wheat, but they have then had the best wheat.—*Note*, I do judge the letting the lime lie in heaps, mixt with heaps of earth, for a long time, in Somersetshire, &c. is because the fallows will not work fine enough without being long exposed to the sun, and, if so, the lime would not be well dispersed, to the great disadvantage of the ground ; but, in lands working mellow, I am of Morris's opinion.

Sign of good lime

§. 86. I burnt a kiln of lime to a greater degree than ordinary, so that the bricks were all glazed, and in making and wetting up the lime I particularly observed the water, as soon as flung on, to boil and dance more than ordinary, and the lime to heave more, and in bulk the mortar (tho' the content of lime in bushels was the same) was much bigger : I observed it to the masons, who seemed much pleased with the goodness of the lime.—On which one of the labourers observed, that the case of lime was the same as of bread-corn ; for as the drier the wheat is, the flour of such corn takes up the more water, and plimbs the more, and makes more bread in bulk, both lighter and hollower, (whereas the flour of cold damp wheat heaves not with the water, drinks little water, and makes heavy bread) so my lime, being higher burnt,

burnt, took more water, plimb'd into a greater bulk, and would be mellow and lighter under the trowel ; and so all the mafons agreed.

§. 87. When I told a gentleman, used to lime burning in Wiltshire, that in the Isle of Wight they used to burn off a kiln of eighty quarters of lime at a time, he wondered at it ; saying, how could they be assured to get it out before a rain came, for I, that burn but a little, am forced to get a cover to keep out the rain, lest the lime when made should by a rain fall into plaister.

§. 88. Slack-lime cannot be so beneficially laid on land as stone-lime; because a greater virtue must be attributed to the stone-lime for it's burning quality after it is laid on. Stone lime the best.

§. 89. Lime being laid on meadows or pastures slacks and cools by slow degrees, so as not to undergo such a heat and fermentation, as when it is covered with the hillocks of earth flung up in arable ; therefore it cannot be of that great advantage to pasture. Lime not so good for meadow and pasture as for arable.

§. 90. Worlidge says, fo. 242. A mixture of lime is very good in most grounds ; but the salt of limes extracted by water, and your ground watered therewith, is much to be preferred : it hath also this singular property, that it makes the worms soon leave the place so watered. Salt of lime extracted by water commend- ed.

§. 91. In Wiltshire they lay twenty-four or thirty quarters of lime on an acre, as the ground is.—But at Winterhays, and thereabouts in Dorsetshire, they never lay above twenty hogsheads on an acre, every hoghead is four bushels.—The lighter the land is the more lime it will require, the stronger the less. Quantity of lime on an acre.

§. 92. In Leicestershire they sow or scatter the lime on wheat-land when they sow the wheat, but on barley-land the last earth save one ; and so plough it in, lest, if they should sow it with the barley in the spring, it might burn it. They lay five quarters on an acre of each, according to the measure as it comes from the kiln, for after it is slack'd those five quarters will near make ten. When to scatter lime on wheat and barley, and what quantity.

§. 93. Liming of land being to bind it, it seems to me, land should not be limed late in the year, no more than building should go on then ; because, the land being then cold and moist, and but a weak sun to consolidate it, the end of liming is lost ; for if it consolidate not at first liming, it will not afterwards. Time of liming land.

§. 94. Farmer Wey and others say, in the Isle of Wight they have a practice (which is the easiest way, in case a bushel of lime be laid in a lugg-square) when a bushel of lime is laid down, and the cart going, to tie a piece of leather to the spoke, and when that goes just round, it measures a lugg ; for the compass of a cart wheel is a lugg, that is sixteen feet and a half : and, if

D

you

you would lay it in a lugg and half, you may manage it accordingly.

Price of liming.

§. 95. Mr. Taunton of Dorsetshire, in form of a bill for work, gave me the following account of the method and prices of liming; (the prices I think extravagant) viz. For covering an acre of lime, 1 s. 8 d.—Covering is when the lime is first laid on the land, it may be a peck in a place, and so covered over with earth.—For turning an acre of lime, 2 s. 6 d.—Turning is mixing the earth and lime together.—For spurning an acre of lime, 2 s. 8 d.—Spurning is throwing it abroad on the earth just before sowed.—For hacking an acre of lime, 1 s. 6 d.—Hacking is breaking the clots abroad after 'tis sown.—For shoveling the furrows of an acre of lime, 8 d.—Shoveling is the cleansing the furrows, and throwing it on the land.—9 s. per acre.

Method of liming in Loughborough; he said, they laid on their grounds they laid up Leicester-shire.

§. 96. I ask'd Mr. Clerk about the method of liming about to grafs forty bushels per acre about the beginning of October, and on their arable lands the same measure; their way is, as the cart goes along the ground, to sling it over with shovels, and to spread it thin. It seems it has been very hurtful to their grafs-ground in rotting their sheep in wet years; for it has proved the grafs so fast, as to rot the sheep.—I supposed the lands were subject to rot before, or else the lime would not have subjected them to it; but Mr. Clerk said, no, that the lands were high up-land-downy grounds, never subject to the rot before; and that many men in that country had proved it to their sad experience; and, since they had found it, their way was to remove such sheep in a wet summer out of such grounds, and put others in. Note, the lime in this country is strong: Mr. Chestlin is of the same opinion.

Hurtful to their sheep

Mr. Chestlin of Leicestershire says, he pays but 12 d. per quarter for his stone-lime, and fetches it two miles; he lays fifty bushels on an acre, because his is colder moister land than his neighbours.—He says, as it binds sandy ground, so it meltows and flats cold and clay-land. He can with a dung-pot and two men shovel it on about an acre and half per day. He says, he has had a fill-horse's black coat burnt red with it; if it be wet weather when they spread it out of the dung-pots, they cover their horses with old hammock-cloths, and yet it will burn them very much.—Mr. Bowly says, he never lays above forty bushels on an acre, but that forty when slack'd will be near eighty; if it lies out in the weather any little time, to have the dews or a shower of rain, it will slack of itself, but if they fetch it and lay it on their grounds directly, then they slack it with water.—He thinks lime shews not it's full strength and power till the third crop. One may over-lime; for where the lime is laid in heaps in the field before spreading or spurning it, there will seldom grow any corn for a year

a year or two.—He says, they generally sow the lime on the ground, and then the wheat, and then turn it in under furrow; but in sowing it with barley, they generally sow it the last earth save one, and turn it in, and then give the last earth for sowing the barley; but, if they sow with a wheaten crop, and then lay down to grass, they sow the wheat on the plough'd land, and harrow it in, and then sow the lime, and harrow it in, in order to lay it down smooth to grass; for if they should harrow the lime in first, and sow their wheat, they would not in the second harrowing it be able to bury it, the ground would be so fine.

§. 97. A very understanding husbandman of Shropshire coming to me at Sir Ambrose Phillipps's, I ask'd him, whether his was as deep a country as Leicestershire; he said, it was. I asked him, if they used liming; he said, they did, and, on enquiry, I found the method in all respects agreed with the Leicestershire manner, saving that they laid dung and lime together, viz. about twenty load of dung, and but twenty bushels of lime on an acre. In the wheaten crop they ploughed in the dung the last fallow before sowing, and before the sowing the wheat sowed lime.—They fetched the lime fourteen miles on horses backs, because in their deep country the carts could not so well go; it was a stone-lime, not a chalk. He said, it cost at the kiln 3 d. per bushel, therefore with the carriage it must be very dear.

Method of liming in Shropshire.

§. 98. I deliver it as a rule to all husbandmen to be cautious of liming ground, and then ploughing out the heart of it. I limed some years ago in Wiltshire seven acres for an experiment, and laid down one acre to it's own natural grass in two years time, the grass of which is to this day worth 40 s. an acre. The third year I laid down another acre, which is to this day worth 30 s. per acre. The rest I ploughed five or six years farther, which is not worth fifteen groats per acre. The like experience I have had in burn-beaking ground.

Of over-ploughing after liming.

§. 99. Farmer Farthing, farmer Wey, and F. Loving of the Isle of Wight, told me, that if, after I fallowed, before I ploughed my lime in, I dragg'd or harrow'd the ground fine, the lime would mix much the better with the earth, and it would answer that charge very well.

Of harrowing the ground fine before liming.

§. 100. If we try the experiment, we shall soon find it very visible, that lime agrees with sandy ground by it's binding quality; and the like observation may be taken from the mortar commonly made of these two ingredients.

Lime good for sandy-ground.

* Of liming from Mr. Duhamel, a French author. Vol. 3d. edit. 1754. P. 48 to 57.

OF BURN-BEAKING.

Not to §. 101. Worlidge, fo. 234, says—In the burn-beaking of over-burn land the rustic observes, that over-burning the turf is injurious, the turf. and that a more moderate burning makes the ground more fertile.

The

Lime is used chiefly on fresh broke up lands ; after having ploughed them up not very deep, they lay on the lime in the manner following.

They carry on the lime as it comes from the kiln ; and lay about one hundred pound weight in a heap on every square perch ; so that the heaps lie at a perch distance one from another ; then they raise the earth all round the heaps in form of so many basins ; the earth that forms the sides of these basins should be a foot thick ; and lastly, they cover the heaps, half a foot thick, with earth, in form of a dome. The lime slacks under this covering of earth, and is reduced to powder ; but then it increases in bulk, and cracks the covering of earth ; if you do not carefully stop these cracks, the rain will insinuate itself, and reduce the lime into a paste which will not mix well with the earth, or make a sort of mortar, which will not answer the end proposed. The farmers therefore are very careful to examine the heaps from time to time and stop the cracks : some only press the top of the heaps with the back of a shovel ; but this practice is subject to an inconvenience, for if the lime is in a paste within the heap, by this means you beat it so together that it will not easily mix with the earth ; wherefore it is better to stop the chinks by throwing some fresh earth over the heap.

When the lime is thoroughly slack'd, and reduced to powder, they cut the heaps with a shovel, and mix the lime as well as possible with the earth that covered it, and then having thrown it up in heaps again, leave it exposed to the air for six weeks or two months ; for then the rain will do no harm.

About the month of June they spread this mixture of lime and earth upon the land ; but not all over as may happen ; on the contrary they take it up by shovelfulls, and distribute it in little heaps at equal distances on each perch of land : they observe that these little heaps promote vegetation more than if it was spread uniformly all over the field, and they don't mind leaving little intervals unlimed between each shovelfull. Afterwards they plough the field, for the last time, very deep : then towards the end of June they sow buck-wheat, and cover it with the harrow, and if any heaps remain break them with a hoe.

Buck-wheat occupies the land about one hundred days ; so that this grain sown about the end of June is gathered about the end of September.

When the stalks and roots of this plant are dead and dried, they plough it up, and immediately sow wheat and cover it with the harrow.

About the month of July or August, after the wheat crop, they plough as soon as possible ; they plough for the last time in February or

March

The reason is plain ; for in the burning any vegetable, a gentle, easy, and smothering fire doth not waste the volatile nitrous spirit so much as a quick fire would do, and causeth more of it to fix and remain behind.

§. 102. Where much long moss grows thick, tho' the ground be never so sandy in it's nature, yet the ground underneath must be of a most cold and sour nature by being kept from the sun, and the wet more fogging in it than if it had been solid earth upon it ; for nothing retains water longer than such a spongy body, nor breaks the rays of the sun more from penetrating. Therefore such ground ought to be burn-beak'd, or the moss harrowed up before seeding, and burnt in heaps, but rather burn-beak'd to destroy the seeds.

§. 103. Quære, in burn-beak'd ground what weeds or plants appear the first year, because, according to Mr. Bobart of the physick garden at Oxford, their seeds are destroyed ; only some few may be supposed to have lain deeper than the fire went into the earth :

P L O U G H

March in order to sow oats, or in April for barley, but in this case they stir the land two or three times to make it fine.

They harrow in all these different grains, and when they are come up they pass a roller over the oats, and if there remain any clods in the barley they break them with a hoe.

The next February or March they sow grey peas or vetches.

After the harvest of these pulse, they give one or two ploughings to prepare the land for wheat the ensuing autumn.

The year after they sow oats mixt with clover, and then lay it down to pasture for three or four years.

In some new broke up lands they sow no buck-wheat, but let it lie fallow from the month of March when it was first broke up, till October, when they sow it with wheat ; making use of the intermediate time to give it several ploughings ; these lands by this means being much finer, they use little more than three fourths of the quantity of lime above prescribed, and generally have a better crop than when they begin with buck-wheat.

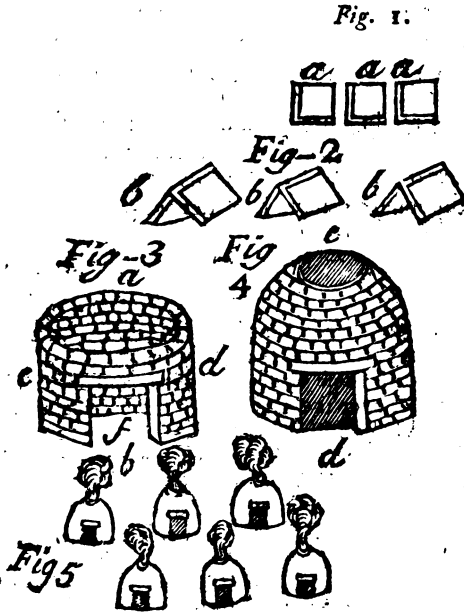
Some farmers think a perch too great a distance for the convenience of spreading the lime ; therefore they make the heaps less, and increase the number in proportion. Being persuaded that lime is most efficacious when near the surface, they first plough it in, and then give it a second ploughing before they sow, by which means the lime lies chiefly near the surface.

Others lay the lime in a ridge from one end of the field to the other ; this disposition is the least trouble to spread.

The following is an extract from Mr. Du Hamel's account of burn-beaking in France, which I have here inserted, hoping it might be of use to the reader.

PLOUGH and CART-TACKLE.

Of different kinds of ploughs. 1. **M**R. Baily (who had many times set his own hand to the plough, and got 200l. per annum, from a small beginning by it) and I were talking about the different varieties of ploughs



OF BURN-BEAKING.

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83.

With regard to lands which are ploughed up but once in eight or ten years, it is the custom to burn them, to the end that the fire may divide the particles of the earth, and that it may be fertilised by the ashes of the roots and leaves. This is the method of the operation.

They raise the surface with a hoe or crooked pickax, the iron of which is very broad and thin, cutting each turf as regular as possible in the form (a. a. a. fig. 1.) about eight or ten inches square, and two or three inches thick.

As soon as these turfs are cut, they employ women to pile them one against another, with the grass side inward in the manner (b. b. b. fig. 2.)

When the weather is fine, the air will dry them, in a couple of days, sufficiently for making the furnaces and burning them; but, if it should prove rainy, you must be careful to turn the turfs, for they must be well dry'd, before you make the furnaces, of which we are going to speak.

In

ploughs in different countries, and I asked him, wherein he thought a two-wheel plough had the advantage of a foot plough, or a plough without wheels. He said, he knew of no other use of a two-wheel plough, but that the ploughman could keep it more steady in stony lands, so that every jolt should not fling it out

In forming the furnaces, they begin by raising a sort of cylindric tower (a. b.) of * *one foot* diameter (c. d. fig. 3.) as the walls of this little tower are made of the turfs, their size determines the thickness; but in building them they always lay the grafs downwards, and they make a door on the windward side, of a foot wide.

On the top of this door they lay a large piece of wood, which serves as a lin:el. Then they fill all the inside with small dry wood mixt with straw; and finish the furnace by making a vault of the same turfs, like the top of an oven.

Before the vault is entirely finish'd, they light the wood that fills the furnace; then they quickly shut the door (d.) with turfs, and finish by stopping the opening (e. fig. 4.) which was left at the top of the vault; taking care to lay turfs on all the places where the smoke comes out too plentifully, exactly as the charcoal-makers do; for without that precaution, the wood will consume too fast, and the earth be not sufficiently burnt.

If you cover the furnaces with earth, all the crevices being too closely stop'd, the fire will be extinguish'd; but, as you use only turfs, and always put the grafs downward, there is air enough to keep the fire burning.

When all the furnaces are made, the field seems covered with little hay-cocks ranged in quincunxes (fig. 5.) but you must watch the furnaces till the earth is red hot; to stop with turfs any cracks that may happen; to repair such as may be in danger of falling, and to light again such as may be extinguish'd. When the earth seems all on fire they want no further care; even rain itself, tho' before much to be feared, will not hinder their being sufficiently burnt; so you have nothing more to do but to let them go out of themselves.

An the end of twenty-four or twenty-eight hours, when the fire is extinct, all the heaps are reduced to powder, except some of the tops which will remain not sufficiently burnt, they not being enough exposed to the action of the fire; and 'tis for this reason that we advise not to make the furnaces too big, because the walls being proportionably thick, the turfs on the outside will not be done enough, when the inside is over-done; for if you burn them like bricks it will not be fit for vegetation. Besides, in making large furnaces you will have too far to carry the turfs. You might even make them less; but that would consume too much wood: thus you will find it necessary to conform pretty near to the proportions we have prescribed.

* This must be a mistake, I suppose three or four feet may be a convenient size, as may be judged from the figure.

out of it's work ; for it stands to reason that the wheels cannot be so easily jostled off, as the plough might be without wheels ; for the outward wheel goes in a seam, and is kept in by the whole land ; for the same reason, in hill-country-lands, where one ploughs along the side of a hill, any jolt would be apt to lift a plough without wheels out of it's furrow towards the declivious ground.—I asked him, wherein he conceived the advantage of a plough with one wheel to consist : he said, in the same points as the former ; he knew of no other reason for using them.

Of pro-
scission.

§. 2. In the Isle of Harries, &c. the way of tillage is commonly by ploughing, and sometimes by digging ; the ordinary plough is drawn by four horses ; and they have a little plough there commonly called a ristle, i. e. a thing that cleaves, the coulter of which is in form of a sickle : it is drawn sometimes by one, and sometimes by two horses, according as the ground is : the design of this plough is to draw a deep line in the ground, to make it more easy for the great plough to follow, which otherwise would be much retarded by the strong roots of bent lying deep

When the surfaces are cooled, they wait till it rains, and then spread the burnt earth as even as possible, leaving none on the spots where the furnaces stood, which nevertheless will produce finer grain than the rest of the field, for which reason they leave only such turfs as are not burnt enough on those spots.

They immediately plough it very lightly, to begin to mix the burnt earth with the surface ; but they go deeper in the following ploughings.

If you can give the first ploughing in June, and rain follows, it is possible to reap some advantage from the land immediately, by sowing turnips, radishes, or millet ; which will not prevent your sowing wheat or rye the autumn following.

Nevertheless it is better to lose the advantage of such a first crop, that you may have the whole time to prepare the land well for the reception of wheat.

Some choose to sow rye rather than wheat, because the first production being very vigorous, wheat is more apt to be laid than rye.

Some do not spread the burnt earth till just before the last ploughing for wheat ; they content themselves with ploughing well between the furnaces, which they take care to set exactly in a line, in order to leave a free passage for the plough. But this is a bad method ; for, since wheat is always apt to be laid the first year after burning, it is better to spread the burnt earth early, before it loses part of it's heat, and for the convenience of well preparing the land ; for it is very material that the burnt earth should be perfectly well mixt with the soil.

It must be owned that this method of burning is very expensive, because the labour must be performed by men, and that it consumes a great deal of wood ; but it is very advantageous, for, after this single operation, the land is better prepared than it would be by many ploughings.

deep in the ground, that are cut by the little plough: the little plough is used also to facilitate digging as well as ploughing. Martin, fo. 54.—This was also a common method used amongst the Romans, where the soil would allow of it. But it seems not practicable in stony and flinty lands, but without doubt in deep lands is good husbandry, and enables the plough-man to turn up the fallows in an exact and beautiful manner: I wonder these barbarous Islands should have it in use, and not we in England.^a The Romans in rich ground, that was apt to detain the wet, used this cutting plough, or what they called proscission, in spring, after the weeds were all come up, and before the seeds were ripened.

§. 3. I find in Leicestershire they use Danish iron in all plough-Of the tackle and horse-shoes, except the coulter and the plough-shares, sorts of which are English iron. They hold the Danish iron to be more iron used durable, and tougher than the English iron, which they cannot in plough-work so well, as being much brittler, and wearing faster: they tackle. can in Leicestershire afford the Danish as cheap as the English iron.—I asked the Loughborough smith, if Danish iron would make wheel-tire, he said care must be taken that the smith puts not in iron rank with steel, for then 'twill break presently; but by breaking a bar before 'tis used the smith will know it.

§. 4. It is much the interest of a gentleman to agree with the Agree smith for his plough-irons by the great; for it is impossible such a with the person should watch his servants, so as to see that they sent to the smith by smith such shares and coulters only; as were worn out, or to the great. take an account how often; whereas servants are apt before there is occasion, or the irons are worn out, consulting their own and their horses ease, to send them to the smith, who sets down the same price as if the irons had been quite worn out: so that if servants and smith be left to themselves, irons shall come again no better than they were when they were sent.

§. 5. The better order you keep your irons in, the easier it is On keep- to the man that holds the full, and the easier to the horses that ing the plough: the longer the point of your share is, the more steady irons in does it go, and carries an even furrow. order.

§. 6. I take care to have a spare coulters and share always by Of keep- me, which is in readiness, whilst the worn-out one might be sent ing a spare to the smith to be new pointed; and this I do, because I expect coulters the and share.

^a See Pliny fo. 294, 295.—Pallad. fo. 94 to 98.—Varro, book 1st, fo. 37. Of proscission.

^b Pingues campi, qui diutius continent aquam, proscindendi sunt anni tempore jam incalescente, cum omnes herbas ediderint, neque adhuc earum semina maturuerint. Columella, lib. 2. fo. 99.—Of several new invented ploughs and their construction. See Mr. Tull's book of horse-hoeing husbandry.

the smith himself, and not his man, should have the pointing of it; for I depend on him for the well hardening it, which could not be, if I sent the worn-out one over night to have it the next morning; I must then take who could be found, either master or man. Add also, that such coulters will be much the harder for lying by two or three days before used.

Old iron bands on new wheels ill husbandry. Of making the bands to wheels.

§. 7. To put old iron bands on new wheels is very ill husbandry, for the wood must necessarily wear out presently, the iron not being broad enough to save it.

§. 8. An old Nottingham smith told me, it was much the durablest way to turn up the edges of the bands to wheels, which adds to the thickness of the edgings, and is the main security to the bands; for in the edgings they wear away first; but, for their own interest, wheel-wrights will pretend there is no advantage in it; yet where the edgings are not turned up, in the using the edges shall be worn away, and the fillies so worn, that the spokes shall be ready to start out of their sockets, when the timber in other respects shall be very sound. The smith said, the making them so was a penny in a stone difference to him.

Split ash good to make fillies.

§. 9. Note, for fillies, ash that will split is with us thought fittest, and much the strongest; but the arms of an ash-tree are commonly put in, if they be not too frowe, and they must be saw'd, and the body of an ash likewise, if it be knotty; because, that will not split; yet, because such fillies are saw'd cross the grain, they are not like to be durable.

Elm good for fillies.

§. 10. Farmers Farthing, Wey, and Loving, of the Isle of Wight, all assure me, that elm fillies are best for wheels, especially in deep ways, where the waggon sways, and only such they use in the Isle of Wight; for they will not crack with the nails being drove into them, as the ashen will; but we at Crux-Easton, &c. use only ashen ones; but I suppose the reason is, because elm grows not in the hill-country, and I the rather think so, because below the hill, where elm grows, they all use elm fillies.

Of boarding waggons.

§. 11. If the farmers boarded their waggons in Hampshire, as they do in Hertfordshire, the price of the boards would be gained in one harvest by saving the droppings of the corn.

Of tying on the side boards of waggons.

§. 12. It is found by experience, that tying the side-boards to the raths of the waggon with leather thongs greased, is much better and more lasting than nailing them, because the heads of the nails are continually breaking out by the shaking of the waggon, &c.

Of housing waggons.

§. 13. It is a vast damage waggons receive in winter by lying abroad: when they are wet the frost cracks the wood.

Of harness and the cheapest way of making it.

§. 14. Every body grows weary of chequer-harness; for tho' it looks pretty at first, yet it soon flies to pieces: chequer-harness is that which is worked up with thongs.—The cheapest way is to work

work up the harness at ones own house ; the harness-maker has but 1 s. per day and diet, you finding the stuff ; in such case you must provide three or four bull-hides two or three years before, and put them out to dressing to the collar-maker ; the dressing commonly costs as much as the hide is worth, be it bigger or less ; when hides hold a pretty good price, a small bull's hide is worth 12 s. and it is common for the currier to dress one half for the other ; when these hides are dress'd they'll take no harm for four or five years if kept dry, as suppose laid on the ground under the beds that lie on it ; tho' it is said, that is rather too dry.—A bull's hide should never be used by the shoe-maker, nor a cow's hide by the collar-maker, there being a statute that provides in that case, tho' not strictly observed.—A careful and good farmer in my neighbourhood keeps bull-hides always by him, and uses them on all occasions about his harness in mending it, unless for sowing-thongs, and there, must be white leather, but otherwise the bull-hide is always best.—The common price for a horse-hide undrest is 5 s. and the dressing 5 s. If the eyes of the plough-traces are lined with leather, (which is good husbandry, to save them from fretting out) such lining costs no more than hempen traces.

The halters, and cruppers, and back-bands should be made of bull-hide, the belly-bands of heifer-hide, double-lined with horse-hide ; the fill-hangs of horse-hide, the rigg-rope of white leather, that is horse-hide ; the pipes of the back and the collars of the belly of bull-hide.—If the leather be not well tawed, that is, dress'd thoroughly with allum and salt, it will have a raw black seam run throughout, which, when it grows dry, will be hard and horny, and crack in bending ; whereas, what is dress'd kindly is like buff, soft, and one may blow thro' it. Few harness-makers, that are white tawers, understand how to dress their hides, but have them of the glovers or selmongers, and such can less answer for their goods. Such leather, as is white tawed, is never tann'd : of my set of harness only the pipes and collars pass'd through the tanner's hands. With good usage they may last a dozen years, and wet weather will not damage them, if well dress'd, and made according to the above directions ; but great care must be taken not to hang them against a plaister wall in the winter, that being the likeliest way to rot and spoil them.

§ 15. The smith, carpenter, wheel-wright, and harness-maker, may be said to be the landlords of those gentlemen who keep much husbandry in their hands.

PLOUGHING.

P L O U G H I N G.

Of pulve- § I. **T**HE antient writers on husbandry lay a very great stress
ration. on making the ground fine by frequent ploughings.

^a It is adviseable, says Pliny, in strong land, such as we generally have in Italy, to plough five earths, but in Tuscany nine earths; ^b and Virgil, adds he, is supposed to have prescribed four earths, or two summer and two winter ploughings, by the rule he lays down in his first Georgic.

Illa seges demum votis respondet avari
Agricolæ, bis quæ solem, bis frigora sensit.

^c It was the constant maxim indeed among the Roman farmers, that they could not give their ground too much tillage; and, if a field required harrowing after the seed was sown, it was a sign, with them, that such field had not been sufficiently ploughed. Land, say their authors, especially if it be of a rich nature, and that is apt to hold water, ought to be turned up so often, and reduced to so fine a powder, that the track of the plough-share may hardly be distinguishable in it; for by this method the roots of all weeds will be torn in pieces, and destroyed.

Among the moderns, Mr. Ray assigns several reasons for making land fine ^d and mellow before it is sown. It is beneficial, says he; that the nitrous particles of the air, which chiefly promote vegeta-

^a Spissius solum, sicut plerumque in Italia, quinto sulco melius feri est, in Tuscis verò nono. Plin.

^b Quarto feri sulco Virgilius existimatur voluisse, cum dixit optimam esse segetem, quæ bis solem, bis frigora sensisset. Plin.

^c Malè aratur arvum, quod satis frugibus occandum est; id demum rectè subactum erit, ubi non intelligetur utro vomer ierit. Plin.—Pinguës campi, qui diutius continent aquam tam frequentibus densisque sulcis arandi sunt, ut vix dignoscatur in utram partem vomer actus sit; quandoquidem sic omnes radices herbarum perruptæ necantur: sed et compluribus iterationibus sic resolvatur vevactum in pulverem, ut vel nullam, vel exiguam desideret occationem, cum seminaverimus; nam veteres Romani dixerunt malè subactum agrum, qui satis frugibus occandus sit. Columel. lib. 2. fol. 99.

^d Tum ut particulæ aeris nitrosæ, quibus præcipuè vegetatio promovetur, in terreni interstitia liberius et copiosius se insinuantes ibidem præcipitentur, et terreno adhærescant: quin et aquæ pluvix fortasse ad salium solutionem conducunt, quos secum unà in radicum poros convehunt: præterea in terra laxa et soluta aquæ promptius subsidunt, adeoque nec humore nimio radices suffocant, nec frigore corrumpunt: præterea terra laxa et soluta ad hoc conducit, ut aer copiosior radicum tracheas subeat, ad respirationis usum, quam plantis non minus necessariam esse quam animalibus ostendimus. Ray, fol. 33.

vegetation, may insinuate themselves more freely and in greater quantity thro' the cracks and interstices of the land, and there be precipitated and adhere to it ; perhaps the rain water also may be of use in dissolving those salts, which they carry with them into the pores of plants. Besides, the water sinks more easily thro' light loose earth, so that the roots are in less danger of being suffocated by too much moisture, or of being corrupted and killed by too much cold ; and there is this farther advantage in it, that by letting the air more plentifully into the air-vessels of the roots, it gives them a freer respiration, which we have already shewn is not less necessary to plants than animals.—Mr. Evelyn explodes those, who fancy the turning and ploughing land frequently in the winter, before it is employed for a crop, causes it to exhale, and spend the virtue it should retain, there being in truth no compost or lætation comparable to this continual motion : it evaporates the malignant halitus and impurities of the imprisoned air, laxing the parts, and giving easy deliverance to it's offspring. These *feminal* salts and rudiments, where-ever latent, are free to move and exert their virtue, when these chains and weights, which fetter and depress them, are taken off. He ascribes more benefit to often opening, stirring, and ventilating the earth, than to dunging.

But if to pulverize and grind the ground was the only end of ploughing, without any regard to the taking in the corporeal emanations of the sun, a frosty winter fallow would chasten the earth, and make it as fryable as a summer one ; but the difference is vastly great ; for the sun improves the earth more than dung does.—As fire in lime, or burn-beaking, raises and fixes the salts, so does the sun, which is a fire ; therefore the more you let the sun into the ground by ploughing, the greater the benefit.

In Asia and the hot countries their corn does not burn up, but is able to come out of the ground, which in England it would not do, if we had their hot weather. This seems to be owing to the mighty fineness to which their ground is reducible by the plough, they having such dry seasons for fallowings and stirrings, whereby their ground falls much closer than ours, and does not gape by the heat, but, by reason of its mellow parts, drinks in abundance of the dews, which our land less fryable, does not, and which dews, in great probability, fall more with them than with us.

§. 2. ° The method among the antients of ploughing from one tilt to another is laid down by Columella as follows : Lands that are inclined to be moist ought to be first broken up from about the middle

The order of fallowing among the antients.

° Uliginosi campi profcindi debent post idus mensis Aprilis ; quo tempore cum arati fuerint, diebus interpositis, circa solstitium, quod est nono

middle to the latter end of April, and, after this first ploughing, to lie still till towards the latter end of June, or about the time of the summer solstice, when they are to be ploughed a second time, and about the beginning of September they are to receive their third ploughing: but it is better to omit either or all these ploughings, than to turn up the ground, when it is wet and in mortar, or even when the upper part of it, after a long dry season, has been wetted by sudden small showers, which have not sunk deep into it; for, if you plough up the ground when in a wet and dawby condition, there will be no meddling with it again for the whole year, but it must lie useless; and if you plough it up when the surface only has been thus wetted, it will be barren for three years afterwards. The best season for ploughing is, when the ground is in a moderate temperament, neither very wet, nor very dry; for by too much moisture, as I said before, it will cling together, and be like mortar, and, after a long drought, tho' a little moistened at top, the plough-share will either not be able to penetrate it, and be continually thrown off by the hardness of the earth, or, if it should penetrate it, it will not make it fine, but turn it up in large clods, which will be a continual hindrance to you at it's next ploughing, and at last be left unbroken and in lumps on the field. Add to this, that even in rich soils the part that lies deepest is always the most barren.

Summer-fallowing, cause of the benefit of it.

§. 3. One great reason of a summer-fallowing's enriching all ground seems to me to be, because the steams and vapours of the earth, which lie beneath the turf and furrow ploughed up, are, in the summer-time, constantly exhaling upwards, which being stopp'd and retarded by the furrow, and lodged in the caverns, are, after evaporation of the watery parts, by the fire of the sun, digested into fixed salts; for the continuation of the channels or pores

nono vel octavo calendarum Juliarum, iteratos esse oportebit: ac deinde circa Septembris calendas tertiatos: sed quandocunque arabitur, observabimus, ne lutosus ager tractetur, neve exiguis nimbis semimadidus, quam terram rustici variam cariosamque appellant; ea est cum post longas siccitates levis pluvia superiorem partem glebarum madefacit, inferiorem non attingit; nam quando limosa versantur arva, toto anno desinunt posse tractari, nec sunt habilia sementi, aut occasioni, aut sationi: at rursus quæ varia subacta sunt, continuo triennio sterilitate afficiuntur, medium igitur temperamentum maxime sequamur in arandis agris, ut neque sacco careant, nec abundant uligine; quippe nimius humor, ut dixi, limosos, lutososque reddit, at qui siccitatibus aruerunt, expediri probe non possunt, nam vel respuitur duriâ soli dens aratri, vel siquâ parte, penetravit, non minute diffundit humum, sed vastos cespites convellit, quibus objacentibus impeditum arvom minus recte possit iterari: quo evenit ut in iteratione quoque scamna fiant. Accedit huc, quod omnis humus, quamvis lætissima, tamen inferiorem partem jejuniorum habet. Columella, lib. 2. fol. 99.

pores of perspiration being broken by the furrow turned down, the effluvioms are stopped, and fix, as against a cieling of a vault.

I summer-fallowed the one half of a field in May and June for wheat; the other half I ploughed in September for winter vetches: the winter after I could observe the half sowed to vetches very much over-run with geranium columbinum, but the wheaten part had not the tenth part of that weed, notwithstanding it's having been dunged for wheat. So much is owing to a summer-fallow, which destroys the weeds before seeding-time, whereas in the vetch ground the weeds had seeded before it was ploughed. That winter vetches prepare the earth for a barley-crop next year, is very much to be imputed to the summer-fallow such ground may be supposed to have received the year the vetches were sown in it; and the dominion the vetches get over the weeds the following summer, by killing them, lays open the bare earth to the sun the second summer also, which in a manner answers to two summer-fallows.

It seems to me no small regard ought to be had to keep cold clay-ground from running out of tilt, in respect that when it is so, the natural grass so matts it, and it is so clung with the roots thereof, that the sun cannot easily penetrate, to cherish and ferment the juices into vegetable salts; whereas, if you keep your ground knot-fine by summer-fallows, and clover-grass, which gets dominion over the natural grass, and plough it up before it runs to a sward, the ground will be loose and open and easily penetrable by the sun, rain, and air, whereby it will be capable of being impregnated much more with those salts.

§. 4. On sound experience I am thoroughly confirmed, that no Not to land, especially clay, ought to be summer-fallowed, when it is summer-the least heavy by wet, in order to prepare it for spring-corn the fallow spring following; for, tho' the ground may work mellow enough when wet. as to the temper of the earth, having the summer's sun to shine on it, yet being ploughed wet or heavy, the grass will grow so as to clod it together, and so matt the earth, that it will plough too rough in the spring to sow spring-corn at once ploughing.—It is the same, in case strong land or swarded land be winter-fallowed wet, or stiff, and heavy, in order to prepare it for stirring the next summer for a wheaten crop; it will turn up monstrous stiff and rough: in both cases you give away your first labour.

O F F A L L O W I N G.

I summer-fallowed a field when one part was burning-dry, the other part very dry also, but yet moister than the former; at Michaelmas that part which had been ploughed burning-dry had ten times more weeds come up in it than the other; from whence I infer,

I infer, that the dryer you fallow still the better to destroy the weeds.—Again, I fallowed part of a field burning-dry in July, immediately on which came a very hard rain, which made the furrows, though ploughed dry, fall flat and hard, in which at Michaelmas very few weeds, comparatively of what might have been expected, if such rain had not fallen, were come up; for the ground was thereby fastened before the seeds could chitt.

On summer-fallowing early in cold strong land.

§. 5. The husbandry of cold, wet, strong clay-land in Wiltshire is to turn it up as early as one can in the spring for a wheaten fallow; if the ground be so dry and starchy, that eight oxen and an horse must be put to the plough, so much the better; on this fallow (that is, on this one earth) they sow their wheat and drag it in, and have much better corn than if they gave their wheaten land three earths.—I think this husbandry founded on very good reason; for such land, being ploughed up in so hot weather and so dry, becomes mellow and perfect dusty; the earth being hard underneath, it will cast off the rains into the hollowneses between the furrows, and will lie dry all the winter; whereas, if such wet clay-land had been hollowed with two or three earths, it had lain sogging in the wet, and drunk it up like a sponge, and the chill would have killed the corn; nor would it have fallen mellow under the harrow than the grete as above would do under the drag; and the common saying of the farmers in Hants, that they see not but white land brings as good corn as clay-land, seems to make good, that they often manage clay-land in Hampshire ill in their ploughing.

Caution against letting the grafs grow too long on land to be summer-fallowed.

§. 6. I am very sensible on experience, that you ought not to let ground you intend to summer-fallow for wheat run too far to a head of grafs, so that the sheep shall refuse to keep it short or bare; for if the grafs comes to that pitch, you will not be able to make the sheep eat it, but a great deal of it will run to bents; and when you summer-fallow, the furrows will not cover and turn over the ends of the grafs, but it will lie out at the seams, and so being not covered from the air will keep growing, and the roots will consequently live, and matt, and plough up very rough when it is thwarted, tho' the ground was summer-fallowed never so dry.

Manner of fallowing in Leicestershire.

§. 7. In their common fields in Leicestershire they give five tilts for their barley, and four for their wheat, five for their oats, and one for their peas and beans; their first fallowing for barley is about March, as soon as seed-time will give them leave; the second the latter end of May, or in June, as hay-making-time will give them leave; the third in July or August, as harvesting will permit; the fourth the latter end of October, or sooner, as the wheat season will allow; the last earth is when they sow, at the latter end of February or beginning of March: they say, if they

they did not make these many tilts the weeds would come up so fast, and seed, that they would be quite destroyed with weeds. The tilts for wheat commence, as for barley, about March, and so they hold on according to their leisure till they sow, which is about Michaelmas, and within three weeks after.—From hence it may be observed, that the deep land of the north can never want rain at seed-time, or soon after, for their fourth earth being taken about September, or October, the winter passing over it, and the earth being four months stale when they come to sow it, it must needs turn up so moist, as both to bring up the corn, and to support it against the drought of any summer.

My servant was observing to me, that in Leicestershire they cared not how deep they went with their furrow, when they summer-fallowed, which, considering how subject they were to weeds, he looked on as a great fault; for, said he, if they went shallow, the sun would have power to scorch up the weeds and their seeds in a shallow furrow, as soon as it moldered after the first rain; whereas when they turn up so deep a furrow, the seeds and the roots of weeds are buried and kept moist, and cool, and lie quiet, and not being influenced from the sun and air to germinate and chitt, and thereby to be malted, they are secured in a safe repository, in order for vegetation, when the earth is again ploughed up for wheat.

Of the DURABLENESS of some SEEDS.

§. 8. It is manifest a great many seeds will endure many years buried in the ground, and yet never rot nor perish, but rise up again in their plants, when the ground by tillage is made a fit matrix for them: but, forasmuch as I can observe, these seeds are the smallest of seeds, such as poppy, charlock, and mustard-seed; for peas, beans, and other corn-grain, and acorns, and the like, will perish soon, being buried in the ground; the reason of which seems to be, because these small seeds consist of more oily or bitter juices, which preserve them from moisture, and, in the next place, they consist of such small fibres or vessels, that it is impossible, when they lie half a foot, or a foot deep in the earth, for the power of the sun so to rarify the juices into such fine particles, as to penetrate those minute tubes, on which all vegetation depends: whereas, when by tillage they have a light bed of earth, those seeds, which are turned up on the surface, lie in the warmth of the sun, where the particles of the earth are made very active and fine to pass their tubes. Thus those larger seeds above mentioned, whose juices are less oily, and their tubes more open, are easily penetrated by the heavy and gross juices, which lie a foot deep in the earth, but not being able to protrude a root downward, nor a plant upward, by reason of the closeness and
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pressure

pressure of the earth, from a plethora of the juices it is necessary that an extravasation must follow, from whence a corruption must proceed. From hence I conceive it is, as Meagre writes, that primrose seed, which is exceeding small, being sown in fine mold, some of the seeds will not come up under three, some under four, five, six, and seven years; some of those seeds, I suppose, lay buried deeper, some shallower in the ground, and the juices that lie deeper require more time to be rarified than those lying shallower.—That seeds are more hardy, and can endure more than is generally conceived, Mr. Rudge of Portsmouth gave me an instance; he affirmed, that until king William's time they did not use wormwood in their ship-drink; but that of late they have used it with their hops, which are constantly boiled two hours, and then flung out on a dunghill, and that in those places now grow great quantities of wormwood at Portsmouth, where none grew before. And Dr. Brady of Leicester did assure me, that at a dyer's in that town, who used the attriplex baccifera, and boiled it in his dyes, after it had much boiling, and was flung out on the dunghill, there would grow up, in great quantities, from the seeds of it the attriplex baccifera: the berry of this plant is like a mulberry, and it's seeds are exceeding small. When Mr. Ray says the erysimus Neapolitanus (wild cress, or hedge mustard) did grow in that abundance after the fire of London, he adds that this plant brings very small seeds and in great quantity; therefore a hundred years might it lie without germinating, and not like to germinate then, unless it's tubes were put in action by the heat of fire. Sir John Floyer, in his Touchstone of medicines, tells us, that poppies are very mucilaginous, and contain an oil, as appears by a milky juice; and an oil is pressed out of poppy-seed: this seems to account for the great length of time they are suspected to have laid in the ground, where grass-lands after many years have been ploughed up, and this plant has come up so plentifully. Sir Thomas Brown also, in his vulgar errors, gives several instances of the lasting vitality that some seeds are endued with. If Le Grand had been acquainted with, and considered these instances, he would not, I think, have so readily asserted the equivocal generation of plants; for his argument is.—If you dig up the earth an ell deep, it will, without sowing, be fruitful the first year, but, if you turn it up deeper it will not be fruitful till after a year or two. The seeds therefore of plants, says he, are those insensible particles,

which,

Of equivocal generation.

† Plantarum igitur semina sunt insensibiles illæ particulæ, quæ, per materiæ subtilis agitationem, eum situm, figuram, et motum acquirunt, quæ necessaria sunt ad primum stirpis rudimentum efformandum; sed eorum conformatio tardius absolvatur, seriusque ex illis plantæ proveniunt quam ex feminibus plantarum. Le Grand, p. 466.

which, by the agitation of the subtle matter, acquire that situation, figure, and motion, which are necessary towards the formation of the first rudiments of plants; but this formation is not so soon compleated, nor are plants produced so quickly this way, as in the ordinary manner of raising them from the seeds of plants.

Surely we have great reason to conclude, from the instances above mentioned, that the earth does not produce the most contemptible weed without a seed; and we find that even at the beginning God took not that method, nor did the earth bring forth plants in that manner when it was vastly rich; for it is said, Gen. ch. ii. ver. 5.—“ That God made every plant of the field before it was in the earth, and every herb of the field before it grew;” and it seems as if Moses had said this to prevent an hypothesis, that matter could act so nobly on matter; what is recorded therefore in the preceding chapter, viz that God said, “ Let the earth bring forth grafs, the herb yielding seed, &c.” can only mean, that God bad it come forth out of the ground. Patrick will have those words above quoted, “ before it was in the earth.”—interpreted—before the seed was in the earth, which if the Hebrew will allow of, yet the foregoing words in that verse, “ God made every plant of the field,”—shew the earth did not produce plants, as causes naturally do their effects.

§. 9. A great advantage in summer-fallowing for barley is, that your barley-land seldom is sufficient to provide for all the graffes you sow, and oat-land will seldom knot fine enough to sow; but if oats be sowed on the barley-stubble which was summer-fallowed, in all likelihood it will knot very fine, and be fit to be laid down to grafs.

To summer-fallow for barley, in order to destroy weeds, you ought to fallow before the living weeds run to seed, and yet so late, that the seeds of such weeds as are in the ground may not have summer enough to grow up and seed before winter come, but as soon as may be (avoiding the latter inconveniency) is best; because when weeds are most turgid with juices, by being ploughed up, their roots are like to be killed by a plethora: for the time of weeds feeding consult the herbal.

Lands lying to the north, being cold clay-lands, should, if sowed to barley, be summer-fallowed, in order to sweeten the ground, and sowed under furrow, the middle of March, if the earth can possibly be got dry enough, that the barley of land exposed to the cold may be got ripe before the sun leaves it, and frosty nights come.

§. 10. It ought to be observed by the husbandman, not only what grounds are cold and sourest, but also what part of every ground is so; this he will easily discern by the grafs the cattle shall refuse, unless hunger forces them to eat it: in the hill-country

country we may generally perceive those grounds, or parts of grounds, which lie upon a declivity from the sun, or are cooped up between hills, so that the sun cannot freely irradiate them all day, and are not so pervious to the air and winds, do bear a much sowerer grass than the summits of the same field; and it is refused by cattle, especially at a time when grass is plenty: I do advise in such case, that the husbandman take hold of all opportunities and seasons to turn up such parts of a field early in the summer to the sun, and also that he stir it more in the summer, thereby to sweeten it for grass, and render it kinder for corn; for he may be assured, such ground as bears four grass, however it may bear a burden of straw, will not bear a plump berry, but a thin coarse sort, which will not fill the bushel, as finer rin'd or floured corn will do.

On my farm there is land, which tho' very cold, poor, and whitish ground, or woodseary, yet is very apt to run to four, rowety grass, tho' it has born corn but the year before; on such pieces of land we ought to have a circumspect eye, both in respect of ploughing them very dry, and hot, and earlier than other lands, before they are run to grass, so as to nip the grass, as it were, in the bud.

Of winter fallowing.

* putting forth its roots.

§. 11. I find the evil of white poor ground chiefly is, that all the spring time it ploughs up too dry to bring up the corn, and tho' it be just wet enough for mixed or clay-ground to bring up corn, yet that white ground so soon dries, either by heat or the cold churlish winds, which come at this time of the year, that the corn is checked in its * chissum; therefore, if you sow such land on fallows upon a second ploughing, my advice is, that you fallow early; for stale fallows will work moist. When you plough for sowing also in the hill-country, there are advantages in ploughing the poorer or mixed land first, if it lies warm and in shelter, and the stronger clay-land last; because, when the season of the year for sowing draws towards an end, the fallows being too dry for the corn to grow without rain, the full, in strong clay-lands, that have a depth, may, without damage, be carried lower than the stale fallow, into the fresh mold, which will turn up moist, (whereby you may have your corn all grow) which, in hot summers, in the hill-country, is the life of a crop.

Of winter-fallowing dry.

† mold.

§. 12. If ground be ploughed dry, tho' ever so much rain should fall after it, it will soon be dry again, for the same passages the water found to wet it are also permeable to the sun: but if ploughed wet, it will not dry kindly again that season, for the † grete is in a manner crust thereby, and blended so in a dab together, that the sun cannot penetrate it; but his rays are reflected.

I was

I was observing to a certain farmer, that a certain field did not produce me so good a crop of oats as I expected, the ground having been fed to hop-clover for two years. The farmer replied, he believed the reason was because the winter proved so wet, and that, being a white ground, we still went thither in wet weather, because ploughing in such weather did not that harm in white ground that it did in other, but that white ground so ploughed bore the worse corn, which I believe to be true. Beware however of either summer or winter-fallowing poor land in the hill-country too dry, so that it turns up deep, and breaks lower than the staple: by experience I know, you impoverish such land as much, by jumbling the bad with the good, as a year's dunging with the pot can do it good; and all the experienced farmers I have consulted, which are many, are agreed, that, tho' it is best to plough up wheaten land in dry weather, (for if it is fallowed wet, it will be apt to chill all the year) yet white land should be ploughed up somewhat wet: for, when dry, it is apt to break up in too stiff clods, and turn up below the *goodness* of the mold. I have found by constant experience in our hill-country-land, where the chalk in many places lies shallow, if, by reason of ploughing too dry, the chalk brush tears up, the corn will in that vein become defective some years after, tho' more manure be bestowed on it than on other parts of the same land, where the chalk has not torn up: therefore fallow not such land too dry.

The air and watery parts in earth ought to have a free circulation, as in our human bodies, otherwise a corruption and poison of humours arises: the case is the same in earth ploughed up wet, which clings and holds in all the watery body, which then is very much, till it corrupts, and lets in no fresh air, dews, &c. Now earth should be always taking in and perspiring out, even as our bodies do.

If ground be worked wet in seed-time, the wetter it is, the less can a plough dispatch in a day; for if it clings and sticks to the plough, and to the holder's shoes, it hinders the speed, nor shall the harrows harrow it so well at eight tinings as otherwise at four.

§. 13. If your ground be cold clay-ground, or sour ground, Of fallow-
 such as I have, take care to pursue the ploughing it up whilst the ground is in the most burning condition, and dry over head; and stop when either of those cases are wanting; and either give your oxen play, or contrive some other work for them. When your ground is so ploughed up in fallowing, it will always turn up again rotten, and in good order; and by such methods of never fallowing your grounds cold and wet, they will in some years time be marvellously sweetened, made healthy and kind for corn, dry in cold land.

and you will get a dominion over all common grasses and herbs of the field, so that such hill-country-ground, after it has lain down to clover, will turn up the second year knot fine, or friable, which is a very auspicious temper to promise a good crop.

Different practice in hill and vale-country in winter-fallowing. §. 14. The difference in practices amongst husbandmen is very great; to plough up many grounds in the winter, and let them lie so till seed-time, and then to sow them with oats or barley on one earth, i. e. drag the corn in without more ploughing, is a frequent custom amongst the hill-country-men, which the vale-men, when they are told it, are surprized at, and say, if they did so, they should have nothing but weeds, which I believe to be true; but, on the other hand, it is undeniable, that the hill-country-men, whose land lies cold, do this with good success. These different events seem to me to depend on good reasons, viz. high hill-country-land lying bleak and cold, and being somewhat poor, yet, if it be of a clay kind, being ploughed up early, will not, by reason of its barrenness, and cold exposition, produce weeds during the winter; the seeds of weeds in such cold beds lie asleep, till roused out of their lethargy by the warmer air and sun of the spring; whereas in warmer soils, which lie in the vale, where the land is commonly richer, the seeds of weeds, even during the winter, if the ground be hollowed up by ploughing, and mellowed by rains and frosts, will sprout and put forth a blade.

Of ploughing unseasonably. §. 15. I was saying to farmer Elton, it was the common opinion of farmers, that a team should be still going, in season, or out of season; but I differed from them; for when a season presented itself, and I was behind-hand, I should not scruple the hiring three or four days work of a plough, and, if a season did not present itself, should not scruple the going on somewhat towards a second year's crop. He agreed with me, and said, 'twas better to be in the stable than to do things out of season, and said, there was a piece of one of his fields an instance of it; they went to fallow there in a wet time, because they would not stand still, and that part of the ground has worsted three crops since successively, and made it run to weeds.

Winter-fallowing.—Not to winter-fallow across the furrows. §. 16. It seems to me to be very wrong (though in the hill-country, where the earth is consequently dryer) to winter-fallow across the lands or furrows, if possibly it can be avoided, especially if the lands lie on a descent, and are of a cold clay nature; for the current of the water is thereby stopt, and the field lying the wetter for it is thereby soured and chilled; it seems therefore, that such lands should be winter-fallowed the same way the lands and furrows lie, if they lie upwards and downwards especially.

The

The ground generally winter-fallowed better in anno 1718 than had been observed for many years: the reason doubtless was the long, hot, and dry summer the preceding year: whereby not only the earth, through the drought, was made more friable, but also the free growth of all weeds, and their roots, which matt the ground together, and harle in the clots, was checked.

The philosophers seem to agree, that in winter the air is fuller of nitre than in summer; therefore a winter-fallow, to let in the nitrous particles of the air, must be beneficial.

§. 17. It seems the winter-fallows of every ground are then ^{When} most seasonable, when you can make the furrows stand most up- ^{winter-}right, and so continue, with as little falling down as may be, that ^{fallowing} thereby the land may lie the healthier and dryer, and shoot off ^{most sea-}the rains; whereas by falling flat it lies foggy, spongy, and cold. ^{sonable.}
—Accordingly I was telling a very good farmer in my neighbourhood, that I thought it was better not to winter-fallow stiff land till the frosts were near at hand; for, if one fallowed such lands early in October, they might settle too much before the frosts might come to hollow them. He replied, if it was lay ground, it might be as I said, but, if it was stiff land that was ploughed the year before, it was best, he thought, to plough it up as soon as I could, though the very beginning of October, before it had time to settle after it's last burden of corn; for then it would, when first fallowed, molder fine enough.—Tho' clay-lands however ought to be fallowed early for the better mellowing them, yet it seems to me no loss of time, but rather gain, to wait a little for the dry frosts; because in such weather you will better effect your ends. If the fallows should have been flatted by the rains, the frost having less power over them, they must needs be more inclinable to run to weeds; on the other hand, tho' fallowing should happen when the ground is very wet, yet, if dry frosts follow, and not wet weather, such fallows may do very well. The reason is, because such frosts uphold the ground from falling, till it settles in the ridges in an upright standing, and consequently receives the benefits of the frosts: but this venture is not to be trusted to, lest wet weather should come after such fallowing, which is most likely, as the ground is already full of wet; and yet the farmers will plough and fallow in the wet, knowing, that they sometimes have had as good corn after a wet fallow as a dry one; but of the accidents, whereon it depended, they were ignorant; otherwise I judge they would not have done so.—On the like reason, in my opinion, depends the wholfomeness of the summer-fallows; for, if the fallow be wet, it will be in danger of falling flat, unless very dry weather follow, to support the ridges: consequently the sun has less power over the parts, nor can it kill the weeds by it's burning heat, as in a dry fallow.

I gave a barley-fallow to a broad clover-field in July: some said, it would not gain it's end, but lay the ground chill for the whole winter.—By Michaelmas I found it full of all sorts of weeds green on the ground, which when stirred it would all be destroyed.—Note, that fallowing land well carries a whole furrow in the winter, and cannot be supposed to lay a ground wet during the winter, but rather dry, seeing the furrows have gutters between them, for carrying off the water; but if the ground falls small, then it may lie foggy and spongy. The harrowing this ground after it was fallowed made it fine, so that it brought up weeds in abundance, which would be stirred in, and so destroyed, and yet it lay hollow underneath.

The reasons of early fallowings and stirrings, or thwartings, seem to depend altogether on the nature of the lands you have to deal with; for if it be probable that ground may work dry and mellow at spring-feed-time, care ought to be taken to fallow so early, that you may thwart early, I mean in January, that your ploughing at seed-time may be moist; but your fallowing, if the ground be not grassy, may be later, especially your thwarting, viz. not till March, if you are apprehensive your ground is like to be too wet at seed-time; for 'twill plough much the drier at seed-time for being thwarted late in a dry season.

I fallowed a lay-ground to grafs in October and November; I began very early to plough it, and sow barley in it, viz. the 25th of March: notwithstanding the fallows were very stale, and being sowed so early in the year, one would think the ground moist enough to bring up the corn, as by turning up the furrows it seemed to be, yet the ground ploughing very rough, being of a white nature, and requiring ten tinings, it was a very great disadvantage to the corn's coming up, there being no rain; for the weather was hot, or windy and dry, when it was ploughed, and the tumbling it up and down so often with the harrows dried the ground too much: so therefore to order white ground, that it may harrow at four or five tinings, and thereby not lose its moisture, is good husbandry.

Mr. Raymond says, the good husbands with them (in Wiltshire) fallow up all the lands in the beginning of winter, and finish by October, if they can, whilst their horses are at grafs, and then lay them up at a cheap keeping all the winter: this they do in Leicestershire, as I have elsewhere noted.

Seeing the finer the earth is tilted, the more each part of it communicates it's virtue to the grain laid in it; I suppose the finer it is winter fallowed (for the same reason) the more the winter rains and frosts communicate their virtue to the land.

Of winter-fallowing for wheat.

§. 18. The finer the earth is made by often ploughing for wheat, the closer it lies all the winter to the roots of the corn, provided

provided you sow your corn in good time, so that the frosts come not to hollow it before it is settled; for, not having time to settle, it is in more danger of being hollowed by the frosts. From my walking over the fallows, and observing how dry, and healthy, and exposed to the frosts, weather, and sun, the convex parts lay, and how the many small concave parts and hollows lay to receive the sun's strongest heats, I cannot but think it great husbandry to fallow up grassy, or strong clay-lands in the winter season, for wheat, tho' one must give them an earth the more possibly in summer, by fallowing twice instead of once: indeed this cannot be done vice versa to barley, by giving that a summer-fallow, because barley is sown after some corn that grew the summer before.

By winter-fallowing for wheat you have this certain advantage, that the fallows are so mellowed by the winter-frosts, that all the spring and summer long they drink up the rains and summer-suns the more greedily.

In winter-fallowing for wheat there also sometimes falls out this advantage (as in anno 1705, when no rains fell from April to the second of July) that you have not only so much land fallowed before-hand, when no plough could fallow in lay-lands by reason of the dryness, and consequently the farmers must be behind-hand; but you may also all that season stir the winter-fallows, for all that time they will work.

§. 19. Whereas in the strong deep lands of Buckinghamshire, Of winter- and in some other counties, where there are strong lands, the farm- fallowing ers hold it ill husbandry to sow much barley, and they are re- for barley- strained from it by their landlords, from an opinion that barley impoverishes their land beyond other corn.—I am apt to think, if barley impoverishes such clay-land, it must proceed from the winter-fallowing it, and tumbling it about in cold raw weather, when it is wet, being cold clay-land, whereby it is chilled and soured; whereas I suppose they plough not up for peas, and beans, and oats till the spring of the year, when they are sown; and peas and beans hollow and mellow the ground.

The first considerations, after wheat and vetches are sown, in order to a barley-crop, are of this nature, viz. to fallow up those grounds which you do not fold, and of them to fallow those first which are declivous from the sun, or by reason of high trees or hedge-rows are much shaded, or by reason of hedge-rows or declivities are skreened from the north and east; for all such grounds may and ought to be sown first with barley; and therefore the earth ought to be prepared first, and if such fields are to be folded, they ought to be folded first, in order to be fallowed as soon as may be.

§. 28.

Of winter-fallowing for oats, §. 20. Mr. Edwards observes, the first thing the farmers do after harvest is to fallow for black oats; for the older the fallow is they sow black oats on they observe it to be the better; but, if they sow white oats, they fallow but before they sow, for the latter the fallow is for white oats, they count it the better, for white oats love to lie light; and, said he, they never give two earths to black oats, but, if the ground be such as is run to grass, and a stiff ground, it is better, and will well answer, in case you sow white oats, if you give it two earths; nay, said he, some of our clay-lands are so stiff, that it would very well pay if two earths were given to peas also, for it is impossible sometimes they should shoot their heads through. I said I never knew two earths given to peas before; he replied, farmer Biggs, if I would talk to him, would tell me the same thing; and he was sure he lost half a crop for want of it.

and for
peas.

It was the 16th of October, and farmer Biggs had fallowed for oats; I asked whether the land (he sowing on one earth) would not be too stale, and lie too hard at seed-time. He said, no; if land worked light (for on this land he had sowed oats also the last year) it would be in fit temper enough at spring; that he and others commonly gave a fallow to some oat-land by the very beginning of October.

Of Winter-fallowing early for OATS and BARLEY.

§. 21. On the 20th of October, 1719, I began ploughing a field of fifty-two acres for oats, which had been sown to corn, and chiefly to vetches, so that the stubble ploughed up so fine and small, that it might be well supposed the ground by the winter rains would fall flat: I had finished ploughing these fifty-two acres by the 20th of November.—Notwithstanding it was light and white ground, and fell so fine, yet at the oat-seed time, February 20, the harrow tinings being good, the oats were laid deep enough in the furrows or seams; for though they seemed to be closed, they were not so, but there were cavities underneath, tho' the seams closed at top. This ground was all harrowed off at five tinings, which was the effect of early ploughing in the winter. This method of fallowing light ground succeeded admirably well, and answered in every respect; the oats were let in deep enough, and prospered in colour beyond those I sowed that year on strong land in two earths, and when I mowed them, the 15th of August, they were in every respect great oats, and the hop-clover I sowed with them succeeded very well. I concluded therefore, from this and other experiments, that ploughing such light ground (which falls fine) thus early is best, since the oats can be let deep enough into the seams, and by that means the ground

ground so ploughed, taking the winter rains, will retain so much moisture as to bring the oats all up, the contrary of which is the danger in all such light grounds.—For the same reason I began following such light lands for barley as early as the middle of October this year, that so they, being beaten flat by the winter rains, and being drunk with them, might retain sufficient moisture to bring up the barley at spring.

In the beginning of November, 1712, I ploughed up four acres of a field consisting of fourteen acres, which had lain down to broad clover for two years, during which it was mowed: tho' it was a clayey ground, it broke pretty * knot by the plough, * fine. and therefore, having much other business in hand, I thought I might delay the tearing up the rest till the latter end of January, and that it would harrow very well by the latter end of February; sowed to oats; accordingly, the latter end of January I ploughed the rest, and sowed the whole field with black oats the latter end of February: the ground dressed with the harrows very well; only this difference I observed, the four acres ploughed in November was broke by the frosts to dust; the other part ploughed last was not so fine, but worked very mellow. This experiment I made on conjecture that the four acres ploughed so early would carry the best oats, and my expectation was answered; for the whole field from the first appearance gave me great hopes of a good crop; but by the latter end of May the four acres ploughed so early was distinguishable in colour, to lookers on, at a quarter of a mile distance; for it was much the stronger, and darker in complexion. June the 8th, which was three days after, I took a view of another field, consisting of six acres, which I had ploughed in the winter in the former manner, viz.—I ploughed up four acres thereof in October, when the ground was very dry, and in January I ploughed up the two remaining acres, the ground being likewise then very dry. This field had been, as the other above mentioned, sowed two years to broad clover, and it turned up mellow in both parts, when sowed to black oats in the latter end of February, and harrowed knot-fine, only with this difference, that the four acres ploughed up in October worked in dust, or like ashes. The consequence of this husbandry was as the former, viz.—June the 8th the oats in the four acres, so early ploughed, looked more proud, were thicker, and of a deeper green than the two acres; and it is to be noted, that, in both the grounds, in those parts which were so early ploughed, no grass appeared during winter, nor at spring, to prejudice harrowing.

§. 22. I talked with several very experienced farmers concern- Of fallow-
ing fallowing for peas: they all agreed, that their crop of peas ing for
would be better if they did, and it would pay the charges, for peas.
sometimes

sometimes their crops were bad for want of it ; but it seems they had so much other work for their ploughs that they could not allow time for it.

To summer-fallow for peas doubtless would be as proper as for barley ; in which case you need not stir the ground again, but harrow down the roughness of the furrows before you plough for sowing ; your ground by such summer-fallowing, or indeed by an early winter-fallowing, being laid curiously dry, will bear with the sowing the peas earlier than otherwise, which has many advantages.—For this reason it is, that the vale-farmers sow not their peas so early as we in the hill-country do, tho' they lie warmer, because their land is wetter, and consequently colder ; but their barley they sow a fortnight sooner than we, for by that time the sun has well heated their land.

Of
plough-
ing for
peas.

§. 23. This year, 1702, happened to be a very dry year, and summer : an old farmer came to me, and lamented his bad crop of peas, and said, they were worth little, and that they were so from his hiring his ploughing, which was of too little strength ; for, said he, we had not horses able to go deep enough ; if we had had strength to go an inch or two deeper, I had had treble the crop, for then I had laid them deep enough from the sun.

From hence may also be concluded, that the later in the spring you sow peas, the deeper you ought to go.

From what I have observed this year, 1715, it is evident to me, that, if I sow peas in cold clay-ground, I ought to lay the lands round and small, viz. after the rate of five, six, or at most seven furrows in a ridge, whether I sow over or under furrow ; for where-ever the land lay flat, and pitched, or sunk a little, there the peas failed, and did not come up, and those that did continued all the summer in an unthriving condition ; and yet the spring after they were sown was not wet, though indeed we had often cold dry winds : the ground these peas were sown in ploughed up very mellow and dry, and was summer-fallowed. All these advantages give a plain proof to me of the profit of laying the lands in such grounds round, and I doubt not but where the ground was most healthy, and the peas more flourishing, yet both would have been more so, if managed as above said. The peas, from which I made this observation, were blue peas, sowed so late as the 19th of March, when the cold weather might seem almost over.

On experience I am very sensible, that if peas be ploughed under furrow, in ground where one ploughs up-hill and down-hill, very great care ought to be taken that you do not bury the peas ; for if the plough going down-hill be not took up, or held up with a good strength, it will be very visible at the time of their coming up ; they will not come up half so thick in that half of the

the land that was ploughed down-hill, as in that part that was ploughed up-hill in every land respectively; therefore, in such land, and especially when so carelessly ploughed, it must be evident there requires good dragging, and very good harrowing, to break and tear the furrows into smaller pieces, and to open them well, and hollow their compact cohesion, so that the corn may come through. Indeed no corn should be sowed under furrow, where the furrow turns up whole, or does not break well into short pieces, but the drags ought to tear such ground first, before it is harrowed; for in such cases the harrows do but scratch the back of the furrows, and when that loose earth is washed away, or settled, the back of the furrows will appear entire and hard. I was plainly convinced of this in sowing peas under furrow in the two former years, but especially in sowing them so this year, 1716. From hence it is obvious, great care ought to be taken in well harrowing the ground, and that they, who go with the harrows, ought to be well over-looked. It also seems to me, if ground ploughs rough, so that it may require much harrowing, and yet is so heavy as to be in danger of treading, the best way is to drag it once or twice first before it is harrowed, because one turn of the drags will tear such ground more than three turns of the harrows; and it stands to reason the horses need go over it so much the seldomer, and so the treading will be the less; and it is to be noted farther, that if a dry season falls out, and such peas, so sowed under furrows, are not harrowed well, they will have the more difficult task to get through.

§. 24. If a ground be run to a sward, or run out of the sown
grafs, and fit to be ploughed up, in case the grete, or mold, is
but shallow, and the chalk near the top, I think it is good husbandry
to give such a ground, for wheat, a winter-fallow; for then
you can take a leisure time for it; and be sure to take a time
when the ground shall be moist, wherein you may go as shallow
as you please, and then may stir it to your own mind in summer;
whereas, if you fallow such a ground in summer, and the sea-
son be dry, as it ought to be, it is odds but you turn up the
chalk; for if the ground be dry, there is a loose spungy coat be-
tween the first coat and the chalk, which, being hollow, will
suck in the plough, so that you cannot help ploughing up the
chalk; and this method I believe will compensate very well for
the loss of the grafs.

Of winter-fallowing chalk ground that is run to a sward.

§. 25. A field of mine was very well dunged for wheat the
summer 1713, and bore a good crop of wheat; in spring 1714,
I sowed it to barley, having had a good season for winter-fallow-
ing, as also a good dry season at spring for ploughing and sowing
it, and a hot summer, and the barley came up well; yet I do
not believe I had two quarters of barley on an acre.—This
ground

Manner of the hill-country in winter-fallowing for barley condemned.

ground is a strong clay-ground, and it lies aslope north-east.—I am thoroughly satisfied by experience, that the way of the hill-country-husbandry, of ploughing and sowing such grounds four years together, that is, to four crops; the first of which is wheat, and the other three spring-corn, for which last three they winter-fallow only; I am, I say, satisfied, this cannot be good husbandry for such ground: for the first summer-fallow it receives for wheat, whereby it is warmed, mellowed, and sweetened, can by no means qualify the coldness, heaviness, and founness it receives the three years afterwards by the three winter-fallows for spring-corn; nor can, I conceive, any other than the aforesaid reason be given, why such land should produce but two quarters of barley per acre, which in goodness and strength was sufficient to bear four quarters.—Therefore such ground should after the wheat-crop receive one or two summer-fallows every other year for spring-corn, before it will be in right temper to receive a winter-fallow for a barley-crop, in order to lay it down for grass-seeds.

Summer-fallowing preferred to winter-fallowing. §. 26. To plough in a good sward of grass by a summer-fallowing seems to be of much greater consequence to the improvement of the land than the doing it in winter; for the winter is too cold to ferment it, or to raise and fix those bodies of salt thereby; which lie in those grasses; it being easy to be conceived that the moldiness, and finnowyness of the grass so ploughed-in in summer must be much greater than in the winter; for which reason cow-dung and horse-dung, made in the fields by the cattle's soiling, falling so thin, is not of that consequence some are apt to think, because it never ferments, nor heats.

There is a great nitre and salt in roots, as appears by Grew, wherefore the ploughing-in broad clover-roots, which are so big and thick in the ground, before they are dead, by a Midsummer-fallow, to precipitate their rotting or fermenting, whereby their salts are fixed, is of great consequence; whereas by the insensible decay of the root by canker, it is so leisurely done that it has not fermentation enough to raise a good body of salts.

When there is a grassy turf on ground it is observed to bear much the best corn; the reason of which seems to be, because the grass and roots turned down under furrow do heat, and thereby raise a great quantity of vegetable salts; for this reason it was I had so great a crop of broad clover by summer-fallowing its aftermath, and do look upon it, if a ground has a grassy turf on it, and not too rank or poor for barley, it is best to summer-fallow it for barley; then to give a winter-fallow for oats, and sow them on the back; because in the winter-fallow, tho' the grass rots, yet it does not so heat, for want of sun, as to raise from its rotting such a quantity of salts.

§. 27.

§. 27. To plough a grassy ground in winter, when the snow lies on the ground, or when it is a wet season, is to bring up the weeds; for the sward of the ground being turned in when wet, lies there fogging, and grows chill, keeping wet all the winter, nor will it easily dry.

Farmer Biggs ploughed up a fallow for peas, being a lay-ground with a sward; he said, he would fallow it as shallow as possible, which was very judiciously considered; for undoubtedly, if a ground be run to sward, and is to be ploughed against the winter, the shallower it is turned up the more power the frosts will have over the roots of the grass, in rotting them; and there is no doubt, if the plough should go deeper at sowing-time, but that the fresher earth underneath will turn up mellow.

§. 28. A lay-ground having been sown to broad clover-grass two years, about the 8th of November we began to fallow it; and the 18th, when they had fallowed all save the head-lands, my bailiff said to me, that he believed it was best not to fallow the head-lands, for, being strong land and grassy, they would at sowing-time turn back again whole, which appeared very reasonable to me; so they were left unploughed.—From hence I do infer, that when grounds are large that are to be fallowed, and are strong lay-ground, it is good to plough round the head-lands at first hand of the year, tho' the plough should be carried out again for a month or two; there will be time thereby given for the head-lands to rot, that they may turn up mellow when they are stirred again. Nor will the trampling on them, when the ground is fallowed dry, do any harm, but good; this will make the head-lands sweet, and bear a good bodied corn.

§. 29. I was sensible by experience this year (anno 1714) that, if strong clay-ground have two earths given it to wheat, and after the wheaten crop is taken off, it lies the next summer to grass, and is ploughed up at autumn, tho' such ground be run to a thick matted sward, yet it will turn up rotten and mellow at plough-shear, so as to stir well in the thwarting at spring.

Of the METHOD of Ploughing for different sorts of CORN.

§. 30. They find by experience in the vale, that it is best to sow wet clay-land on one earth, for thereby the corn lies dry; whereas if they gave it two or three earths, and wet came, it would lie poachy, and cold, and thereby the corn would be chilled.

If lands are to be ploughed up and sown to one earth, which have lain six or seven years to lain or grass, such ground will turn up with a much evener furrow, and a great deal more be

ploughed in a day, in case you plough up the ground the same way the furrow went last.

I was asking the farmer who rented some lands of me, which I have lately taken into hand, how it came to pass, that a certain parcel of ground, which I had sowed to rye-grass, run so much to erishes, it seeming, when the corn was down, almost choaked up with rowety grass. He replied, that those grounds had not been sown for three or four years last past but to oats, which having but one earth, and stiff land, the sward of the grass and the root had not been killed, whereas, had it been sowed to barley, it would have been in as good tilt as any other land.

Why
ploughing
poor land
brings
weeds.

§. 31. It is plain why ploughing of poor land brings weeds ; not only on account that the coulter in lay-ploughing cuts the roots of the weeds in many pieces, all which grow, but also forasmuch as those roots will emit stronger shoots than the corn can, which proceeds only from seed ; and consequently, the weeds must overtop, and be more luxuriant than the corn.

Of
ploughing
white
land to
one earth.

§. 32. Notwithstanding it was very white ground, I ploughed three earths, and then sowed French grass and barley in it : I had the evenest and best crop, I believe, that ground ever carried.—I sowed the ground when it was as wet as the plough could well go, which I believe is best for white mortar-earth-ground, which is not on a clay.—The reason why farmers sow white land on one earth, I judge to be from their great inclination to save charges, white earth being more capable of bearing a crop in that manner, as being less subject to weeds than clay-land.—The reason again they offer in argument for so doing is, and from experience too, as they pretend, because they have had worse crops on two or three earths than on one.—The true reason of which is, because they have never sowed such white land on two or three earths by choice and forecast, but by necessity, that is, when they have been negligent in taking their time for ploughing up such land, and have deferred so doing too long, whereby it has worked rough ; then on force they have ploughed it again, or possibly the third time, to correct the first error, and all in vain, and so have had bad crops ; whereas, had they designed three earths from the beginning, and ploughed the first early, and acted uniformly in their second and third earths, I believe, they would not have repented it.

It is usually observed, that the white land in our hill-country, if ploughed to two earths, and thereby made light, is very subject to poppy, which we call red-weed, but clay-lands are not subject to it ; the reason of which seems to be this : the poppy-seed is an exceeding small seed, (Mr. Ray computes many thousands to lie in a pod) and for that reason is easily buried in clay-land, and less able to shoot it's seed-leaves through, because the

clay

clay soon fettle and binds ; but through white land, made light by ploughing, it's seed-leaves easily pass : it is very likely therefore (the evil of red-weed being so great) it may be better to sow white land on one earth.

There are several sorts of light or white chalky grounds in the hill-country, which (when sowed to wheat) ought to be sowed on one earth, otherwise they will be subject to red-weed or other weeds ; so that there seems a necessity to give such land but one earth, whenever it is sown ; for it will not bear being torn to pieces, tho' it had lain many years to sward ; so care ought to be taken, that such land does not lie down too many years to grass, lest it should turn so stiff and tough, that drags will not tear up enough of the coat or mold to cover the wheat, and so it suffer on the other hand by lying too shallow, and on too stiff a ground. If such ground has lain so long to grass, as to be stubborn, there is a great hazard but it produces the less crop, especially if it be in a gentleman's hands, whose many avocations call him from home, and from a due attendance in the field whilst such land is sowing, it being very likely where much dragging is required, and labour to dress the ground, that servants will be sparing in it, than which nothing can in such a case be more prejudicial ; and in all cases it should be most the care of a gentleman, especially for the reason above said, so to contrive the ordering his ground against the sowing-season, that, if possible, it should be in so good temper, and order to receive the seed, that it should not be in the power of the ploughman to hurt him, unless he went wilfully so to do. —Such ground should be so nicked in ploughing up for wheat on one earth, as to turn it up when the furrow is a little inclinable to break, or be rottenish, especially when we may hope it will do so, and grow a little mellow by lying a while to sun and rain.

§. 33. In a burn-beaked ground I sowed barley and French Of ploughing to one earth for barley.
grass the 18th, 19, and 20th of March under furrow ; the residue of the month was very dry, and warm, but the month of April to the 20th had every day dry, cold, and churlish winds, and the 17th, 18th, and 19th, there were hoar-frosts in the morning. —On the 20th of this month I viewed my barley, and found most of it looked wan, and some of it yellowish by the cold winds and hoar-frosts ; but there happened in this ground to be a linchet ploughed up in the winter, on which barley had been sown on one earth ; this barley, tho' the ground was new, did very manifestly complain, and was quite yellow, which proceeded from it's lying so shallow, and from it's disability to strike roots in the firmer ground of one earth's sowing. Barley sowed on one earth in other places I observed to be very yellow on the same occasion ; I do therefore infer, that barley sowed under furrow will better bear cold than that sowed on one earth. Part of this white
F land,

land, over which the sheep had often gone to fold, did not in the least complain; but the leaves kept broadly extended in their full verdure; whereas the others gathered up together, or lost somewhat of their colour. The French grass sowed in this ground all this while did not in the least complain, or the seed-leaves abate of their verdure.

I find not only Captain Hedges, but Mr. Weston and others make some objections to my over-fondness of sowing my barley always, and my whole crop on one earth; saying, that in hot summers the ears will shrink and want nourishment, by reason the roots cannot strike a depth; but farmer Bachelour of Litchfield will by no means allow this to be an objection, for he says the contrary of this is true, and that in the driest and hottest summers his one-earth-corn flourishes and looks greener than his two-earth-corn. It must then necessarily be, that when Captain Hedges and Mr. Weston, &c. made this their observation, they ploughed their white land either too wet, or too late, when they sowed their one-earth-corn, whereby the frosts had not time to flat it, and shatter it to powder; and so the drags could not raise a grete to let the corn in deep enough.

Farmer Biggs assured me, that he had found by experience, that it was much the best way to sow barley on one earth, if it was poor white land; on such land he was weary of sowing on two earths, being satisfied he had thereby lost his crops.

In sowing corn, as oats or barley, to one earth, in the hill-country, I conceive these to be the proper rules, and which I do practise, viz. to plough a narrow furrow (not a wide and broad one) that the winter frosts and rains may have the more power to mellow and shatter the furrows against spring, whereby the ground will harrow the better, and the harrow tinings go in the deeper. To this end, that the ground may harrow the better, I always take a time of ploughing such ground not only early in the winter, but also in a dry season; and I take care to fence ground so ploughed, during the winter, and, till I sow it, from sheep, lest they, by treading it, especially in the wet, should tread down the ridge of the furrows, and make it mortar.

On
ploughing
to one
earth for
wheat.

§. 34. I see not why they, who sow wheat on one earth, should sow the earlier, as the custom is, unless on account that the drags cannot raise a deep grete; and so the corn must get an early root, lest it should be too much exposed to the winter: but provided your ground be in very good heart, and the earth mellow, that the drags may, when loaded, enter deep, I see not why such one-earth-corn may not be sowed at Michaelmas.

From the observation I have made, these three weeks, on wheat now growing (May, anno 1712) I pass my judgment, that wheat, if sowed seasonably, i. e. between the 6th and 20th of September,

ber, when sowed on two earths, or on the second ploughing, will carry a better colour about the beginning of May than the wheat sown on one earth; for the latter, tho' it might seem much the more flourishing, and of as deep a colour during the winter, till towards May; yet the ground sowed to one earth lying closer and harder than the other, the wheat could not move, nor strike so good roots as that sowed on two earths would do; when the spring began to grow dry and hot, it would give off it's support to the corn; which will then be apt to turn to a bright and paler colour, and the weaker tillows and branches, which made a show in the winter, will not come on, but starve; whereas the wheat sowed on two earths will, when hot weather comes, flourish with a deep green, and fulfil all it's branches by nourishing them, it having a depth of mold, and mellowness in it to maintain the roots. From hence it appears how necessary it is to plough deep, where the staple of the ground will allow it, and to lay the seed into a good depth of mold well prepared and shattered by being broke with the plough.

However white light lands, as elsewhere observed, are better sown on one earth; nor can a great crop be all sown in strong land, and on two earths, in cold hill-countries, because it cannot be in that manner sown time enough, and the neglect of that would be a worse evil than sowing on one earth.—I must also observe, that my land, which is more brashy and full of small stones, and of less depth of mold, though better supported with pot-dung than the parts, which were only folded, brought less wheat than the other; for which no other reason can be assigned, but that the plough could not turn up a furrow of that depth as in the other part, and consequently the corn suffered by the weather in the summer-months, when it grew dry.—If it be objected to this observation, that barley sown on one earth is generally said to bear the hot summers better than on two earths, it must be replied, that, when barley is spoken of in such a manner, it must be intended of barley sowed on white land, or such light ground as would lie too hollow, if sowed on two earths: of such ground it is true also, that wheat sowed on one earth will endure the summer better than that sowed on two.

§. 35. It is a common practice, in our hill-country, for farmers, the year after they have sowed light white land to wheat ploughing on one earth, to turn it up again early the next year, i. e. in October or November, to sow barley again on the back, or on one earth for earth; and this they do, because such land is poor, and will not answer the expences of two or three earths; and it is a question whether less than three earths would most times make such ground not fine; because such white land in our country, being sowed the year before to wheat on one earth, is subject, especially if the

summer prove wet, to abundance more rowet and grafs than our cold clay-lands sowed would be; consequently it would be difficult to destroy it, and to make the couch tear out at the third earth, tho' one ploughed it in early; therefore they endeavour to feed the rowet with a great flock of cattle as soon as the wheat is off; notwithstanding which, you will, if you have a good quantity of it, have a hard task to get it eat close time enough for your plough to enter.—I do not approve of this husbandry of sowing such land the next year after wheat, as above said, on one earth to barley, for the reason following, viz: such land is commonly of a shallow grete or staple, and therefore must be ploughed up shallow, and the rowet, which is turned underneath such a furrow, will not rot by spring, but the roots will mat and hold the earth together, notwithstanding the frosts may have considerably contributed to the tearing it to pieces;—so that, what with the shallow furrow you was obliged to plough, and the closeness of the earth, your drags and harrows will not at spring be able to get deep enough to give the barley a deep and an easy bed, and consequently the barley must starve in summer.—I do therefore rather recommend such land to be sowed to oats, in the same manner as you would do to barley: oats, being sowed a month earlier, will have established a root, and put forth tillows before they are pinched with hot weather, and will better endure to lie shallow than barley would do.

Of one
earth to
wheat.

§. 36. It ought to be considered, if we suffer poor shallow ground to run out of tilt, by letting it run too long to grafs, it will, if ploughed in summer, be apt to spalt up below it's staple; and if, to avoid that, you plough it up in winter, when it is moist, and will plough shallow, in order to sow it to wheat on two earths, poor shallow ground will bear more weeds and less corn being sown on two earths than on one.—The best way therefore is always to plough up such land before it be run to too strong a sward; that you may turn it up to a shallow furrow, and be secure of it's working and tearing mellow under the drags at seed-time, when you sow it to wheat.

Farmer Biggs and his son both assured me, that though white land did well with wheat on one earth, yet that they had always found it do better with two; but, said they, on about an acre or more of white land, to which this year (1702) we gave two earths, the wheat lies with it's roots out of the ground, there being but a little fibre or two at most that holds the root, and can feed it, so that it can carry no ear; for it is impossible it should have a full grained corn, where there is so little conveyance of nourishment to it.—I asked farmer Biggs how that part of the white land sowed on two earths came to be so much worse than the rest. He said, because the land was side-long, and had a falling both
ways,

ways, so that when at sowing-time they ploughed it up and down, one land having another falling against it, every other furrow, falling with the side-land and not against it, filled up without a seam, so that, the land working fine, the corn could not be buried.—The best way is, said he, to sow white land on two earths, and to sow the last under furrow.

But I have since found by experience, that, tho' two or three earths may be best for wheat on strong red clay-ground, (red-weed not being so apt to grow in that, tho' made never so fine) yet that either two or three earths is very improper for white light ground, or half red earth half white; for the finer such ground is made it is so much the more subject to red-weed, or poppies, especially if the summer prove cold and rainy, as in 1715.

The farmers of our hill-country say, they have found by experience, that it is best, when they sow wheat on one earth, which is always done early, to sow old wheat rather than new; because the old wheat is not so forward, and apt to run away to a grassy head, nor to be so proud as the new, which are faults at the forehand of the year.—This seems reasonable to me.

§. 37. Farmer Lake advised me by all means to give two earths ^{Of giving} to my peas: he said, if my land was like his, or the land about ^{two earths} them, he was sure I should not often have a good crop on one ^{to peas.} earth.—Quære about this.—Farmer Biggs says, if it be lay-land, it will not come in tilt at two earths, but will turn up whole, and, if it be barley or oat-stubble, it will not need it; but he allows, it may be good practice as the ground may work, for sometimes such stubble-land may not work kindly under two earths. Farmer Elton afterwards told me what Biggs said was true, but it was upon land lying still a year or two that two earths was such good husbandry, and in that case it would come to tilt at two earths.

§. 38. If you give some of your wheaten lands three earths, if ^{Three} strong clay, it will turn much to advantage, but then such land ^{earths to} must, if run to a sward, be fallowed in winter; otherwise the ^{strong} grass will not rot soon enough to be stirred: in such case you need ^{land.} not doubt of being able to stir such fallows in the driest time, when you cannot get the sward into the grassy grounds you would fallow: by this means you will be able to cut out work for the most precious time of the summer, when farmers lie by, because they cannot easily plough by reason of the hardness of the ground.

§. 39. The advantage of giving three earths to summer-corn ^{Advan-} is in this very manifest, viz. that in a dry spring and summer, in ^{tage of} any part of a ground that works rough, for want of making the ^{three} earths to earth fine by so much ploughing, in that part the corn will come ^{summer-} up corn.

up edge-grown, and later than the rest of the same ground where it worked finer, and apparently thinner in straw, and shorter in ear, as was visible anno 1704 in most grounds, which might have been prevented by giving three earths;—for if the corn in ground working rough comes up the later, it is consequently the backwarder, which is a great disadvantage in our cold hill-country, where it is of the utmost consequence to have our corn early ripe.

Custom in Leicester-shire, and of the worm there. §. 40. In the inclosures in Leicestershire, where the land is fresh, the way is to have four successive crops without either dunging or folding; and then to lay down to grass, laying pot-dung on the last stubble, viz. they take three crops of barley and one of wheat; they harrow always on one earth; and plough not up for barley till January or February.—Because, as I suppose, the land being deep would be apt to run to weeds, on longer rest, before seed-time.—In these inclosures they never rake a wheaten crop first: it seems in fresh broken-up ground both the wheaten and the barley crops are subject to be eaten by a worm, as the wheat is in the Isle of Wight: to prevent which Mr. Clerk eats the grass as close as he can, for that being turned in, as he thinks, occasions the worm.

Of stirring poor land early for wheat. §. 41. The workmen that were flinging out dung for me said, I might stir my land in the last stirring three weeks or a month before I sown in my wheat, and this was a frequent practice. I talked with an old experienced farmer about it, but he seemed by no means to allow it for poor land that had been often ploughed; for it would, by giving it its last stirring so early in the year, be apt to run abundantly to weeds; yet, said he, for fresh or lay-land it may do very well.

Of stirring land. §. 42. I observe many farmers scruple stirring their ground before seed-time (the success whereof nevertheless they doubt of without it) either out of covetousness, or a fancy of not having leisure to do it then, tho' at such times teams may be hired; and yet at seed-time, when time is ten times more precious, they shall bestow the same time in harrowing it, by reason of its roughness, and, after all, the ground shall not work so well, nor lie down so fine as it ought to do.

If you propose to sow the ground you fold for barley the last in the season, have a regard to the stirring it, especially if it be a ground any wise inclinable to grass, for it is not to be supposed but the winter folding has established such a root of grass, by enriching it, as is not to be overcome by ploughing up the ground, after being sown so late as the latter end of April or May, by which time the grass must have gained a good root, which will not easily be torn asunder from the earth by harrows, and consequently will be apt to grow, and the ground not to work fine.

If

If you summer-fallow for barley, it is best to stir about two months before seed-time, to kill the roots of the green weeds that are come up, by turning them up to the frosts, and burying their leaves and stalks; besides such ground, being so thoroughly mellowed by the summer-fallow, is so separated in it's parts, that it will not easily fall close and heavy before seed-time, tho' stirred two months before.—But if you have winter-fallowed for barley, and intend to stir, if the ground be still stiff, you should stir the earlier to mellow it with the frosts; but if the ground be pretty friable before stirring, the later you stir it the better, for then it will break the smaller at seed-time, having the less time to settle; and true it is, with the antients, that land cannot be too fine for barley.

If ground, by spring-stirring and summer-fallowing, be made curiously mellow for barley at seed-time, tho' it will wet sooner than barley-land that has had but one fallow, so it will also dry vastly sooner; and if it be trampled on wet by the horses, yet the ground being so fine and mellow, the corn will come through; whereas when ground works rough and wet, the unbroken clods bind and cover in the wet, and keep the corn cold and wet all the summer, nor can it come through, but lies cold all the summer; besides, to work ground rough and dry at seed-time, tho' by much harrowing it may be made fine at top, yet it is to be considered, the corn has not a mellow soft bed, much of the land being buried in whole clods, as has been observed by the antient writers on husbandry.

A neighbouring husbandman carried me into his wheat, and shewed me three or four lands that he had stirred, whereas to the rest he had given but two earths: the wheat he had stirred was as good again as the other, both in colour and thickness; the reason why stirring might be so serviceable was, that, when two earths only are given, the earth turned up to the sun in the first fallow, and thereby mellowed and impregnated, is for the most part turned down and buried underneath the corn that is sowed at the second ploughing, but on the third earth, it is again turned up to the surface whereon the corn is sown.

§. 43. The design of striking furrows after harrowing the wheaten land is to strike the corn out of the furrows, wherein the corn generally dwindles, as being chilled; to do this, when the fold is after to go over it, is needless, because the sheep will tread it in again; but after the fold has run over it, it may be done.

For want of drawing a furrow after harrowing in of wheat the reapers at harvest are at a loss how to measure, and for a guide to work by.

§. 44. Wet clay-grounds, that lie wet and foggy all the winter, will chop and grow starkey all the summer, so that they will

have peculiar infirmities in all seasons : in my opinion, abundance of, and very thick trenching of such lands will be a much cheaper, and more effectual improvement of them, than dunging ; but indeed no improvement can have effect before they are laid dry.

Of the T I L L A G E of different L A N D S.

Of ploughing stony land
 Vid. p. 46. §. 1. Of picking up stones. Arguments against it answered.

§. 45. * Mr. Hillman, a notable farmer at Thrupton, was against my picking up of stones, and said, it was certain ground would fall finer under the plough which had most stones. To which I answered, that it was true, lay-ground, or grassy ground, would break better on the first ploughing (at least if the ground was wet) the fuller it was of stones ; for such ground cannot so easily cling, nor bind when ploughed up, because of the great number of stones ; but ground, that has no stones, will be made to work as fine at three earths, as the ground that hath stones, and will plough with a much narrower and finer furrow standing upright and on edge than the stony ground will do, the furrow whereof must be carried broad, or else the tumbling of the stones will fill it up.

Different Tillage of dry and moist earths.

§. 46. Quinteny says, to dry earths I allow a large culture or tillage at the entrance of winter, and the like as soon as it is past, that the snows and rains of the winter and spring may easily sink into the ground ; but to strong and moist earths I allow but small tillage in October, only to remove the weeds, and stay to give them a large one at the end of April, or beginning of May, when the fruit is perfectly knit, and the great moisture is over.

Of ploughing husky, loose earth.

§. 47. If ground be of a husky, wood-seary nature, in the parts of which is not a fit continuity, in such earth there is a porous adhesion, through which both cold winds and the sun may penetrate, and in which, being of a spongy nature, as light as it seems to be, the water will lie and chill the ground, as it does also in heathy grounds ; to cure this evil, and bring it to a more solid body, the more you plough it the closer it will lie to the roots of the corn, and become more solid, being also rolled, or rather trod with sheep ; for if in clay-land, notwithstanding the great room a post takes in a post-hole, the same earth will with ease be rammed into the same hole again with the post, and even more if need were, because in the digging it up the earth is broken into minuter parts, how much more is the husky land above mentioned so broken by ploughing ; it being much more porous, and capable of being forced into a compacter and closer body in it's surface the more it is broken by the plough, and then trod with sheep, or rolled ; whereas the roller, or sheep, if it be sowed on one earth, will not be able to compress the clods, nor squeeze the earth close in the hollows.

Of

Of the MANNER of PLOUGHING.

§. 48. I observed this year, 1711, it having been a wet and cold spring, that where-ever in my clay-lands there was a little sinking of the ground, on those flats there was little barley, and that thin in body, the ground being too wet for barley: from hence it seems to me, it would be very good husbandry to ridge and round up all the grounds that are cold clay on our hill-country, where the land is of depth to bear it; for, as the delving parts of the grounds are much too cold for barley, so the very healthy and driest parts of cold clay would be the kindlier for barley, especially in so cold a country; whereas throughout this hill-country we all plough the grounds upon the flat, and thwart the furrows in stirring. It seems also to me, that this very good effect may proceed from such ridging up the lands, viz. that the lands will on that account plough so much the drier and mellow-er in fallowing, and consequently will at seed-time, (by turning up dry in fallowing) turn up dry and in powder; whereas, when the lands in fallowing are laid flat, they take in the wet, and lie wet all the winter, and when they come to be stirred at seed-time, they turn up too wet and cold for barley.

Of ridg-
ing land.

§. 49. There is a practice in husbandry of giving the last plough-Of ing to grounds some time before sowing them; which is, when ploughing ground is not in a proper temper for sowing in the seed and har-just before rowing; this is done when persons have a great deal to do, but, sowing, wanting a season, they would prepare their grounds against one, not good for spring-corn. may happen; but this practice commonly meets with very different events in wheat, or winter-corn, and in lenten or spring-corn; for winter-corn, when prudently done, it is very good husbandry; but seldom so, when practised for spring-corn, for the reasons following. The reason of doing it for wheat is, because the season of the year being far advanced for sowing of wheat, and the land too dry to venture the sowing (for wheat is seldom long hindered from sowing by wet) the husbandman gives the last ploughing in order to sow wheat, that on the first rain he may commit the seed to the ground, and then harrow-in several acres in a day; whereas were he to plough for what he sows he could dispatch but little in a day: it is apparent this practice may be very good husbandry; for the ground in this case is supposed to be ploughed very dry, and consequently a fine bed, by breaking the ground with the plough, is not prepared for the growing of the seeds of weeds; for no seeds of weeds can make advances to get the start of the corn till rain comes, and then the wheat will be sowed, and be able to set forth as forward as the weeds; and hereby, when we are behindhand in sowing our crop of wheat, much

much time is gained; which is a great advantage to a crop of wheat; but in the other case, ploughing beforehand for barley, or spring-corn, in order to sow it when a season comes, or the ground is in temper, must in all likelihood be improper husbandry; because, generally speaking, we must in such case be supposed to plough beforehand, because the ground was too wet or too moist for sowing barley, and then, a bed being prepared, and the spring and warm time of the year being advanced, the seeds of weeds will grow, if the ground were ploughed never so dry, yet if a glut of rain should come, which will hinder you from sowing, it will nevertheless make the weeds grow.

Of laying the furrows flat in the hill-country. §. 50. Mr. Edwards asked farmer Biggs, if he had not laid his ground too flat. Note, he had sown it to wheat.—Farmer Biggs replied, considering what sort of ground it was, it could not be too flat, it being a lightish sort of ground.—I asked whether it was possible to lay the wheaten ground too flat in the hill-country of Hampshire; farmer Biggs replied, if it was clay-cold-land, they looked on it best to round up the furrows a little,—and so said Mr. Edwards.

Mr. Garnam, of Prior's-court, Berks, was also of opinion, that if ground was any ways wet and cold, laying it a little round for wheat not only favoured the corn in laying it the healthier in the winter, but also, when the spring came, by lying healthier it would lie so much the warmer, and shoot away, tho' the spring should prove wet and cold, and thereby avoid the blights the better; for laying corn dry forwards it as much as sowing early.

It is the heat and warmth of the earth, occasioned by the sun and dry weather, that opens, loosens, and refines the vegetative parts, and causes them to breath up in steams into the plants; nor does the earth want moisture for such a purpose, provided it hath just enough for a vehicle sufficient to convey those corpuscles; therefore all cold rains, or rains in cold weather, or wet fogging in the earth, are great enemies to that vegetative power, and do chill, check, and lock up (instead of loosening) those corpuscles from ascending up into plants, to the augmenting their bulks; from hence it may be collected, how reasonable it is to lay the furrows of wheaten clay-lands up round, tho' they are in the hill-country; but, if they should lie at all flat, yet so to contrive that they may not lie wet, longer than needs must be, under the cold winter or spring rains.

Lands being made very fine for wheat ought to be sowed the later; because, if early sowed, many seeds of weeds, more tender than wheat, and too tender to grow at the latter end of September, will grow at the beginning of that month; and the bed of earth you have made so fine and fit for corn will, you must conceive,

conceive, be also fitter to bring up the seeds of weeds; and the later you sow your wheat, if upon strong land especially, the more need is there to lay up your lands somewhat round, tho' the clay be of a healthy dry nature; for the drier the land lies, the faster the corn will come away, and keep growing the better during the whole winter, it lying the warmer for lying dry; whereas cold and wet are certain enemies to vegetation.

§. 51. Mr. Edwards was saying to me, that it was a great error to turn up too large a furrow, and that ploughmen, that they might be thought to have done a good day's work, were very apt to do so, whereas it was more profit to turn up as narrow a furrow as they could, tho' less land were ploughed.—Of this I spoke afterwards to farmer Bigs; he said, it was true; the smaller the furrow the better; but in lay-land, if stiff, it would not turn up small, but stand an end, if the ploughman endeavoured to turn it up small; but, said he, in oat-stubble, or barley-stubble, that work light, the smaller the furrow the better.

Mr. Edwards having told me, that it was a great fault in ploughmen, out of greediness to seem to have done much, to turn up large furrows at seed-time, and it seeming good reason to me, because, the more and narrower the furrows, the more the corn, the corn coming up for the most part, in the furrows.—I asked also Thomas Elton about it, a very understanding husbandman, and he said, he could never for his part see the sense of fallowing, and taking pains all the year, to lose a third or fourth part of one's crop at last by a large furrow.—I asked him then, what furrow was best in fallowing; he said, if ground worked fine, a large furrow would do well, and turn up small enough at it's second earth; but, said he, if it fallows up heavy and rough, and be turned up in a large furrow, it will not be brought to be fine by seed-time; therefore such land ought to be fallowed with a small furrow.

Quære, If the narrower the furrow in fallowing of stubble ground would not be the better for barley, as well as in the last ploughing in sowing-time? because the narrower the furrows the more power the frosts and dry weather would have over them, and the more upright the more hollow they stand; whereas the broader the flatter, and more apt to receive the wet, and the more the furrow holds in breadth the less does it break. I know in whole land, that is grassy, it is otherwise, for, if such land be designed for a fallow, unless one furrow flap over the other, the grass will live between the furrows, and not rot, and if such land is to be sowed on one earth, if the furrows lie upright, the corn must fall between.

I ordered my head-ploughman to fallow for barley in a field, which being proper to be ploughed the same way again, as I fallowed

lowed it, I thought it might not plough so fine at sowing it, as if I had thwarted it; so I gave him a caution, not to fallow it rough, but to turn up a little furrow.—But he said, a large furrow would be best, because that will be split or divided in seed-time, but if he ploughed a fine furrow now, and ploughed the same way at seed-time, a narrow furrow could not be split in the middle, but turn back again whole.

I was sowing barley on wheaten-fallow, and, as you plough up-hill and down, the plough also goes along-side part of the hill; as I was in the field observing this ploughing, my bailiff said, the plough going on the side-long could not carry so narrow a furrow as otherwise it might, for, if they should go to plough a very narrow furrow, they could not hold the plough in, but the hill-side would be often casting it out; on the other hand, when the plough turns, and the broad board goes against the side of it, it is as hard to keep a narrow furrow, the hill being apt to fling the plough off.

OF PLOUGHING with HORSES or OXEN.

Stiff land ploughed cheaper with six horses than four.

§. 52. My carter says, that where-ever one ploughs stiff land, or lay-land, or hilly land, it is cheaper to maintain six horses, and drive them in the plough, than four; for, says he, four cannot be supposed at most to plough above an acre in a winter's day, and six will go away so fast with it (it being so much easier to them) as to plough near an acre and half per day; and then besides the horses need not that proportion of oats, their labour being easy. A farmer stood by and said, he believed the same; if so, the two horses will well pay for their keeping.

I summer-fallowed for barley, and hired a farmer to fallow with four horses, and I fallowed myself with other four; but the season being very dry, and the ground having laid two years to broad clover, and being stony withal, I found they made but a slow rid-dance, insomuch that I believe, a plough and six horses would have ploughed as much as those two ploughs; and besides, they, by being weak, were forced to plough the ground scragling, inas-much as the ploughman was forced to wriggle with the plough, where the fall stopped at any stones, to help the weakness of the horses, by means of which we could not hold a steady and even furrow neither in breadth nor depth; and as his plough did consequently often jump out of ground, so he was at a great deal of pains and care to get it in again; whereas a plough with six horses goes through thick and thin, and will carry an even furrow by flinging and forcing up all stones in it's way; so note, against the next time, in like case, the advantage of ploughing with six horses.

Advantage of oxen.

§. 53. One advantage in a team of oxen is, that one of the men who go with them may go about other business when ploughing

ing hours are over, for one man is abundantly sufficient to look after six oxen.

Mr. Baily of Wiltshire very strongly persuades me to keep a plough of oxen together with my horse-plough: he confesses an ox-team cannot go to market, in a country where horse-ploughs are kept, because of the ruts they must tread into, but for carrying out dung into the fields, ploughing, and harvesting, they will do as well as horses. He says the shoeing of an ox round, comes to 16d.—but if the inner hoofs behind are not shod, (which in our country they need not, not going on the roads with them) four oxen in shoeing are but the price of three. He says they will endure eight hours ploughing in the day, in winter, with straw only, till towards Lady-day, and then they must have hay; and if they are kept up, they will go as fast as a horse-plough. And he says, in the very winter they may be turned out into the backside to straw after their day's work, and will not take cold; but I believe in our country such usage would be too cold: Mr. Bissy was present, and agreed to all this,—and both of them held, that, if fattening oxen stalled were over-bound in their bodies, which by being kept hot they might be apt to be, they must be turned out to the air, for, whilst bound, they will not thrive.

An advantage of ploughing with oxen is, that you summer-fallow the strongest lands with them in the driest season (their chains being strong) by making a plough of ten oxen, and adding a ploughman the more to hold down the plough; whereas, if at such time you make a plough of eight horses, they will not carry so true a furrow, and will break their harness.

H A R R O W I N G.

§. I. **T**HE Romans, after the several fallowings before mentioned, sowed their grain, and, if they found occasion, harrowed it, and then, as it seems to me, turned it under furrow, tho' I do not remember that any of their writers speak particularly of sowing under furrow, or on one earth; I think they are silent in these matters. When this was done, and the corn was come up, they proceeded to another operation, which they called sarrition, a kind of harrowing or raking with wooden or iron rakes, for they are both either mentioned or intimated by Columella.—^b This sarrition was performed in dry burning lands before

^a Ligneis rastris sarriondus. Colum. de medicâ.—Ferro succisa emonitur. Id. de lupino.

^b In agris siccis et apricis, simul ac primam sarritionem pati queant segetes, debere eas permotâ terrâ obrui, ut fruticare possint, quod ante hyemem

fore the winter came on, and then they covered the blade intirely by raking the new earth over it, taking however what care they could not to wound or mangle the roots.—This, they thought, protected it from the cold, gave it fresh nourishment, assisted it in it's growth ^c, and made the roots tillow and spread.—When the rigor of the winter was over (in January, according to Palladius, and in February according to Pliny, and in dry but not frosty weather) they raked it a second time, in a slighter manner, or a different way;—^d But in cold wet land they used only the spring sarrition, raking the earth so as not to bury the blade, lest the young suckers or tillows should be thereby destroyed.—^e The great use of this later sarrition was thought to lie in it's loosening the ground which had been bound up by the winter's frosts, and thereby giving an easier admission to the rays of the sun.—They made it a rule however, let the season be never so favourable, not to use this husbandry ^f, till the corn was grown to that height as to equal the tops of the furrows.—Wheat was thus harrowed when it began to have four leaves, barley when it had five, beans, and the rest of the leguminous kind, when they were four fingers high.—The earlier sarrition would by no means be proper in our wet climate; ^g and indeed this method of husbandry, both of the earlier and later kind, tho' in frequent practice among the Romans, was thought by many to do rather harm than good, inasmuch as it often wounded the roots of the corn, or laid them bare to be killed by the frosts.—When their sarrition was finished, they pulled up by hand the weeds that these harrows had left remaining, and this they termed runcation.

To steel
the tinings
of your
drags.

§. 2. Mr. Hillman being with me, when I ordered the smith to make tinings to my drags, he persuaded me to have the tinings steeled

hyemem fieri oportere, deinde post hyemem iterari.—Sic fieri debet ut ne radices fatorum lædantur.

^c Ut latius se humi frutex diffundat.

^d In locis frigidis et palustribus plerumque transactâ hyeme sarriri, nec adobruï, sed planâ sarritione terram permoveri.—Cum pullulare desit frumentum, putrescit, si adobrutum est.—Columella.—Qui sarriat, caveat ne radices frumenti suffodiat.—Plin. lib. 18.

^e Sarculatio induratum hiberno rigore soli trititiam laxat temporibus vernis, novosque soles admittit. Plin. lib. 18.

^f Cum sata fulcos contexerint. Columella. (Sulcos æquant sata. Virgilius.) Triticum sarritur quatuor foliorum, hordeum quinque. Palladius et Columella.—Faba et cætera legumina cum quatuor digitis a terra extiterint. Columella.

^g Quidam negant eam quicquam proficere, quod frumenti radices sarculo detegantur; aliquæ etiam succidantur, ac si frigora incefferint post sarritionem, gelu frumenta enecentur. Subjungenda est deinde sarritioni runcatio.

steeled, assuring me it would five times over-pay. — Qu. Why not steeled tinings to harrows ?

§. 3. It is some disadvantage that oxen will not make any great dispatch in harrowing, nor will the slow manner of their drawing the harrow about do great service, if the furrow tear not easily ; for the harrows drawn slowly slide over the hard earth ; whereas, when drawn apace by horses, they jump, and whatever the tinings or teeth catch hold of they tear through ; but in mellow rotten ground, where the harrows easily enter, there you may make good work with oxen.

§. 4. Sometimes in dragging-in of corn, especially by oxen, where the chain, which is fastened to the drags, may be taken up and shortened, as the ox-hind pleases, if you have not an eye to your ox-hind, he will be apt to shorten his chain so, that it shall lift up a row or two of the hither or foretinings, and so but a small weight will lie on the hinder row of tinings, whereby the drag will, for the most part, be borne up from the ground, so that the first row, and it may be the second, shall not enter the ground, nor the hindmost row go deep enough ; and this the ox-hind will do, if not well looked after, for the ease of his cattle ; because they draw abundantly less weight, when the foremost rows of tinings are lifted up from the ground, than when the chain the oxen draw by is so lengthened out, that every row of tinings may lie plumb and flat on the ground, and have liberty thereby, not being held up, of sinking in the deeper ; whereby the corn is also laid the deeper, and the ground torn the better : the ox-hind's ill practice in favour of his cattle is ruinous to the matter, and therefore servants are to be well looked after : an hundred pounds by this abuse may soon be lost in an hundred acres of corn sowed on one earth.

§. 5. Where land has been summer-fallowed for barley, two harrows will harrow it as well as four harrows will harrow land winter-fallowed for wheat.

It is agreed, that three harrows will do more service than four going two and two, for the third harrow contributes much by its weight in keeping down the other two.

§. 6. If furrows be starchy and stiff, so that there may be danger of turning them back again, in thwarting them with the harrows, if one harrow them not directly athwart, but aslant, that danger will be prevented.

§. 7. It is to be observed in harrowing, tho' the ground may harrow well enough at top, whether it may not be so wet underneath, as for the horses to tread the seed in too deep, and into such paste and mortar, that it cannot shoot it's blade through.

It is a common piece of ill husbandry, when the spring-season of sowing proves wet and rainy, and there may be a ground under

der harrowing that may want but the last tining or two, (perhaps an hour's, or but half an hour's work of being finished) when a hard shower of rain shall come, and the ground harrows wet, to continue harrowing, out of covetousness of finishing that ground, and unwillingness to leave so little behind undone, and to come again to that ground, when the next work they are to go upon lies perhaps a mile or half a mile off; but servants should have most express charge given them, as a general rule, at the beginning of seed-time, immediately to stop and desist harrowing, if the ground harrows wet and dauby, especially in clay-ground; for, tho' the ground harrowed never so well before a shower of rain came, yet the taking one turn more with the harrows, while the surface is wet, will make it crust and bake so, that, if dry and windy weather come, the corn will have a difficult passage through.

Of har-
rowing
stony bot-
toms.

* mold or
staple.

§. 8. I sowed a field anno 1703 with oats, having fallowed it very early; the winter proved wet and rainy, which beat the ground very flat; but, being in good heart, it was apt by sowing-time to shew grass; and particularly in the bottom of that ground, that being very stony, as well as beaten flat by the great rains, the harrows could not raise a * grete; therefore, tho' in the hill-country such grounds are the best, yet that bottom brought me more grass than oats; wherefore it is to be remembered, that such bottoms be ploughed up again at seed-time, and care ought always to be taken, that such bottoms lie light, when to be sowed, that the harrow tinings may be let in.

I had wheat anno 1706, which I sowed on one earth, and tho' the bottom of the ground was as good as any of the rest, yet the wheat was not above half so good, neither as to thickness, nor the proof it was in: the reason must be, because, the bottom of that ground being very stony, the tinings of the harrows rid upon the stones, and so the corn was never well healed.—Therefore, when such grounds are sowed with wheat on one earth, I advise that the stony bottoms be ploughed some time before, so that they may come to be thwarted, and sowed under furrow, when the other land is ploughed and sowed to one earth.

Much har-
rowing, no
cure for
ground
ploughed
rough.
To drive
sheep over
wheat
raised out
of the
ground by
harrow-
ing.

§. 9. I can see but little cause for the satisfaction the farmers seem to have, in fancying if a ground works rough, that fault may be cured by much harrowing; for thereby the lumps are buried, and, for the most part, the corn under them, there being only a fine smooth mold gained at top, by the scratching of the harrows.

§. 10. Having harrowed a field of my wheat, and endeavouring to give it three or four tinings more, in order to fine off some of the rougher part, they brought up a great deal of grain, that in three or four tinings before they had buried: I advised with
farmer

farmer Biggs, and proposed to rake them in: he said, the best way by much, and which in such cases they used, was to drive their sheep over the ground, which would prick them in.

§. 11. It is best to let the furrows lie three weeks or a month, *Of har-* after sowing peas, unharrowed; the furrows keep the cold and *rowing* wet from the corn; whereas, if by that time the peas be rooted, *peas.* they will not have sprouted out, and then the harrows will not hurt them.

§. 12. In talking with a notable farmer in Wiltshire on the sub- *Of drag-* ject of sowing broad clover with oats, he told me, he always *ging.* dragged them in with their country drags (which are not so big as ours, and have but six tinings on a harrow) and this he does, tho' his ground had been ploughed up but a fortnight before; but he commonly sowed broad clover on ground ploughed so long before as Candlemas, which never will, tho' it works mel- low, fall too close for the drags to tear it.—Here note, if dragging does so much better with them than harrowing, even in ground that would, as we should think in Hampshire, tear well with harrows, it must do better with us, because we do not plough so deep as they do in Wiltshire, nor will the tinings of the drags go so deep with us as with them, on account of the stones, and so we can be in no danger or fear of burying oats or barley. The farmer says, he sows very little or no barley without dragging it, and the like he does to wheat too after he has sown it, tho' on a second earth; nay, he often drags the ground once, when ploughed the second time, before he sows either wheat or barley, in order to break the furrows and the seams, that the corn may come up the more * suant; and on the backs of the fur- *kindly;* rows, which are dragged after the corn is sown, there is no fear but the drag-tinings will let it in deep enough.—To make wheat come up more suant, when sown on one earth, or on stale fallows, he always drags it first, before it is sowed, and then gives it two or three tinings, and says, there is no fear but the drag-tinings will let the corn in deep enough.—This method of drag- ging wheat and barley-land, in any of these respects, before you sow it, saves seed: for you may sow less on an acre.—It is a general fault in Hampshire, that, having so much to do, we slubber it over without dragging when it ought to be dragged, and content ourselves with only harrowing the ground, and, when we either drag or harrow, we do not bestow labour enough on it in either respect.

PICKING UP STONES.

Advantage of picking up stones. Vide §. 45. of ploughing. † mold or staple.

§. 1. **T**HE advantage of picking up stones in clay-land is, that, the stones being picked up, the ground harrows much the better; the number of stones and their bigness bearing up the harrows from reaching the † grete, and making the ground plough rugged; nor can a weak plough turn it up but to great disadvantage, every stone being a harrow-rest; besides, to plough such ground true, there must two men go with the plough, for a man and a boy are not sufficient, it being too tiresome for one man to hold the plough all day, a man's weight being necessary to keep the plough in the ground.—It is to be noted that, where ground is trod much by cattle, especially that part of it that they go most in and out on, or where carting has been, the ploughing is very stiff.

The better raking up the barley is another motive for picking up the stones to be added to the former.

Another advantage of picking up stones is, that thereby the plough turns up fresh earth by going deeper: the very weight of the stones (where there are many) contributes to the settling and binding of the earth to great prejudice after rains.

The advantage of picking up great stones at least appears from the inconvenient rolling of wheat in March or April; for the roller is always riding on one stone or other, which it cannot squeeze in, and, in that case, is born hollow throughout it's whole length from compressing the ground.

Another advantage of picking up stones is, that, if it be clay-lay-land, and ploughed dry, which for wheat is to the advantage of the land, the plough-beam, sprinter, whippings, and traces must often break when they come against a great stone, as my neighbour experienced this summer (anno 1704) who said, they broke, in one piece of ground as much plough-tackle (even their beam, tho' new, &c.) as came to the value of every day's work.

Another advantage of picking up great stones in arable land is, that a less roller, with fewer horses, will roll the ground in seed-time.

Another advantage of picking up stones is, that, at a day's notice, one may take the advantage of the times in hayning up for mowing, after one has waited for the fattening cattle on one's land, and found by the markets rising they must be bought in too dear; but, if an hundred load of stones must be first picked up and carried away, it will render that method impracticable.

§. 2.

§. 2. To pick up stones from poor land, continued in that condition, I look upon rather to be impoverishing than improving it; for thereby you rob the poor land of it's only dependance, which was being kept moist; for, if such ground has not moisture to bring up the corn, it must fail, having no strength; of rich land I believe just the contrary, and that such abundance of flints, which lie so thick, or are so broad as to keep the dews and the sun from impregnating the ground, must needs be to it's prejudice.

Not to pick up stones from poor land.

If a multitude of small stones lie on light white ground, the evil whereof is being subject to be too light, it seems good to let them remain, that the weight of them may compress the ground together (for which reason they are prejudicial to clay-land) and wedge themselves with the ground, which secures it from burning, &c.—But great stones are every where pernicious.—^a In Sicily, near Syracuse, says Pliny, a farmer, who was a stranger to that kind of land, and to the manner of husbandry in those parts, lost his crops by picking up the stones, and found it so great a disadvantage to his land, that at length, to retrieve his damage, he thought it adviseable to bring them back again.—The ground was light there, and, I suppose, they had not the use of rollers in those countries; nor do I find that Cato, Varro, Columella, Palladius, or Pliny make any mention of a roller for their lands, but only of a cylinder to roll their earthen barn floors hard, and a crates, or flat frame of timber, to draw over their corn, and level their ground.

§. 3. Quære, whether an abundance of stones in a ground may not hinder the tillowing of wheat at spring, by bearing the root off from the earth, and hindering it taking fresh root, and not suffering the roller to press it to the earth.

Stones hinder wheat from tillowing.

§. 4. To the disadvantage of stones in grounds may be added, that though the corn under them comes up, yet where the root is hindered from the sun, such corn must be thin; and, when corn lies under stones, shaded from the sun, I suppose it not only to be thinner in grain, but shorter in ear, and to carry less and fewer tillows under the stones than if exposed to the sun and air.

Keep the roots from the benefit of the sun.

Nor in the bottoms, where so many stones generally lie, do the sown grasses, such as clover, &c. come to any thing, tho' the ground is allowed to be much the best; if such a ground of twenty acres has such a bottom of two or three acres, and it should cost ten pounds ridding the stones, the advantage to the clover in those two or three acres would, I believe, pay the whole charge.

^a In Syracusano agro advena cultor, elapidato solo, perdidit fruges luto, donec regeffit lapides. Plin. lib. 17.

S O W I N G.

Of choice of seed among the antients. §. 1. **T**HE best seed, says Pliny, is that of a year old; if you keep it to two year old it is not so good, but, if to three, it is worse still, and, if it be older than that, it will not grow. ^b For seed you should chuse the heaviest corn, and fullest ears, and set them apart in the barn, and by no means admit those ears that are not full throughout, but have only grains here and there by intervals. Note the curiosity of the antients, and it stands to reason; it is in danger of producing such ears.

Quantity on an acre. §. 2. ^c Pliny directs those that sow early to sow thick, as the corn will be longer in coming up; and the later sown corn, he says, should be sown thin, lest it should be destroyed by coming up too thick on the ground: but surely he must mean this of the spring-corn, and not the winter-corn, for the direct contrary rule holds in sowing wheat.

Time of sowing. §. 3. ^d According to Cato, cold wet land should be sown first, and the warmer and drier ground be reserved to be last sown.— This he must mean of a winter-crop. Pliny and Palladius give the like rule: see also a subsequent remark of mine on a passage in Columella.

Of the seasons of sowing various grain, and the quantity among the antients. §. 4. ^e In the month of November, says Palladius, we sow wheat and barley, and of wheat five modii to an acre; Columella's directions are, four modii of wheat, five or six of barley; three of peas, and six of beans, which I wonder at. So that a modius,

^a Semen optimum anniculum, bimum deterius, trimum pessimum, ultra sterile. Plin.

^b Ad semen reservandum est quod gravissimum: quæ spica per intervalla semina habet abjicietur. Plin.—Quæ seges grandissima, atque optima fuerit, seorsum in area secerni oportet spicas, ut semen optimum habeat.—Varro, sect. 56.

^c Festinatâ satione densum sparge semen, quia tardè concipiat, serotina rarum, quia densitate nimia necetur. Plin.

^d Ubi quisque locus frigidissimus, aquosissimusque erit, ibi primum serito; in calidissimis locis sementem postremo fieri oportet. Cato, sect. 34. fol. 8.—Sationem locis humidis celerius fieri ratio est, ne semerum imbre putrescat, siccis serius, ut pluviz sequantur, ne diù jaciens, et non concipiens evanescat. Plin. lib. 18. fol. 300.

Frigidis locis autumnalis satio celerior fiat, verna vero tardior.—Pallad. lib. 1. fol. 60.

^e Novembri mense triticum seremus, et hordeum: jugerum seminis tritici modis quinque tenebitur. Pallad.—Tritici quatuor, hordei modios quinque vel sex, pisi modios tres, fabæ sex. Colum. lib. 9. fol. 9.

modius, as above, being near half a bushel, they sowed above two bushels and a peck on their acre; which is as much as generally we sow in good ground; but then it must be considered, that they sowed in November, and we in September and October.—^f But Palladius says, in his calendar of September, In this month, in wet, barren, and cold ground, and in places shaded from the sun, wheat should be sown, in clear, serene weather, about the time of the equinox, that the roots may have time to grow strong before the winter.—^s Speaking of September, he says, This is the first season of sowing vetches to be cut up for food, and the quantity to be sowed is seven modii on an acre.—So that 'tis plain they sowed vetches two months before wheat, and sowed seven modii on an acre, which is above three bushels. But in his calendar of January he says, In this month we sow vetches for feed, and not to be cut up for food;—which seems to agree with what I have in another place observed, that the seed of a plant is the tenderest part of it: and so Columella, lib. 11. f. 9. —^b Of the month of May Palladius says, At this time most corn is in flower, and the farmer must by no means suffer it to be meddled with. Wheat and barley, and all seeds that are single, and do not split, are eight days in flower, and afterwards forty days in growing to maturity; but seeds that are double, such as beans, peas, and the rest of the leguminous kind, are forty days in flower, and are coming to perfection during the same time.

¹ Columella, lib. 11. f. 9. has these expressions; It is an old proverbial saying among the farmers, (a) early sowings often deceive us, (a) late never.—We lay it down as a rule therefore, that those places which are naturally (b) cold, should be sowed first, and those that are (b) hot, last.

As to the former expressions (a. a.) they wholly depend on the climate whereof they are spoken, viz. Italy,—where they used to

on the climate, and

^f In hoc mense, uliginosis locis, aut exilibus, aut frigidis, aut opacis, is no rule circa æquinoctium triticum seretur, dum serenitas constat, ut radices frumenti ante hyemem convalescant. Pallad.

^s Nunc vicia, cum pabuli causâ, prima satio est; vicia septem modii jugerum implebunt.

^b Nunc omnia prope quæ fata sunt florent, neque tangi a cultore debent. Florent autem sic: frumentum et hordeum, et quæ sunt seminis singularis octo diebus floreant, et deinde per dies quadraginta grandescunt, usque ad maturitatis eventum; quæ verò duplicis seminis sunt, sicut faba, pisum, cæteraque legumina, quadraginta diebus florent, simulque grandescunt. Pallad.

¹ Vetus est agricolarum proverbium, maturam (a) sationem sæpe decipere solere, (a) seram nunquam;—Itaque in totum precipimus, ut quisque naturâ locus (b) frigidus erit, is primus conferatur, ut quisque calidus, (b) novissimus. Columella, lib. 11. fol. 9.

sow wheat and barley in December: no wonder therefore, if an earlier sowing, where the corn indures the whole winter, oftener miscarries than a later sowing, where it indures but half a winter: nor could they well sow too late, in another respect; because their corn was ripe the beginning of June, that was sowed in December: what harm then can ensue from its being sown in January or February? for then it will be ripe in July, which is before it can suffer by a cold autumn.—It is plain therefore, it would be very dangerous to import this Italian maxim into England; because we may easily sow too late: for our ground being poorer, if we sow it in May, which is the latter season of English seed-time, it may often be so dry, as never to bring up the corn, and what may be brought up, if the summer be cold, will never ripen kindly; some sort of strong fat lands, and even some cold gravels, may carry it out so late sown.—The latter expressions, (b. b.) are also purely southern, and would deceive an Englishman; but no wonder it was best in Italy to sow their cold land first, whether for wheat or barley; for directions are given by Palladius to sow such wheaten-lands, in September and October;—And those months, and November and December, are drier months than January and February; therefore heavy strong ground may be expected to work better, and the sowing corn into a dry warm bed, especially if land be cold, is of great consequence, whatever weather may come after: and the season of sowing their hot land is as judiciously chosen in January and February, which are wetter.—But this general practice would be destructive to paying rents in England; for the beginning of our barley-season being in March, and the beginning of April, and the grounds satiated with winter-rains, 'tis then commonly the wettest season, and consequently cold lands ought not then to be sown, but hot lands; and therefore with us, in that case, the order in husbandry is plainly to be inverted.

The anti-
ents sow'd
more corn
on an acre
than we
do.

§. 5. If it be well considered, that a Roman jugerum is but little better than half our acre, and their modius a little less than half our bushel; we shall find that the Romans, see their *Rei rusticæ scriptores*, did seed their grounds more than we do, notwithstanding they sowed better land, and it lay so much warmer than ours.—A modius is 26 lb. 8 ounces.

* Pliny orders to sow in an acre, (which is but little above half our acre) of wheat five bushels, (each little better than half our bushel) of barley six modii, of beans a fifth part more than of wheat, of vetches twelve modii, which I think very strange; of chick

* *Tritici quinque modios, hordei sex modios, fabæ quintam partem amplius quam tritici, vicicæ duodecim modios,—ciceris, & cicerculæ & pisi tres modios.*—*Plin. lib. 18. c. 24.*

chick peas, and chicklings, and peas three modii, which is equally surprising.

§. 6. Sharrock in his book of Vegetation, speaking of the season of sowing, says, fol. 10. The most natural time of sowing is that which nature itself follows, viz. when the seeds of their own accord fall into the ground.

§. 7. In the second volume of Collections of travels it is said, that in Muscovy, as well as in Ingerland, Carelia, and the northern parts of Livonia, they do not sow till about three weeks before Midsummer, because the cold, which has penetrated deep into the earth, must have leisure to thaw, notwithstanding which, their harvest is over in August, the sun, which remains so long above their horizon in summer, soon ripening their corn; ^{Time of sowing in the northern countries.} but the Livonians are forced to dry their's by the help of ovens in the barns, after it is brought in, which is subject to many inconveniencies, and make their corn unfit for seed, whereas the Muscovites carry in their's dry and fit to be threshed, fo. 18.

§. 8. A seeds-man is much less apt to sow too thin, going up and down-hill than on a level, because, when he takes his turn up-hill, his steps are always short, and his hand must cast corn at every step; again, going down-hill it is painful to take large steps. ^{Of sowing up and down-hill.} —My carter and seeds-man are very positive in this point, and to me it seems reasonable.

§. 9. If your seeds-man in the cast of his hand back drops pretty much of his seed, which is common to many, who are not right good seeds-men; in the middle of each half of the land, which the seeds-man walks on, you may perceive a thicker list or seam than ordinary, when the corn comes up, as if it had been double sowed, as indeed it has; and the other parts of the ground between must consequently be thinner sowed, by reason of this seed misemployed: old seeds-men will often do this when the wrist of their hand grows weak; but such a seeds-man ought by no means to be suffered to sow. ^{Of a seeds-man.}

My seeds-man says, he has many a day sowed five, and sometimes six quarters of oats or barley per day; though it is a very hard day's work; but wheat, he says, is too heavy a grain to carry so much of, and that three quarters of wheat per day is very good sowing.

§. 10. In our hill-country of Hampshire some sow two bushels and an half of wheat on an acre, and some sow four bushels: I have been at a loss to understand the reason of this diversity. In both cases, the ground being very poor, I do conclude, that where but two bushels and an half are sowed, the land lies cold, ^{Quantity of seeds, and why farmers differ in this in the hill-country.}

¹ Of this see Mr. Tull's and Mr. Duhamel's account in note on Grartries. Article—Of preserving corn.

and is also cold in nature, (as at Easton) and must therefore be sowed early, as in August, whereby it has the benefit both of the autumn, and of the spring-tillow. But in warm, tho' poor land, and lying on the open hills, yet much warmer than at Easton, should they sow early, it would run up to spindle; consequently they are obliged to sow late, perhaps the latter end of September, or the beginning of October;—whereby they lose the benefit of the autumn-tillow, and can depend only on the spring-tillow, which on poor land is not considerable; therefore to fill out a crop they sow it thick, viz. four bushels on an acre.

Of sowing §. 11. Whenever you see corn in flourishing proof, and of a
ill, or un- good colour, tho' never so thin on the ground, you may be sure
seasona- the ground is in good heart, and would have born a great crop,
bly, had there not been some error in the managing it, either by under-sowing, or by sowing the ground out of order, in respect either to it's temper, or to the season when it was done.

Quantity §. 12. Being at Mr. Whistler's, a discourse arose about the
of seed on quantity of seed to be sown in a new broken up ground, rich in
new broke heart.—Mr. Whistler said, he always understood that such ground
up should be sowed thick.—And it is true; this is the practice: but
ground. the intent of this can only be, and the only foundation this practice is built on must be, that the thicker the corn comes up the lesser the ear, and the shorter the straw, and therefore not in such danger of lodging as when sown thin; for then the straw runs to a length, with a long heavy ear; besides, when corn tillows much, as in good ground sowed thin it will do, many stalks or tillows on one root do not stand so firm as the same number of stalks do in the same field, where only one or two stalks stand on the same root.—But this method seems to stint the produce and power of nature, for fear of a worse inconveniency attending the corn by being * more loose, and so apt to lodge;—whereas, in my opinion, this may be prevented by sowing great wheat, or battel-door-barley; or beans, which have stronger stalks, and are not in such danger of falling as vetches, peas, &c. are;—and thus the increase of the ear will not, as in the former case, be diminished.

* loose at
 root.

Of sowing §. 13. The only reason, as I conceive, for farmers choosing
small the smallest and leanest seed for their poor ground, such as ours
lean seed in the hill-country, is, that the large seed has a posse in it to
in poor send forth more tillows than the poor seed, according to which
ground, power if the great seed should exert itself, and the ground by reason of its poverty could not maintain what it had brought forth in a green blade, then most of such blades must die, or starve; in which case, it had been much better to have sown small seed, which would have brought fewer tillows, and those have been well maintained.—What way soever, whether by
 brining

brining or liming your seed-corn, or nicking the seed-season, it is of great consequence, and the first good step to be made, to get good roots from your seed; for, though your ground be poor, the larger and fairer the seed strikes it's roots, it has the larger compass of ground to draw nourishment from.

§. 14. It seems dangerous to sow any sort of corn under fur-
row in gravelly land, or such stony ground as may bind after rain, ^{under fur-}
tho' it should work never so fine; for the ground being inclined ^{row.}
to bind makes the corn require a much longer time to come up,
whereby it runs the greater danger of such weather falling, be-
fore it can come up, as may destroy it.

§. 15. In the spring-fowing-time, in our hill-country, we ^{Offowing}
may venture to plough and sow our ground a little wetter in the ^{spring-}
beginning of the seed-season than we may in the middle and ^{corn.}
latter end of it, because at the beginning of the season the air is
cooler than at the latter end, and the sun not so scorching; and
so the ground ploughed and sowed a little too wet will have lei-
sure to dry moderately, and not be so subject to bake and bind as
towards the latter end of fowing-time, when the season begins to
be scorching.

§. 16. If ground, be it clay or other cold land, has been ^{Offowing}
ploughed when dry in winter, and so early, that the rains and ^{summer-}
frosts it has sustained have flatted it to powder; such lands no ^{corn early}
one should be afraid of sowing to barley, oats, or peas, a fort-
night sooner than usual, in case the season be very dry, so that it ^{on ground}
will harrow on one earth in dust, or stir up in like manner by the ^{winter-}
plough; for, if the earth be in such temper, no frosts, even the ^{fallowed}
very hardest, following immediately on such sowing, can freeze ^{dry.}
the ground, because there is no watery substance in it to be
frozen, and the seed, being put into the ground dry, cannot
freeze, and so must lie in a warm dry bed.—But again, sup-
posing rain should immediately come, and hold for a fortnight af-
ter such sowing, yet ground so ploughed and sowed, as above-
said, will lie very light and hollow, for the air, and winds, and
sun to dry it apace, and will not lie cold to the corn, as cold clays
fallowed and sowed heavy would do, so that your corn will then
lie safe: again, when corn is sowed in such ground in dust, a
moderate rain will not thoroughly wet it, but the ground,
when so dry, will take it without being glutted; and if such rain
should continue for many days, time is gained, and the spring,
by the end of those days, will be much nearer advanced, which
is a great point gained.—But supposing the worst, that, after
many days rain, when the ground is thoroughly wet, a smart
frost should come; neither in this case would corn, sown when
the ground was in such order, take harm; for first, it is to be
considered, that towards March the sun has got some strength,
and

and that frosty weather is usually clear weather, when the sun shines by day, and thaws as deep as the frost went by night, which frosts at that time of the year seldom go so deep as the seed lies, in ground working in dust when sowed, which falls in deep; but supposing the frost should go as deep as the seed sown, it must still be allowed, the roots of the seeds strike downwards, and first form themselves before the spear peeps out of the rind, or shoots through the skin of the corn; so that to hurt the roots the frost must go deeper than is common at that time of the year; but to prevent all possible evil from frosts by sowing corn so early, when the ground invites you to it by so excellent a temper (which I do not easily foresee can happen) the person so sowing his corn may do well to roll it immediately after sowing, whereby the ground so compressed, if rains should fall, and then hard frosts happen, would be able, by being more compact and close, much better to resist the frosts.

Bad custom among the farmers in their sowing.

§. 17. It is the custom of farmers too frequently, both at autumn-seed-time for wheat, and at spring-seed-time for barley, to plough up several acres of each sort a fortnight beforehand, in order to sow and harrow them in immediately, whereby they think, who have a great deal to sow, that they make a mighty dispatch, having prepared so much land beforehand, and kept themselves thereby beforehand in their business, and out of a hurry; but I take this method to be very improper, and ill husbandry, for I have always observed such sowings to be full of weeds.—The reason of which I conceive to be, because in August, and at the beginning or in the middle of September, and in the middle of March, when these beforehand-ploughings are performed, the season of the year is warm enough to set seeds on growing, and the earth moldering under the plough is well prepared for that end, whereby the seeds of weeds begin to chissum or set forth their roots, and to germinate in such land so ploughed up before the corn is sowed, the harrowing in of which when sowed will not prejudice such seeds so as to choak them; no wonder then if you have another crop of weeds along with the crop of the first ploughing, and by harrowing in the furrows fresh seeds of weeds are moved;—but if any ground may be so managed it seems that for peas may, because in such case, if one plough barley-erth for peas beforehand, we plough it about the latter end of February, which is before the season of the year is so far advanced, as to make the seeds of weeds put forth either root or branch, and therefore, in this case, I have known it often done successfully.

Cold, loose land to be sowed early, for wheat or winter-vetches.

§. 18. Those lands that before harvest, on the sun's withdrawing from us, give-out in nourishing and supporting the corn, as, amongst others, cold, loose, hollow, wood-scar land will do, such lands

lands ought to be earlier sown at autumn for wheat or vetches, because in such ground the corn will come but slowly on to establish a root before winter, for the same reason that it gives out the following autumn before harvest; but such ground ought not therefore to be sowed early in the spring with tender grain, such as white oats, barley, &c.—the ground being too cold, such ground also springs later with grass, and against winter grows sooner rowety.

§. 19. There is no article in husbandry of higher regard, and of greater consequence, than the rule of difference and distinction we ought to make between the seasons of sowing light, white, and chalky earth (of which we have abundance in our hill-country) which is generally very poor, and other sorts of earth. By the constant experience of my neighbours husbandry, and my own bought experience, I find, that if such chalky white ground be sowed very wet, the whole crop is like to be very ordinary, tho' the ground was put into the best heart; for such grounds ploughed wet, to the degree of fatness or dawbiness, will certainly bind, and grow obstinate to a greater degree than the stiffest clays so ploughed; so that little corn will be able to come through, nor shall the corn which grows be able to strike roots freely, by reason of the strong union of the white earth; and successive rains, after you have sowed white earth in such condition, will sooner loosen, and open, and mollify the parts of clay-earth, so as to let corn through than of white earth; therefore ploughing such ground wet at seed-time (for fallowing it wet cannot be amiss) or harrowing it wet and dawby is most pernicious: yet it is a common thing for the farmer, when the rainy seasons make it too wet at seed-time to plough other grounds, to plough and sow in the white lands, being deceived by the mellow breaking of such earth, which seems to fall in pieces, all which soon close into a solid compact substance; nay, the very best of the farmers, who are afraid of, or avoid the former evil, will in such case run into another, when the white earth is too wet to plough and sow at the same time, viz. they'll plough up such lands, and take the opportunity of sowing them when they are dry; but this is bad practice; for the inner parts of these lands bind and squat together below the harrow tinings, so that the corn cannot strike roots, and if rainy weather continues two or three days after it is thus ploughed, the top of the earth will bind and squat also; so that the harrow tinings will never heal the corn, nor open the ground, though they go twenty times over it. The farmer will also, through dispatch, in a hurry of much business, sow his ground in this wet condition, which brings commonly an additional affliction; for, if wet weather follows, his corn must lie above ground unharrowed, exposed to the birds, and will soon grow,

grow, which will oblige him to harrow it in more wet, and unseasonably, than otherwise he would; and these are the consequences of sowing spring-corn in white-land, either over or under furrow.

Offowing white earth that is grassy.

§. 20. A crop of corn sown on white earth, after it has lain down long to grass, is hazardous, if there come a hot summer after it; a second crop does better; your corn may then with drags and harrows be let in as deep as the plough goes, and, being rolled, will indure the heat and want of rain.

Rule for sowing spring-corn.

§. 21. It is much in the power of farmers to make a short harvest every year, which would be much to their advantage. This might be effected by the order of sowing the different sorts of corn, viz. to sow the rath-ripe and earlier corn so in order, that they might be ripe nearer together, and as early as possible. To do this it is but employing the more hands in a shorter time, whereas there are too many farmers, who, for want of this contrivance, or out of a delight they have in employing but a few hands, so sow their several sorts of corn, as to cut them with the fewest hands in a lingering manner, not considering how much is lost by the thinness of the corn in measure, in a backward harvest, besides the too frequent damage by rains in being late.

Of sowing SUMMER or WINTER-CORN early on one earth.

§. 22. The reason of sowing summer or winter-corn early on one earth is, because the ground being closer and firmer underneath than land often stirred, the corn cannot so easily enter with it's roots, and gain a depth before winter or summer advances.

Advantage of sowing early.

§. 23. There is a great advantage in sowing early, where it may be done, by ground being in it's nature warm, and lying warm, and being skreen'd from north and easterly winds. It is no small inducement to it also, where it may be done with good husbandry, in consideration that the straw of the corn will be so much the shorter, whereby it is evident the strength of the ground will be so much the less exhausted.

What land not to be sowed early.

§. 24. Such land as was hard ploughed, and thereby subject to weeds, or was pot-dunged, a farmer, of whose judgment I have a very good opinion, said, he chose to sow about the middle of Michaelmas, because the sowing such land of the first sort early made it subject to weeds, and if pot-dung was laid early on ground it would be apt to breed weeds.—I asked him, how the early sowing of land hard ploughed made it subject to weeds. He replied, that much ploughing brought weeds; I suppose cutting the roots into pieces that grow, as it is by colts-foot, which being ploughed in early gets a-head before the winter comes, but being ploughed late is apt to be killed by the winter.

§. 25.

§. 25. ^m Though white and clay-land may bring corn of very good change for each other to sow, yet in a cold country, where both those sorts of land are cold, and consequently bring a coarse and thick rin'd corn, I do by no means allow of such feed for change, as before hinted. The change of earth to seed is not of that consequence to a crop of corn, as is the sowing in of seed in perfection into a cold ground in a cold clime.

So much depends on the goodness of your seed, that Mr. Hillman of Berkshire, a gentleman of great experience in husbandry, said to me, I verily believe a farmer, that sows clean feed, and good change, may live as well upon his farm as the land-lord could do, that had that only farm, and kept it in his own hands, but sowed foul feed, and was careless in his change; for what signifies it to give one shilling in the bushel extraordinary for fine feed-wheat, when three bushels will sow an acre, the produce of which may be supposed to yield twenty bushels that will raise twelve pence per bushel extraordinary; besides, if foul feed be sown, the burden cannot be so large; for a great deal of it will be taken up in weeds.

It is however to little purpose to sow the cleanest of seed in the common-field-lands; for it will never come out fine again, because the neighbours in sowing cast over some of their seed into each other's land.

§. 26. Any wound to the nib of any seed, wherein the smallest fibre is damaged, grows up and increases with the plant, as a wound in the bark of a tree: any imperfections in the leaves of bean-stalks, when they first come up, or other seed leaves, seem to owe themselves to this cause.

§. 27. Towards the latter end of May (1707) I sowed garden-beans in a strong piece of clay-land in my garden; the ground being in heart, I expected a crop of beans in the beginning of August. The seed-beans were ^{*} finnowy, and somewhat damaged withinside (for I broke many of them) being laid in a dampish place; the halm or stalk came up well, and they blossomed well enough, but not one kid came of all the blossoms, though I sowed a spot of ground two or three lugg-square: the chief end for which I instance this, is it's relation to a preceding observation, that defective beans proceeded from defective feed.—And this is the more

^m The common opinion, says Mr. Tull, is, that the strong clay-land is best to be sent to for seed-wheat, whatever sort of land it be to be sown on; a white clay is a good change for a red clay, and a red for a white; that from any strong land is better than from a light land, and that sand is an improper change for any. But from whatever land the seed be taken, if it was not changed the preceding year, it may possibly be infected with smut; and then there may be danger, tho' we have it immediately from never so proper a soil.

more observable, because in the blossoming-time frequent and great showers of rain fell, and continued so to do till August, so that this failure could not be attributed to any blight, or want of moisture, but to the defect of the seed only.—I also had this spring some summer-goar-vetches, that had been harvested wet, and lain all the winter sodden in their kids, and when threshed they were finnowy and stunk; I doubted whether or not they would grow; I made a trial of them in the garden, but not half of 'em came up; so I sowed about two acres of 'em in a treble quantity, but having ten acres to sow, I bought seed for the other eight acres, and I observed, though I know the whole ten acres were of equal goodness, that the vetches of the damaged seed did not produce one tenth part of the kids the sound seed did, though the halm of each was much of the same goodness.

Mr. Bobart, of the physick-garden at Oxford, gave me some Smyrna cucumber-seeds, of which very few came up, but none of those came up which he reserved for himself: the reason was, as Mr. Bobart suspected, because he kept his too long in the mucilage, after he had taken those out which he gave to me; and I do suspect that mine also, though not kept so long in the mucilage as to perish wholly, had however in the seed of the seed received a perish; because, though the fruit came up very fair, being twelve inches long, yet every seed of some hundreds of them wanted a kernel. The like defects I have already observed in beans, whose seed hath been defective, and bore no kids, though they blossomed, and others I have had bearing kids, and yet not seeds; all which, as well as that of the cucumber, proceeded from the defects of those parts of the plant, which had been formed perfect and compleat in the seed, but had, while in that state, received some damage, so as to occasion a putrefaction in them, more or less, according as they were more or less tender; for as the plant by glasses is to be seen perfect in the seed, so the respective parts of flower, pods, and seed of the pods, though smaller than a mote in the sun, may for as much reason be conceived to be fully formed in the seed: it is plain the kernel of the seed is not so tough or firm a body, as the plant itself, or as the pod, or the skin of the seed, the kernel being at first but a thin gelly or mucilage, and therefore more liable to be damaged. It may be refer'd to the above observation of the Smyrna cucumbers, that, of those exotic plants, which come from warmer climes than ours, though they are of a strong nature, and grow well with us, yet many will not blossom with us, and some, that will blossom, will not seed; because, as the blossom is more tender in the seed than the plant, so is the seed of the seed more tender than the blossom. Lucerne grass rarely seeds with us, though it flowers, but the jessamine never; and it is
very

very probable there are such defects in mulberry, grape, and fig-seeds here in England, that from the seeds of the fruit growing in England, they can never be propagated in England, tho' from their seeds they may be propagated in other countries: this also may seem to account for the degeneracy of the foreign coliflower-seed, when sown in England, from whence, in two or three years time, if sown from seed raised here, no flower will proceed, but only a cabbage-head. Thus apple and pear-trees have been known not to produce kernels, which I suppose was from the damaged seed; and I do therefore believe the cyons or cuts of such trees will not produce kernels; of oranges, &c. likewise it is supposed the first failure is in the seed: Mr. Bobart says, oranges rarely seed in England.—Heat and drought, as well as cold, will, I doubt not, hurt the seminal juices of a plant before any other part; for in the very hot and dry summer, in the year 1705, I found few apples that had any kernels in their seeds, though the cotylidones seemed perfect enough, and I question whether under the tropics, or near them, the apples bear seeds, or the husks of the seeds kernels. Seeing therefore that fruit is never the less perfect, though it has no seeds, quære whether the stamina farinacea in the flower does not contribute to the well-being of the fruit as well as the seed; (God having intended the fruit for the use of mankind, as well as the seed for propagation) otherwise the blossom that proves seedless ought to fall, as it is observed to do when the stamina farinacea are wanting; for then the whole design of nature is defeated, both in reference to fruit and seed.

§. 28. The farmers of Crux-Easton, and this hill-country, buy ^{Change of} their seed-wheat from Newbury and that country, because they seed. are on a white earth, whereas Crux-Easton is on a red earth; and the country about Newbury buy their seed-wheat of us, because to change is thought best.—The changing the seed of all grain whatsoever is of as much use and service as half the dung sufficient for a crop; therefore the farmers are often to blame for not changing so frequently as they ought to do; if their corn prove good and fit for seed they will sow it a second year, and so it may do tolerably well, but longer it will do very ill.

I have a great opinion of the advantage of changing seed every year rather than once in two years; for I sowed barley of the last year's seed in the beginning of April, and I sowed part of the same ground, but a clayier piece of land, with fresh seed of this year's change, on the last day of April, which ought to have been the coarser barley, whereas it proved full as white and fine, if not finer than the other.

§. 29.

The order in which different crops should succeed one another.

§. 29. Pliny takes notice, that the rule laid down by Virgil is, to let the land lie fallow every other year, which, if the farm be of sufficient size to admit it, he thinks is a very good way, but if you are straiten'd in conveniency of this kind, he advises to sow wheat after lupines, vetches, or beans, or any other grain that has the quality of fertilizing and enriching the ground.—This is to be well noted, because in England, where our land is worse; the farmer, if he pays twelve shillings an acre, will not imagine rent can be paid, unless he sows it every year, and he will not lay it down to grass.

Of sowing peas after wheat.

§. 30. Some farmers approve very much of sowing pease after wheat, and then barley, and say, it will make a better tilth for the barley, and be the lighter, inasmuch as the ground lies down a year with wheat, and but half a year with pease, therefore better to sow barley after peas than after wheat; but it seems to me the best way is (inasmuch as it may suit other circumstances of conveniency) to sow the clay-land to peas, and then to barley, because the clay-land will be the better mellowed thereby for barley, and the whiter and mixt land to wheat, and then to barley, because the whole year such land goes with wheat will not prevent it's working unkindly for barley.

Peas do best on barley-ersh.

§. 31. The country people say, peas do best on a barley-ersh, and of this I have spoken more at large under the article Peas, to which I refer the reader.

To sow wheat after peas on clay-land.

§. 32. Farmer Wingford falling into my company, I told him I purpos'd to sow my clay-land to peas, and then to barley, and lighter land to wheat and then to barley: he replied, I might also sow very well in my clay-land sow wheat after peas, which I remark, because I think it properly said; for peas will be a manure to wheat on such land, and not make it so light as to be subject to blight, and clay heavy lands in Wilts are so managed.

I ask'd farmer Elton, why I should not on the strong clay-land of Crux-Easton sow wheat after peas, seeing strong clay-land could not by being lightened by the peas-stubble be subject to blight, and it was the method of many countries, where their land is of a strong heavy clay, to sow wheat on peas or vetch-stubble; he replied, they had on the clay-peas-stubble sowed wheat the same year at Crux-Easton, and it had sometimes come well, but for the most part ill; for the worm had in October, November, and December fallen on it, and eat it up. I put afterwards the same case to farmer Biggs, and he said, if the season proved dry for sowing wheat after peas, the wheat generally proved

Virgilius alternis cessare arva suadet, et hoc, si patiantur ruris spatia, utilissimum proculdubio est; quod si neget conditio, far serendum, unde aut lupinum, aut vicia, aut faba sublata sint, et quæ terram faciunt lætiorem. Plin. lib. 18. sect. 10.

proved well on clay-land ; but, said he, if the peas-stubble be wet when ploughed, the land being hollowed by the peas-stubble will lie very cold, hollow, and wet the whole year after, and the wheat, if a bad winter, die away. I replied, when I spoke of sowing wheat after peas, I did not mean the sowing it till the year after. He said, he thought there could be no better husbandry than that, and free from the before-mentioned inconveniences.

I observe, in Wiltshire, where the said husbandry is used of sowing wheat on the same year's peas-stubble, that the ground is of a heavy malmish sort of clay, and consequently not subject to the inconvenience of our dry hill-country strong clay, which is apt to be hollowed too much after peas-stubble ; again, such husbandry is practised often in common-fields, where people will not be at chargeable husbandry ; it is also practised (instead of manure) where lands lie at a distance from a farm-house, and in deep baning lands, where the husbandman dares not trust to his fold.

If one would sow a large quantity of wheat on a peas-ersh, it must, in the hill-country, be with a proviso that harvest does not fall out very late ; for in that case a large quantity of ground cannot be sowed on a peas-ersh early enough, but a considerable part of it, especially the poorer sort, will be obliged to be sown to barley.

§. 33. It had been a mighty wet winter and spring, whereby Oats may the fallows were well wetted : I had that year a great crop of succeed oats, and but a middling crop of barley, which I impute to the wheat better than barley's lying wetter, by being buried deeper in the cold earth ; whereas the surface of the earth, in which the oats were sowed, barley can was soon and easily rectified, the sun having full power to penetrate that, and to move the salts, &c. for which reason, in such wet years, the husbandman should alter his measures, and sow his barley-fallows on one earth to oats.

§. 34. Mr. Byffy of—near Bradford in Wiltshire ploughed Sowing up a piece of French grass ground worn out, and sowed it on wheat too one earth, and said he had excellent barley ; and the next year he soon after ploughed it for wheat, which whilst he was doing, farmer Sar- French gain came by, and said, that ground would fool him, for he would have no wheat ;—and I, having observed a wheat-stub- grass, condemned, ble of his to be very indifferent, asked him, how it came to pass his crop was so ordinary ; he said, that was the ground above-mentioned, and added, that the corn all blighted ; he thought the roots of the French grass, being not sufficiently rotted or rather too rotten, but yet not converted into mould, made the wheat * more-loose, which I believe reasonable, and therefore * loose at such ground is to be well considered of before so husbanded. root.

What success of grain on new broken up rich ground. §. 35. Mr. Raymond of Puck-shipton in Wilts broke up ground of 30 s. per acre to destroy the ant-hills, and the first crop he sowed was white oats; for, said he, if it be sowed with wheat it will be mad, and come to nothing; the second crop he sowed was some sort of great wheat, whose straw is so large and strong, that it is not subject to lodge; whereas, said he, if sown with any of the smaller wheats, such as red straw, &c. the straw of those are weak, and would certainly, being rank, fall down and lodge; the next crop, said he, I will sow red straw; for by that time the ground will be tamed; and this is the approved method in that country, where rich lands are broken up.

Order of sowing in the Isle of Wight, Hertfordshire, &c. §. 36. The whole method of husbandry in the Isle of Wight is, upon the first tilth of land, to sow peas; on the next wheat, and then barley. In Hertfordshire the method is to sow, first wheat, next peas, and then lay down to fallow for a wheaten crop, or else sow oats after the wheat, and lay down to grafs-seeds.

In Essex, &c. In Essex, and some other places, especially where the ground has been improved by chalking, they first sow wheat, then beans, which, being kept clean by the hoe, they reckon equal to a summer-fallowing, then wheat again, sowing broad clover on their last wheaten crop.

In Wilts. About Holt, it is a great practice to sow wheat after peas, and then peas, and wheat again, not having in those parts so much land as to afford to let a ground lie still for a summer-fallow. They reckon that a peas-crop does the wheat as much kindness as laying it to a summer-fallow.

In Leicestershire. In Leicestershire they sow a wheaten crop the last, and lay down to grafs; the reason they give is, because, the ground having a twelve-month to grow to grafs, the year following they may expect a very good head of grafs; and so gain a year by it; whereas, if they sow it with a summer-crop, they can expect but little show the first year; and Mr. Clark said further, that they counted the wheaten stubble kept the grafs warm in winter, and, as it rotted, the worms drew it into the ground, which made much for the grafs.

Wheat sown on poor land will not yield well. §. 37. I am fully satisfied on experience that whoever keeps land poor, and sows it with wheat, which grain requires land, (according to it's nature) in good heart, it will not only produce a thin crop in show, but also a crop that will fall short in respect of yielding.

Not to be sown on the green stubble of goar-vetches. §. 38. Whatever the practice may be to the contrary, I hold it improper to sow wheat on the green stubble of goar-vetches cut

See the Author's observations on corn in general, where you will find some particulars relating to sowing.

cut for horses: this stubble being ploughed in with the wheat will finnow, and heat, and moldy the ground, and be so far from feeding the wheat with a sweet dish that it will make it produce but small ears, and weak tillows, and thin bodied corn.

§. 39. No wheat can be ensured to be clean seed from oats, if Wheat be sown in the next adjoining ground, for the rooks and near oats small birds will carry them into the wheat-land. brings

§. 40. I have ventured to sow some grounds with wheat after foul seed. a wheaten crop the time before, being summer-fallowed the year Of sowing after for the second crop, and have found by experience that wheat after strong land will bear an excellent crop of wheat after wheat, provided it be summer-fallowed the second year, that is, let the ground rest one year, dunging, or folding it for the second crop; but by experience I find, that shallow light ground will produce but thin wheat, and a small ear, if sowed to wheat after wheat, and a summer-fallow taken between; though the ground be dunged for such second crop, especially if the spring prove cold and wet; for shallow or weak ground being unkind for a crop of wheat so managed, if the spring and summer prove unfavourable to this grain, such ground will shew, it's passiveness, and tokens of such inclemency, much more than ground of but equal strength, when sowed to the first crop of wheat.

OF S O W I N G W H E A T.

§. 41. Lord Bacon, in his natural history, says, he sowed Of steep- wheat steeped in urine and dungs of several sorts, chalk, &c. — ing corn. And that the corn steeped in urine, and sowed in the same earth See Wheat with the rest, came up, and grew bolder than the rest; — There- §. 14. fore it seems of consequence that sheep and other cattle have plenty of water; — But he says not that he let it grow till it came to seed.

§. 42. I had wheat sowed under furrow in a ground which I Of sowing had ploughed, thwarted, and dragged, after which I ploughed wheat un- and sowed the corn in the most husbandlike manner I could; and der fur- indeed the wheat came up in the furrows in uninterrupted paral- row. lel lines, and without any weeds between the furrows. — But farmer

¶ In contradiction to this, Mr. Tull asserts, that, if seed-wheat be soaked in urine, it will not grow, or, if only sprinkled with it, it will most of it die. — A very knowing husbandman, whom I consulted on this occasion, confirmed the former part of Mr. Tull's assertion, and assured me he had found it so by experience, but added, if the urine were mixed with somewhat more than one half water, it would make excellent brine for seed-wheat. — See more on this subject in the author's observations on Wheat.

farmer Ginneway said, that the ground at seed-time working so curious fine should have been sown one cast over the other under furrow, and then the ground between the furrows had been filled, which I believe to be a good way.

By the consideration of a ground where I have wheat sown this year 1706, where the ground had been winter-fallowed, and brought to a curious mold, I am apt to believe, that in our cold climate wheat in such earth should be sown under furrow, that it may lie the deeper; for this crop on the 24th of April was miserably thin, and what blades grew seemed something towards an ink-blue, and the roots seemed matted on the surface of the ground; which makes me believe, that the winter-corn was not buried deep enough; being sown, as this ground was, not till the 25th of September, it lay too much exposed to cold; for, where ground works fine, the earth crumbles in at the first tining, and fills up the furrow; and three or four tinings finishes it, in which case it is not possible it should be well buried.—If ground works well, it is also best to sow vetches under furrow, the dung in that case being laid on the ground after the thwarting it. At sowing, the ground working so fine, the seed was not easily buried, but lay on the surface, which was inconvenient.

Some consideration there ought to be whether you sow under furrow at two earths or three. It seems, if no reason offers to the contrary, that wheat sown on fallows should be sown under furrow on the second earth, because the strength of the dung is turned down to the corn, but, if sown on the second earth, then, for the same reason, to be sown under furrow on the third earth; but if the winter-fold for barley was on lay-ground, the barley should, for the same reason, be sown under furrow on the third earth.

September 14th, 1699, I observed a close ploughing up in Leicestershire, and the corn sowing under furrow; the ground had been limed, and so strangely run to weeds that I wondered at the boldness of the husbandman, and went up to him.—He was sowing his wheat steeped in lime; I observed the grain was plim and very large; I told him in Hampshire we esteemed the lesser wheat the best; he said, in the common-fields, where they gave three earths, which laid the land light, they usually sowed of the smaller seed, but (said he) here we choose a large seed, as supposing it has strength to shoot forth its stalks through the clots of earth it lies under; for it now lies deeper, and the earth closer and heavier upon it than if it were sown after the plough, and harrowed in; besides, if very wet weather should fall upon it, so as thoroughly to wet the trumpery of weeds we turn in, a small grain would be sooner chilled than this large sort.—I asked

asked him, how many bushels he sowed; he said, three to an acre.

Mr. Biffy of Wiltshire being at Easton, I told him of my new husbandry of sowing my wheat under furrow, and ridging it up. — He said, if I sowed it under furrow so, I must take care to be sure that the ground was so thoroughly moist that the corn might grow from such moisture, though no rain should come; for he had known crops often lost, by sowing dry under furrow, — and I remember my carter had told me the same thing.

In North Wiltshire, when they sow under furrow, I find by the account of many experienced husbandmen, that they aim to sow the last of their crop that way, and to sow it on mellow earth, such as peas-ersh: the reason why they generally sow the last of the wheat so is, because it is the latter end of autumn, for the most part, before the ground is well wetted, and in order for it; for it is the greatest caution they have not to sow dry under furrow, but, on the contrary, to sow so wet that they may be sure the corn will grow: but I find they all agree, provided the earth be wet enough, the middle of August would not be too soon to sow under furrow.

§. 43. It seems to me in early harvests, occasioned by hot and dry summers, at which times the wheat is also very yellow, and ripens to perfection, there is no need to sow so early as in cold wet summers, when the harvest is backward, and consequently the wheat more horny; for the ground being heated, or in a manner burn-beaked by the hot and dry summer, and the flour of the wheat dry and mellow, it will come up and shoot away at an incredible rate, and the after-masses of all grasses in the autumns of such summers carry a strong deep green, a token of the ground being impregnated with the heat, and a proof likewise that it has not been exhausted of its spirits, for they were not transmitted into vegetables, being bound up for want of a vehicle to infuse themselves into their roots by rains; but after cold raw summers the autumn-aftermasses of grass has a weak pale verdure.

§. 44. It was May 12th (anno 1700) and time to consider what to do with the wheaten fallows. Several good farmers were of opinion that it was time enough to sow my fallows a fortnight before Michaelmas, because I had dunged them; but, said they, in case one sows a light and poor ground, or a cold ground, without well maintaining it, such ground ought to be sowed the beginning or middle of August.

§. 45. To sow summer-corn dry, and wheat wet, is accounted best for different reasons, viz. in the spring there is no doubt wheat ed best for different reasons, viz. in the spring there is no doubt wheat but wet.

It is a general rule, says Mr. Tull, that all sorts of grain and seeds prosper

but rain will come enough to bring up the corn, and in September, when wheat is sown, there is little danger at that time of the year of so much sun as to harden a crust on the earth, so that the corn cannot get out, though ploughed and sowed wet.—It may not be amiss however, if one sows wheat at the latter end of the year, suppose at Michaelmas, to sow it when the ground is dry; for that time of the year grows cool, and large dews fall, nor can it be long before rain will come; and, if it be cold land, and sowed at the latter end of the year, when the ground is very wet, it will be the apter to chill.

Time of sowing wheat on various soils.

§. 46. In the beginning of August, 1697, I asked a husbandman when the farmer intended to sow a certain field to wheat; he said, in the latter end of August. I asked him how that came to pass, seeing he was already sowing the field adjoining with wheat. He replied, it was because that was such light ground, that it must be sown early, that it might get root before winter came on; otherwise it would be in danger of being killed; but, said he, the former is a clay heavy ground, into which the winter could not soon penetrate, so as to kill the corn; besides, if that were not sown late, the weeds would get ahead.

Practice in the Isle of Wight.

On the other hand, December 19th (anno 1700) I saw ground of farmer Farthing's in the Isle of Wight sown to wheat, which was malmed, and it was not come up; also I observed some other persons sowing then; I thought it very late, and asked the farmer about it. He said, that, in their country (the winter being milder than with us at Crux-Easton) if sandy and poorish land be sowed early, it will have spent it's strength on the halm, or green wheat, before the spring and summer comes, and will not then be able to maintain the crop.

The sowing of wheat in the Isle of Wight late, that is, at the latter end of October, and all November, especially if land be poor, is very good husbandry, (but it seems ought to be well trod, lest it should blight by being too loose) because that country is warm through the vapours of the sea, and it would spend itself too fast, in case it was sowed in September; but it is quite otherwise in many parts of Hampshire, because the cold lies so hard there, that the wheat cannot be too rank before winter, and will settle the better; yet, in case the winter should prove so mild, that it should

prosper best, sown when the ground is so dry, as to be broken into the most parts by the plough. The reason why wheat is an exception to that rule is, because it must endure the rigours of the winter, which it is the better able to do, by the earth's being pressed or trodden harder or closer to it, as it is when moved wet. For this reason the farmers drive their sheep over very light land, as soon as it is sown with wheat, to tread the surface of it hard, and then the cold of the winter cannot so easily penetrate, to kill the roots of the tender plants.

should by being sowed early run to be rank, it ought to be refreshed in the spring by pigeon's dung, or some such contrivance; otherwise a small and weak ear with a weak spindle must be expected.

§. 47. The Hampshire farmers observe, it is not to be expected, that wheat sown so early as the beginning of August should tillow so much, when spring comes, as wheat would do that is later sown; because wheat early sown has already tilled and too far spent itself in the forehand of the year.

I struck in with a notable farmer in company with Mr. Hillman; it was July 24th, anno 1701; I ask'd them, whether some in their country were not sowing wheat; they said, many talk'd of beginning; but, said the farmer, I think they had better let it alone; for our's is a light and sandy ground, and the summer has been very dry and hot, (for not above a shower or two of rain had fallen between May and that time) therefore, said he, these last two days rain (for it had rained plentifully for two days) the corn by virtue of the great heat of the ground will rise up very quick and fast, and run itself out of heart before winter, and dwindle all next summer, for it is in a manner carrying a double crop;—so said Mr. Hillman also.

Many of the hill-country of Hampshire are of opinion, that a fortnight before Michaelmas and a fortnight after are the prime times for sowing wheat in the hill-country,—but I do think all wheat should be in the ground by Michaelmas-day.—It is true, too many of the hill-country do not husband so well as they ought to do; for poor land sown early, if a mild winter should come, may spend itself so much, that at harvest the spindle may be but weak; but if the land were better husbanded, it would bear the running to rankness in the forehand of the year, tho' the winter should prove mild, and have strength enough not to abate of it's crop in the spring.

It was the 15th of September (anno 1702) when farmer Hawkins told me, that no wheat had then been sown with them about Andover; for, said he, our ground puts very forward in the spring, and wheat sowed early would then be too proud.

It seems, that in the hill-country of Hampshire we ought to take care not to sow strong clay-land too late with wheat; indeed, the beginning of September seems not to be too early, for there is no danger of clay-land, lying so cold, being too proud; the dews and cold nights in September and October, the frosts and cold rains in winter, and the cold spring will keep it back; so that it seems in cold clay-land wheat ought to get some good root before the cold seasons come on, that it may be in heart to bear up against the winter; whereas earth of a mixture between white earth and clay being of a drier, warmer, and healthier nature,

and in every of the foregoing respects capable of thriving both in October, and all winter long, how wet soever, as well as in a cold spring, if such land be in good heart, it need not be sowed till the last of all your land.—The mere white earth-chalk might also be sowed as late, but that it is rarely in heart enough.

In Wilts. I was observing to some farmers of Holt in Wilts, it being in the month of March (anno 1702) that their wheat look'd much greener than our Hampshire wheat at this time of the year. They said, it was because it was sowed so much later, and that their's would lose it's beauty, and it's first leaf would die and look rusty were they to sow early.

In Leicestershire. Mr. Clerk of Leicestershire says, if the season be mild, they often sow wheat at Christmase, and that Mr. Chestlin has sowed wheat this year (1699) which is not out of the ground, it being the 12th of February; that if they should sow wheat as early as we do in Hampshire it would be destroyed by weeds, as well as be too rank.

Wilts. Mr. Raymond of Puck-shipton, Wilts, tells me, the notable men, who make their observations in the vale, say, though they should not have a season to sow their wheat so early as they would, by reason of the wet, and are forced to sow late, suppose the middle or latter end of November, yet they find such wheat will do very well, if very hard frosts do not come before it has made a pretty good spear under-ground; no matter whether it has first put forth a blade or not, for by the time the spear is shot under-ground the corn is well rooted.

I have eight or nine acres of brashy ground, tho' reddish and clay, occasioned chiefly by the abundance of stones, which mixing with the clay make it hollow; this ground was fallowed up pretty late in the summer, viz. the latter end of July or beginning of August, with intention of ploughing it again, and sowing it with wheat; but viewing it September the 30th, after a good shower of rain, I found it would work and tear very well on one earth, so as to harrow off at six tinings at most; so, tho' the ground was designed for two earths, yet I sowed it on one earth; for it is of that consequence to get in corn in good season, if the ground will work well, that in the hill-country, where we have a great crop of wheat to sow, no opportunity of sowing may be lost after this time of the year; for it very rarely happens but wheat early sown in such ground as above described, and in the hill-country, comes off better, and produces a better crop than the last sown wheat, tho' we were sure of a season for sowing it.

I ground run to grass. I observed, that a few lands of the abovementioned ground had a pretty deal of grass come up in them, and said to the man, who was there sowing, that I thought such grass would tear up pretty well with the harrows, the ground being hollow, and having

ing lain down but one year.—He said, that he thought also the grafs would do no harm, because the ground would be sown early, and so the wheat would out-grow the grafs, and top upon it, —which I thought a good reason.

§. 48. * The old custom in the hill-country in Hampshire has been to sow two bushels and an half of wheat on an acre in the ground early sown, but in that later sown three bushels and an half on an acre.—The reason they assign is, that the earlier the wheat is sown the more it will shoot out in blades and tillows, and spread farther, whereas the later sown corn will not spread, the cold winter coming on it, and very likely give but one blade only.

The earlier wheat is sowed the less seed is required.

One Parker came to see me with farmer Biggs ; he was speaking of the great fatness of their land for wheat, and said, that at the latter end of November they sowed but one bushel on an acre, and, if in January, but a peck more ; therefore, said he, tho' we give fourteen shillings per acre, we sow a bushel less on an acre; nay a bushel and three pecks less than you when we sow late, for then, said he, you commonly sow three bushels ; so that the bushel of seed you exceed in, or a bushel and three pecks, will abundantly recompence for what we exceed in rent, especially when wheat is at six shillings per bushel ; but then, said he, we give three earths.

I was telling Mr. Bachelour of Ashmonsworth, that I found I had underseeded my wheaten crop that I had sowed in my claylands in September and October this year (1705), and yet I sowed three bushels on an acre.—To which he replied, that of late years he and others had by experience found, that at that time of the year it was best to sow at least three bushels and an half; nay, said he, the ground at that time will take four bushels, and we find 'tis best to sow four bushels and an half of barley, and five of oats on an acre.

As most farmers, who sow any quantity of wheat, propose to buy every year a load at least of seed-wheat for change, so it is adviseable to sow the said load of bought seed so early, and in such forward ground, that they may be likely to house and thresh it time enough for sowing the next year's crop, which, in the hill-country, is by the middle of August.

One ought to contrive to have the clean seed-wheat for a change as early as may be, because it is much dearer than common wheat, and the earlier it is sown it will go the farther, because less need be sown on an acre : again, it is proper to contrive

* Mr. Tull observes, when wheat is planted early, less seed is required than when late ; because less of it will die in the winter than of that planted late, and it has more time to tillow.

trive to sow the choice clean wheat in good land, because the increase will be the greater, whereby you may have the more to serve your own occasions, or to pleasure your neighbour.

Of hand-picking clean wheat for feed.

§. 49. It seems to me cheaper and better to buy middling clean wheat for feed, and hand-pick it, than to buy clean feed, because it costs less to hand-pick that wheat, than what one must give over and above for clean feed, which is never that I know of clean, though pretended so to be.

Sowing early prevents blighting.

§. 50. It is a common expression in countrymen's mouths, that old wheat is not so subject to blight as new,—but, as I take it, the blight is not founded either on the newness or oldness of the corn, but inasmuch as old wheat is generally sowed betimes, and before new wheat can be had, therefore such land is less subject to blight is true.

Again I judge, that, whereas it is said, that wheat sowed early is less apt to blight, the ground having more time to settle, the main reason is, not that the time that later sown ground hath to settle is not long enough before the burning weather and blights come; but that, when ground is sowed early, it has time to settle before the frosts come, which keep heaving and hollowing it, and hinder it all the year after from settling.

Different times of sowing new and old wheat.

§. 51. It is observed, that new wheat and old wheat being sowed at the same time, the new wheat will at the end of the first three months be above a week forwarder than the old: for this reason I advise to sow old wheat at the first and earliest sowing, if you fear winter-pride, but new wheat, if you sow late, and fear it will be backward in tilling.

Of ploughing in britted wheat for a bastard-crop. * brit shed.

§. 52. In a hot summer, when harvest comes early, before the strength of the summer be far spent, when the wheat is yellow, tho' not hardened and thoroughly ripe, it is incredible how soon, if the ground be wet, * britted corn will grow. I had some acres this summer (1714) blown out by a high wind, enough to seed the ground for a bastard-crop; and what fell in crivesses and chinks, the wind coming with rain, grew to be five or six inches long in ten days time; so that in such cases, if you think to drag or plough it in, the sooner the better; and, if you plough it in, the shallower the better, and the furrows as narrow as may be; that, if it cannot get through the furrow, it may have the less way to shoot slantwise before it meets a seam to come out at.—The less grassy any ground is, and the more knot-fine, so much the narrower will the furrow turn up, or break by the plough.

OF

! See the author's observations on Wheat.

OF SOWING BARLEY.

§. 53. Sow barley in the dryer lands, says Varro; so that, in those hot countries, they did not look on their land too hot for barley.

§. 54. It was Christmasts (anno 1702) and farmer Biggs, farmer Crap, Mr. Bachelour, and farmer Hascall were with me: I proposed to them the advantage of sowing barley and summer-corn earlier than they did by a week or a fortnight, in case the land was in any good heart, and in dust, for the damage by what might die by bad weather would not come to so much as was always lost by drought.—Farmer Biggs and farmer Crap were of my opinion, but Mr. Bachelour differed from us, which seemed to arise from his sowing poor land early, but I grounded the supposition on the land being in good heart; however we all agreed, that the earlier barley was sowed the finer it was, and the later the coarser, which must arise from the first having it's growth from it's earing in a hotter time, whereas that sowed later has much the colder time; so rath-ripe barley is generally the finest. Farmer Biggs said at another time, that a week's sowing earlier than ordinary was of great avail to the fineness of the barley.

Time of sowing barley—should be early sowed.

Considering therefore the small dispatch in ploughing the second earth in the spring, and the danger of being late, and also caught in the wet, it seems to me most reasonable to hire ploughs to help the first dry season that offers, and not to trust to the contingency of dry weather; for, tho' you should continue hiring the whole barley seed-time, yet you will be well repaid for it by putting your corn in early, which will carry the finer and larger body.

Captain Tate of Leicestershire says, that it is allowed that their early sowed wheat and earlier sowed barley are the best, and that, if the season permits, they begin to sow barley the beginning of March;—to that therefore I must attribute the fineness of the barley of the north, seeing they lie wetter than we do at Easton, and seeing that we at Easton have finer barley than at Burclear, &c.—where they are on the clays, they sowing as late as we do; yet there should be some difference in soils, seeing Captain Tate named a place in Yorkshire, where he said was the finest barley in England, which would be ripe and in the barn in eight weeks time.

In Leicestershire.

In Yorkshire.

§. 55. At seed-time, in sowing the barley into the ground, the farmers are much governed by the season of the year; for, unless the ground be very dry, and has had warmth by some good weather

Time of sowing barley on different kinds of land.

¶ In aridiorē hordeum potius quam far serito. Varro; fol. 34.

weather preceding, they hold it not proper to sow their barley, in fallowed land that they stir again, till about a week in April, because, if much wet should fall on such land after sowing, it would lie sodding, and be apt to chill the corn, but on white land which they sow on one earth, if the weather be dry, they often sow a week before Lady-day; for from such land the water runs off and sinks down the better; besides land so sown is usually white land that is naturally dry and warm.

Mr. Worlidge in his *Kalendarium Rusticum*, fo. 270, says, About the end of March or earlier, you may begin to sow barley in clay-land, but not so early in sandy-land.—The only reason of which, as I apprehend, is, that hot weather coming on apace at that time of the year, the clay-land is very subject to bake; therefore it is best to sow barley there before the sun has such power, whereas the light land is in no such danger; and since, as above, you find that barley to prove finest that is sowed earliest, so, as clay-land naturally brings the coarser corn, sowing it the earlier may much mend it.

Why
weeds a-
bound in
early-
sowed
barley.

§. 56. It is observed by many, that, when they have sown their barley very early, the crop has been almost eaten up by weeds; the only reason to be given for weeds in early-sown barley more than in that sown later is, because many weeds and their seeds are of a more hardy nature than barley, and will grow early, whilst the spring is as yet cold, and may get the forehand of the barley, and over-top it.

Time of
sowing
barley in
Leicester-
shire.

§. 57. February 1st, (anno 1669) I observed a close of about twenty acres belonging to a farmer of Hawthorne in Leicester-shire, which had been fallowed up but the week before, was sowing to barley; thinking it was very early I asked the farmer, who was in the field, whether it was common in that country to sow so soon. He answered, that they generally found the barley first sowed proved best, and so said others whom I spoke to about it.—This ground kirkelled very fine, and was of a curious fat light mold, lying very warm amidst the barns and houses of the town, and upon a shoot, that neither rain nor snow could lie long on it.—I spoke to Mr. Clerk of it, and he said, by the middle of February all the common-fields and inclosures would be sowing with barley: this was as warm a winter as had been known.—He said their grounds were very apt to bind by heat, and therefore the barley was better if it was pretty high; whereby it kept the ground cool against the time the hot weather came upon it.—He said, the snow at this time of the year never lay long with them, but he approved of late sowing where the snow lay long.—He added however, that the farmer abovementioned sowed his barley a fortnight the earlier in hopes it might be reaped the sooner, and so he might be the forwarder in his turnip-feed-time.

§. 58.

§. 58. My opinion is, that such grounds as are early-sown in a cold hill-country, the land itself being also cold or clayish, ought to be sown with a late-ripe barley, especially if such land be declivous from the sun, or hidden from it by hedge-rows; for the straw of rath-ripe barley being in it's own nature weak, will be much more so where it has not it's share of the sun, and where the cold clay-ground gives off it's strength sooner, after the sun's passing the solstice, than other ground; on this account the straw of the rath-ripe barley, for want of being supported and nourished to it's maturity, rather withers than ripens, and then the straw must needs crumble or fall down; and the grain will plim no farther, but dry away and be very thin; but the straw of late-ripe barley, being bolder and stronger, will stand the longer; and, tho' the sun should be withdrawn, and the corn should lie under a shade, yet, so long as it stands upright, the straw will convey so much nourishment to the grain, it being sown early, as to ripen it kindly, even notwithstanding the disadvantage of being shaded from the sun.—Yet, if I may advise in this case, I should rather propose in such ground as lies from the sun, or is shaded, especially if it be clay and cold in its nature, to sow white oats; for they will have finished their course sooner, if sown pretty early, and will ripen before the strength of the sun shall be much declined.—If to avoid the aforesaid mischiefs late-ripe barley be not sown, and there should come a cold wet summer to add to the evils aforesaid, rath-ripe barley being sown will fall much the sooner, even while the straw is green, and will then never come to maturity, but from the roots new tillows will shoot forth with green ears, which will neither ripen themselves, nor, by drawing away the nourishment, suffer the first and elder ears to ripen.—The reader may see more relating to this subject in my observations on Barley, where I have treated more largely of the nature and qualities of this grain.

§. 59. Four bushels of barley is generally the quantity allotted to be sown on one acre, but, if the ground is very good, they may sow five bushels.

Mr. Edwards of Leicestershire sowed this year (1699) four bushels of barley on an acre, because his barley was not good; when his seed was good he used to sow but three bushels and a peck at most; upon which he argued much to prove, that it was most profitable to sow the best seed, for what of the other will grow, said he, nobody knows.

§. 60. If the fallows are very dry, barley and oats may be sown somewhat the earlier; for it is a great matter to throw seed into a dry bed, especially if cold and wet should come after. Summer-corn may be killed two ways by cold, 1st, by the chill and coldness of the earth; 2dly, by the fierce season and coldness of the air:—

Now,

What kinds of barley to be sown on different soils.

Quantity of barley on an acre —Hants. Leicestershire.

If the fallows are dry, barley and oats may be sown earlier.

Now, if corn be sowed when the land falls into powder, tho' cold rains should fall after, yet the land will lie so warm as not to chill the corn; and if the root is not starved, tho' the blade should be taken off, that will grow again; but if ground be ploughed wet, and such weather should come, the corn will be in danger of being killed both ways.

Different seasons of sowing barley in the hill and vale country, in regard to wet and dry.

§. 61. The general proverbs or the wise sayings of our ancestors relating to husbandry seem rather to have been calculated for the vales than the hills; for the hill-country was of less consequence till the late improvement by sowing grass-seeds. The ancients used to say "barley should leap on the ground, when sowed out of the hopper,"—which exactly suits the condition of the vales, where commonly they begin to sow their barley at the latter end of February or the beginning of March, when it is impossible such deep lands should at that season be too dry; they are rather subject to the other extreme; but in the hill-country, where the lands are light and poor, I have often experienced, that we have sown in the spring, when the ground has been so dry that there was no likelihood, except rain came, of seeing half the corn come up, and we have often waited a month for rain; the consequence of which has been thin barley, and an edge-grown crop; therefore, if my ground be rightly prepared by seasonable fallowing, so as to work fine at seed-time, I never fear sowing my barley too wet, provided the ground be not in danger of treading*.

OF SOWING BARLEY and OATS.

* put forth roots

§. 62. How much cold is an enemy to vegetation may appear from seeds being put into a glass of water; for many days they will not* chissum, nor imbibe the water; but their pores will rather be closed than opened by the water, it being cold; for which reason I conceive it not to be good to sow the lenten corn in cold clay-lands, especially barley, early;—for it seems not to be good to check seeds in their progress to vegetation, for not proceeding in that case is going backward, and such damage may the seed receive in a few days, when first sown, as it can never after recover.

Of oats.

§. 63. I cannot find in the four ancient authors *De re rustica*, that any of them give any directions about sowing oats: It seems they had an opinion, that they were a grain to be neglected, being, as Virgil has it, of a burning quality, and exhausting the land, and they having other variety of corn for their cattle.—On review I find

* Of barley's degenerating, and cautions to chuse the fullest and best bodied seed, see our author's remarks on Barley.

I find the following brief direction in Columella ⁷ Oats are sowed in autumn, and partly cut up green for food, and partly reserved for the sake of the seed. The seed here to be laid up seems intended for seed again; for I cannot find any directed for feeding horses, &c. in these authors. If these oats were to be cut green, no wonder they preferred other sorts of leguminous corn.

§. 64. I inquired of a farmer in my neighbourhood about feed- Time of
oats; and whether he had any to sell: he asked me if I thought it sowing
not too early to sow them yet, it being March 27, (anno 1703) oats.
for, said he, I once sowed oats at this time of the year, and in
good land that I had designed for barley; but cold dripping wea-
ther came, and I had not two bushels in an acre.

§. 65. A field of mine having born three crops, the last of which Time
was vetches, I sowed the fourth with white Poland-oats: the of sowing
ground ploughing very fine, and harrowing in dust, I was the ra- white oats.
ther inclined to harrow them in on one earth, since I could lay
them in a warm dry bed, the ground being very dry, which in-
duced me to do it so early as the 9th and 10th of March, though
it was sooner than I had ever known them to be sown.—There
followed a very dry cold spring (anno 1713) without rain till the
first of May, when there fell a plentiful rain, which went to the
roots of all corn; one fourth part of the oats sown never came up,
and those that did, looked spiry and weak till about the 20th of
May, and then, warm weather coming, they thrived wonderfully
in tillows, rankness, colour, and breath of blade, so that it was
plain the ground was in sufficient heart; but they were sown too
early: it further appears that they were only sown too early,
because the upper part of the ground, though by much the
best, had not half the crop of oats the lower part of it had; the
reason of which was that the upper part lay most exposed to the
cold.—From hence it is plain, that two or three days before the
end of March, or after the beginning of April, is the time for
sowing white oats, and, if the ground be ploughed just before
sowed, they will lie the deeper and warmer.

§. 66. Five bushels of oats is the quantity they sow in the hill- Quantity
country on an acre;—but, if there be a strong elbow-wind at the of oats to
time of sowing, there must be half a bushel extraordinary allowed an acre
to an acre, whether oats, barley, or wheat, but a face or back- in the hill-
wind signifies little, nor the elbow-wind neither to peas or vetch- country.
es.—There are some farmers among us who sow but four bushels,
but that quantity is not sufficient to seed an acre properly: though
the seed be very good they ought not to sow less than four bushels
and an half.

§. 67.

⁷ Avena, autumno sata, partim cæditur in fœnum, vel pabulum, dum
adhuc viret, partim semini custoditur. Columella lib. 2. c. 11.

Quantity of wheat, barley, and oats sowed on an acre in Leicestershire.

§. 67. Hugh Clerk of Hawthorne in Leicestershire, and Mr. Clerk of Ditchly assure me, that, on light lands in the common-fields, they sow six bushels of barley in a lugg, that is a chain-acre, though but four in clay-land in the same fields.—I asked Hugh Clerk the reason of it; he said, because, if the light land was not filled with corn, it would be full of weeds. I asked him whether the clay-land would not be the same, and if so, why he did not sow as much on that; he said, the clay-land would have as full a crop with four bushels as the other with six, for from one grain the clay would put forth three, four, and five stalks, whereas the light earth would not yield above one or two stalks.—I saw this sort of clay-land last abovementioned, and I thought it was half clay half sand.—On the lighter land they sow three bushels of wheat, on the heavier but two, and of oats not above four bushels on the light land, for, said he, there is more of that grain goes to a bushel.

White oats to be sown thick.

§. 68. At Whitchurch farmer Perry and Mr. Bunny had discourse with me about the nature of white-oats:—they both on their own experience agreed that they were to be sown very thick, because they would not tillow nor multiply like black oats;—therefore, said they, five bushels ought to be sowed on an acre.—Farmer Crapp agreed afterwards that they would not tillow like

black oats; but others I find are of a contrary opinion, as I have Vid. Oats. Of the til- lowing of whiteoats. observed in my remarks on oats. ^a Mr. Ray says the white oat will degenerate in poor ground, and become a black oat.—See my observations on oats.

OF S O W I N G B E A N S.

§. 69. ^b Palladius tells us, it is a rule laid down by the Greek writers, that all corn of the leguminous kind should be sowed dry, except beans, and they ought to be sowed wet.

Time of sowing beans in Wilts:

§. 70. In Wiltshire they sow beans in December and before Christmas.—Farmer Miles said, it was observed, that those beans kidded best, and he thought the reason to be, because such beans, being checked in their stalk by the cold weather, did not spend their strength, when at the same time their roots were getting a fastening in the ground, whereby they so much the better fed their stalks when spring came; whereas the beans sown late, having no check, run into halm, and draw faster from the root than it can afford, and so the root has the less strength for kidding.

§. 71.

^a Si ager paulo sterilior sit avena nostra alba in nigram degenerat. Ray, fol. 42.

^b Omnia legumina Græcis auctoribus seri jubentur in sicca terra, faba tantummodo in humida debet spargi. Pallad. lib. 1. sect. 6.

§. 71. August 30th. (anno 1721) I shewed farmer Sartin of Beans, if Broughton in Wilts the two acres and half of beans I had sowed; sowed ear-ly on the strongest and best part of the ground bore the worst beans, ly on and the lighter land by much bore beans excellently kidded.— strong clay-land; I had been at a loss for the reason of it, but as soon as the farmer entered that part, which was the strong and cold land, he said, to be sowed those beans looked as if they were sown too wet.—On reflection ed dry, I well remembered, that I feared, when they were sown, that part of the ground was too wet. Why, farmer, said I, should beans be sowed as dry as peas? he said yes, if ground be strong clay-ground, one need not fear sowing them too dry in February or the beginning of March, for so early in the spring the ground could not but be moist enough to bring up the beans.

§. 72. I was asking farmer White of Catmoor in Berkshire, How to how he would advise me to sow horse-beans, whether to plant plant them or sow them; he said, he thought in our country we could horse-not well plant them, because, our land being very stony, the beans in stick for the most part would not enter the ground, and it would stony-also be very difficult to hough them;—but Major Liver did not ground. apprehend these to be objections, and said, if I planted them, I must plant by a line across the furrows, because there is no good houghing with the furrow, the earth not being so well raised about them.—About Catmoor they often sow beans and peas together.

§. 73. Mr. Ray supposes, that the seminal leaves first swelling do Of the se- afford the first nourishment to the nib or radicle to shoot, which minial having gotten root does again nourish the seed-leaves, which do leaves of again communicate their oleous and salt particles to the plant; seeds. but, says he, in seeds, whose leaves or seminal lobes do not rise above ground, as in beans, peas, vetches, and other legumens, the radicle, as far as I have observed, does afford no nourishment to the lobes, which therefore cannot properly be said to increase and augment, tho' they swell very much, occasioned by the watry humour, that insinuates itself into their pores, as into a sponge. Ray's Proleg. fol. 28. For this reason the seminal leaves or lobes of these grains may not be much the worse for sowing, tho' the lobes are partly cut off. The root of every plant makes a beginning, and shoots downward before the plumbe stirs and advances upwards; for the plumbe is included between the lobes of the seed, and so the moisture or vegetable parts of the earth cannot come immediately to it, and lend their assistance, as they can to the outward part of the nib, which sends forth the root, and therefore the root must make it's first advance.

The roots shoots first;

* See the article Beans.

OF SOWING PEAS.

Of sowing peas under furrow. §. 74. Many good farmers I have conversed with on the subject of sowing peas, agreed, if the ground was very dry, and worked pretty fine, it was best to sow peas under furrow;—but, if they were sowed under furrow when the ground was wet, and a dry season should come, the ground would be so starky that they could not come up.—By sowing under furrow there is this certain advantage, that the peas are secured from pigeons.

In Leicestershire. Feb. 12th, (anno 1699) they were sowing peas under furrow in the common-fields in Leicestershire, and also harrowing some in.—I asked Mr. Clerk what rule he went by for harrowing in peas, or sowing them under furrow; he said, if the land was light, they sowed under furrow; but if heavy, they ploughed and harrowed in; or though the land was clay and heavy, yet, if it had had a frosty winter, whereby it broke and crumbled well under the plough, they sowed under furrow, or sometimes, tho' land in it's own nature light, having had an open wet winter, should work heavy, they have nevertheless sowed peas under furrow.

The great danger of sowing peas under furrow, the ground being wet, is, if rain should come upon it, and after that a baking sun, the earth will have a glazy crust at top; now a pea will shoot forth a stem or wire, which shall work upwards, though a foot under ground, but the danger is, lest the bud, or leafy substance it shoots out when near the top, being broad and tender, should not be able to get thro' the said crust, and so be buried.

Farmer Lake of Faccomb, a very understanding husbandman, is not fond of sowing peas under furrow; he says, they are so long in coming up that the knap-weed, and other weeds get up before them, and are apt to smother the peas, and if the land lies on a slope, it is hard to plough shallow enough, and so the peas may be buried.

Farmer Carter of Cole-Henly being with me, we were talking of peas; he said, he had always observed, when peas are sowed under furrow, if the furrow ploughed heavy and close, so that the peas could not shoot upright, but were forced to shoot aslant for a good length before they could get out, that, tho' such peas halmed well, yet they never blossomed nor kidded well.—This is very probable, and agrees with what has been already set forth, viz. That where a plant receives any injury, the first is in it's seed, as being the most tender part, the next is in it's blossoms, &c. Note, It is very obvious, that where the pea runs slanting under a furrow before it can get out, it must spend itself, and it is also visible, that it loses of it's health thereby in it's being whitened and blanched.

The

The wet spewy clay about Holt in Wilts, of which sort that In Wilts country does much consist, if kept in arable, is mad by much rain, if heat or winds follow; for which reason the countryman is forced to sow his peas under furrow, and to leave the ground and furrows rough upon them, without harrowing-in the grain, in hopes that, if rain come, the ridges will molder and tumble down, and then grow mellow, that so happily the peas, if the ground breaks kindly, may come through the earth under which they are covered, and, if the earth be too close, that they may notwithstanding come through the seams of the furrows; thus their lands when finished lie like summer-fallows for wheat, for the finer they make their grounds the faster they bind, if rain should come and dry weather follow, so that no peas could come through; whereas in the rough manner (above described) in which it lies, the heat and rains together contribute towards the moldering of the earth; tho' this way is subject to many inconveniencies, (as before set forth) yet under the circumstances abovementioned. I know not how the countryman can do better; but where such lands do abound, those parts of England will never get the name of corn-countries.

Farmer Reynolds of Liverstock in Hampshire, speaking of sowing peas early under furrow, said,——it was an old proverbial speech, that

“ The longer peas lie in their bed
“ They will rise with the better head.

Which observation I have found to be true.

§. 75. February the 3d and 4th (anno 1713) I sowed four acres Of sowing with Cotshill-peas under furrow.—February 5th to 10th I sowed peas early under furrow ten acres with great grey partridge-peas; 'tis true, under furrow we had no stinging sharp frosts to endanger them that way, but row. we had a very long cold dry spring with easterly winds, yet I could not observe that either of these peas suffered by being sowed so early, but flourished much the better for it.

Iles, my tenant in Wilts, and Smith of Dead-house had sown In Wilts. the same grey partridge-peas under furrow the 25th of January, in mellow good ground, and throughout the spring I observ'd the halm to flourish very well, but at harvest, there having been an exceeding dry spring and summer, they, like the generality of the Toplough peas of that country, bore very short and but few kids, whereas up the I had long ones, and my halm extraordinary well kidded, not ground in only of this sort, but all the sorts of peas I sowed, viz. blue-the hill-peas, and poplings, early in their season, which I attributed to the country summer-fallowing my ground.

§. 76. I am clearly of opinion, that in a cold hilly country, and some time before you more especially if the soil be clay, which is therefore the colder, sow rather ripe peas. if

if you sow any of the rath-ripe peas, which are the tender sort, such as poplings, blue-peas, or Henley-greys, it is prudent to plough up the ground a fortnight or three weeks before it be sown, that it may be dried and mellowed by the air, wind, and sun, and then to take an opportunity of sowing the peas when the ground is in the temper above described, which cannot in such a situation be too nicely regarded; for the common way of sowing after the plough the latter end of February, or beginning of March, especially if the grain be tender, is still the more improper, because the earth will at that time turn up a little moist and cold, which so early in the year chills corn: whereas by turning up the ground a fortnight or even a month before you sow it (according as your ground may require time for mellowing) you'll be able to command a fit time to sow your seed in, a few dry days rendering land chaffened, dry, and friable; nor will land ploughed up dry in a cold country so early as January or February be apt to bring weeds by lying fallow.—I would also recommend the same way for oats or barley, if sowed by the middle of March, before the weather is warm enough to set the seeds of weeds a growing by the earth's lying in such manner tilled.—But when I recommend the ploughing up of land a fortnight or even a month before it is sown, it is not meant of strong land; which will not by such time be brought to harrow, nor of light ground, which works knot-fine: for, if rain in the interim should come, such ground will quatt, and the furrow will fill up and lie foggy and wet long after; but such ploughing before-hand is meant of ground, which for the most part will hold a furrow, or plough with some roughness, yet so mellow as to shatter either by dry or rainy weather.

§. 77. Being in Wiltshire I inquired of the farmers, viz. farmer Earle, Mr. Smith, &c. why they did not sow popling or grey Barbage-peas; I found they thought those peas too nice to sow in their cold lands, and said they did not do well with them, but that the hot and sandy lands about Scene and the Devises might be very proper for them.—Note, it is my opinion, when any pea is sowed early under furrow, if the land be somewhat mellow and friable, as in that case it ought to be, and also to be very dry when the peas are sowed, the best way is, after the peas are sowed, to let the furrows lie unharrowed for some time, it may be for three weeks or a month, for the roughness of the ground will be a great means to keep the peas warm from frosts and winds, and dry from rain, whereas, if such land be harrowed off fine, immediately after the peas are sowed, it will lie wet and cold a long time in January or February before it can dry again, that being the wet season of the year, and no sun to dry it;

Difference of peas in hardiness.

Best to let the land lie unharrowed some time after sowing peas.

it; but if such land be harrowed only two or three times a month after sowing the peas, they lying deep will only have rooted, but not sprouted, nor will any of them be torn up by the harrows; this method will protect the peas from cold till the fierceness of the season is over, and secure them a warm bed at first putting in by the harrows covering them and shooting off the rain, which is of vast consequence to all sorts of corn.

§. 78. A neighbour of mine sowed peas on fallows, being dry and in good order, but, before he could finish the harrowing them, came a snow; after the snow was melted, which was in a day or two, he sowed more in the same ground, being of the same goodness, and harrowed them in, the ground working pretty well, but not so well and mellow as the former: of the peas of the first sowing he had treble the crop he had of the latter sowing.—I conceive, for the solving these two notable instances, we may compare corn to an egg, which has the sanguinea gutta, of which Pliny says, “certò saltat palpitatque,” and the many damages that sanguinea gutta receives on the first incubation, either by thunder or shaking, or chill the egg takes, are reckoned up by the Roman writers. Now, in like manner, in the germs of corn there is a *punctum saliens*, a minute vital principle, which moves, and which receives an immediate check, if laid in a cold bed, which has a notable ill effect throughout its whole progress of vegetation afterwards; and a warm dry bed, which enlivens it, has, on the contrary, a good effect. I think there is no room to doubt but that there is an innate action in seed, more than is merely mechanical, implanted in it by God Almighty, (it is this, which in its *punctum saliens* inclines the root to take downwards, and the stalk upwards; otherwise the first conduct in vegetation is unaccountable) and that the seed has this power of action seated in itself purely relative to the thing it performs, and confined only to that; nor is this strange, seeing the union of the soul and body in man cannot be resolved without flying to Omnipotence; it is the same of the animal life with the body of brutes, and it is plain the things of this creation move within peculiar spheres of subordinate gradations; we may therefore well believe there is a power of action thus confined, which partakes not of any agitations; this may be termed a moving spring, elater, or pulse; nor is it rash to affirm such a motion we cannot see; for who can see the motion of the index of a clock? and yet, that a motion can be a thousand millions of times less, none can deny.

Peas chilled by being sowed after snow.

Of the *punctum saliens* in seed.

§. 79. On lightish or whitish ground, or such ground as one may suspect to be too light for peas, in my opinion they ought to be drilled when sowed, and drilled at a tolerable distance, that

Of drilling peas on light ground.

that a sufficient quantity of earth may be houghed up to cover the roots of the peas, in order to keep them moist, and to break the scorching heat of the sun, which brings blights, choaks them up in blossoming-time, and occasions other evils, which may be the chief reason of drilling about Burbage.

Peas—the
season of
fowing
them.

§. 80. I asked several knowing farmers when was the best season to sow peas. In this country, said they, peas as well as vetches require to be sown early and when the ground is dry; if they are sowed when the ground is very wet, or if much wet falls upon their being sown, they will be apt to burst, and swell out of the ground, so that they'll lie above ground.—I asked them, how it could be that a pea could swell out of the ground; they could not tell that, but one of them said, he believed there was no more in it than that the rain washed the earth from them.—I asked them, what they meant by an early sowing, and when was the best time to sow peas; the farmer last mentioned said, he thought the latter end of February;—the rest agreed to it, and said, if they were sowed so early they would be likely to kid before the blight came, which otherwise would breed a caterpillar that would eat them up.—They told me little yellow worms sometimes would swarm on them.

Where elms, maples, and furze are, the butterfly, that breeds the caterpillar, lays her eggs, rather than in the peas, which shews instinct for the good of her kind; for the butterfly chooses what is best for the nourishment of her brood, not herself, who is fed by the juices of flowers, and the honey-dews.

It was January the 18th when my bailiff asked me when I would sow the farther part of a certain field to peas; he said he would not advise me (unless I sowed them under furrow) to sow them till a week within, or the middle of March; for, said he, the land has been hard driven, and is but poor, and, if sowed too early, the peas may come up and receive a check by cold weather, which they will hardly recover; it is the same with oats; therefore, said he, about the middle of March is the best time for sowing peas in poor land, but if you sow them under furrow, they may be sowed the latter end of February, because they will require a longer time to come up.—Ashmonsworth-down is poor land, and they are ignorant when to sow it, and commonly they sow it too early, whereby I have known that ground to have had three starts, and as many checks by the cold weather, which has brought their crop to nothing;—it is true, added he, farmer Bond sows peas the latter end of February, but then his ground is good ground, and lies warm.

I find

I find it is the opinion of the best husbandmen in these parts, To be that a good crop of peas depends very much on the early sowing ^{sown ear-} them.—Major Liver says he never missed of a good crop, if he ^{ly.} sowed early, tho' in the coldest part of the whole farm.—He said, it being then February the 12th (anno 1701) if the ground had been dry enough he had sown peas before that time.

Mr. Edwards assures me that on Christmas-day farmer Elton sowed the Cotshill-peas, and never had a better crop.

If you sow hotspur-peas in the field, says Mr. Randal, you ^{The hot-} must not sow them till May, because, if they ripen before other ^{spur-pea} corn, the birds will devour them. ^{to be sown}

This year (1715) I sowed an hundred acres of peas; part ^{of late.} the land I sowed with great partridge-peas, both under and on ^{Of sow-} furrow, from the beginning of February to about the 20th day: ^{ing differ-} these peas were sowed dry, and they flourished exceedingly, hold- ^{ent sorts} ing their own, and prospering throughout the summer.—March ^{of peas.} 19th I began to sow the rest of the land with blue peas and poplings; these peas were all stunted, and continued in an unthriving condition, with a small leaf, and pale of colour, till about the 8th of June, when by means of warm weather they grew established and mended in all respects, and got into a thriving way; yet these peas were sown when the earth worked well, and was in season, all the peas-land having been summer-fallowed. The reason of this difference between the prosperity of the great partridge-peas, and that of the blue peas and poplings I take chiefly to be this, that cold dry churlish winds coming, and cold rains falling from the latter end of March till the middle of May; though they had very little or no ill effect on the great partridge-peas sowed the beginning of February, because their roots were not only well established, but the ground was also by that time settled to them, yet the blue peas and the poplings had not established their roots, nor was the ground settled to them, and so they became passive both to the cold winds and the cold rains.—If it be objected, that the great grey partridge-peas are much hardier than the blue poplings, and that the difference might lie in that,—I answer, 'tis admitted that the great partridge-peas are a hardier sort of peas than the blue peas or the popling-peas; but there being at least five weeks difference in the time of their being sowed, that sets them on the level with each other in respect to their hardiness and tenderness.—And if it be farther objected, that cold churlish winds and cold rain might as well have fallen on the former as on the latter sort of peas, soon after the great partridge-peas had been sown,—I answer, we had a great deal of such weather then also; but by constant experience I have observed, that peas sowed very early, the ground being dry, and in good order at the time of sowing, do bear the cold weather, cold rain, and cold

cold wind, which then happens, better than the peas sowed from the beginning to the middle or 20th of March do bear the same sort of weather, which usually falls about that time of the year, without respect to the tenderness of any particular sort of peas, (for I have sown both blue peas and popling-peas the latter end of February) because it fares with grains, *cæteris paribus*, as with our bodies, viz. that cold rains, cold winds, and cold air in the months of April and May pinch us, and make us more sensible of their effects than those of February and March, when our pores are closer, and the capillaries hardened; for in April and May the sun-beams play on us by lucid intervals, and open and soften the pores and capillaries, whereby the cold penetrates deeper, and we are more sensible of it; and thus stands the difference between the young tender roots of the latter-sowed peas, viz. the blue and popling-peas, because they are tenderer, and the great grey peas sowed earlier, because they are hardier, and so their roots are hardened, and struck down deep into the earth, and the earth is well settled about them before the sun from April to June acts by fits on the ground to the prejudice abovementioned, whereas otherwise, as hardy a pea as the great grey partridge-pea is, the stalk and leaves, if sowed at the time the other peas were, would sicken also upon the same occasion.—It may be demanded now what remedy can there be prescribed to help this; I answer,

Caution-- —By all means roll these latter-sown peas the first opportunity to roll the dry weather you have, after you have sown them, the ground latter-sown peas being then also dry; those sowed the beginning of February need it not; but be sure to roll the latter-sown peas as soon as you have half or a whole day's work for a team cut out, (which we commonly reckon from ten to twelve acres) and delay it not out of impatience to sow your whole crop of peas first, for such delays are fatal; a team, that rolls ten or twelve acres in a day, can in lieu of it plough but one acre.—Note, I and the whole country neglected snatching this opportunity on account of dripping weather, but dearly paid for it.

The quantity of peas on an acre. §. 81. Of the great grey Cotshill-peas three bushels and an half used to be sown on an acre, but the ground about Crux-Easton is not good enough for them; of the grey partridge-peas they sow here three bushels on an acre.

This year (1700) peas being housed dry, the more will go to a bushel; so possibly three bushels and a peck may do to sow an acre; otherwise it is best to sow four bushels; for peas, according to the countryman's observation, never thrive well till they can take hands with one another, that is, by their strings, which they can never do if sowed thin: when they can climb up by one another they shade the ground.

July

July 20, 1701, I observed my peas, being well kidded, were fallen on the ground about three weeks before they ought to be hacked, from whence I did infer another benefit from sowing them thick, viz. that, by handling one another, they were able to stand up the longer before they were pulled down by the kids, whereas by being pulled down too soon, if wet weather should come, both kid and halm might rot. Farmer Biggs says, he had a servant that one year sowed five bushels of peas on an acre, for which he was very angry with him, but however he never had better peas.

Palladius tells us, and Columella and Pliny agree with him, that peas are to be sown the latter end of September, in light, mellow earth, and in a warm moist situation, and we have seen indeed, that this dry summer, 1705, has been more ruinous to peas than any other sort of grain. The quantity Palladius prescribes to be sown on an acre is four modii, or three, he says, may be sufficient; whereas we sow four bushels, that is eight modii, tho' we begin not till March, and of vetches we sow not so many as the Romans^d.

Of S O W I N G V E T C H E S.

§. 82. Palladius says, vetches should be sowed as early in the morning as the dew is off, and should be covered in before night, for otherwise the moisture that falls in the night may corrupt and destroy the seed.

§. 83. Farmer Elton told me, it was agreed to be best to sow Winter-winter-vetches dry; the ground could not be too dry for them; vetches to he said they were a ticklish grain, and it was good to sow them be sowed early, by Michaelmas;—but, said he, I once sowed them when ed dry it was so deep in wet that my horses trod as deep as the plough and early. went, being loth to let them lie still, and people who came by thought me mad, but I never had a better crop of vetches.— Three days after I dined with Mr. Whistler, and, speaking about vetches, I said they were a ticklish grain; yes, said he, but they need not be so, if people pleased; for I was told it by a wife husbandman forty years ago, and have found it true, that, if you sow vetches very early and dry, you'll have vetches enough.— What, by Michaelmas would you have them sowed? said I.— Ay, said he, by the first of September if you can; the winter then will never hurt them; they are to be sowed at a leisure-time, when the ground may be too dry for sowing wheat.

Between the 29th of August and the 4th of September, 1719, To be sowed
I ploughed and sowed to vetches eighteen acres of a barley-stub-
ble dry.

^d See the article Peas.

ble, which had been sowed to corn for several years before : the whole summer having been exceeding dry, the ground ploughed in ashes, and had no moisture to bring up the corn ; I chose however to sow it in this condition, (tho' I had no prospect of the vetches growing without rain) because I was apprehensive, that, if rain came, the ground might fall so flat, and so close together, that I should not bury the vetches. By the fourth of September aforesaid, I had sowed to vetches another field of fourteen acres, a wheat-stubble, it being also all in dust. After sowing I trod them both with sheep. Notwithstanding this great drowth, yet by the 19th of September the vetches in both these fields were come up, thick enough for a crop ; so that it must be concluded, by the beginning of September there is, by night, a coldness and moisture in the air, which enters the earth, sufficient to make a vetch grow : barley also is of the same nature, for the barley by this time came up very thick in the first mentioned field among the vetches, I having ploughed in the barley-stubble.—The sowing of vetches in this manner succeeded to admiration, for, as they came up at first extremely well, so they held their own all the winter, and when I viewed them the 7th of June (the time of noting this observation) the whole crop stood as thick on the ground as the ground could well bear, insomuch that it was not only the most flourishing but the thickest crop I ever had ; for, judging from their thickness, one would conclude that every vetch took root and grew.

Or, for want of an early season, to be sown very late.

Mr. Edwards ploughed for vetches about seven or eight days within September, but if happened to be so wet he could not sow, nor could he harrow till the 24th of October, when he told me he would not sow them till towards Candlemas, for that the middle time of sowing vetches (about St. Leonard) was the worst of all ; he allowed the early sowing was the best ; but, said he, the middle sowing, which is about the beginning of November, and so on, is the worst, because there is warmth enough in the earth to bring up the vetch, which will in all likelihood be tender when the frost comes, and so be cut off by it, whereas what is sown the latest, suppose before Candlemas, when the ground is cold, will, if frost and cold weather come, lie buried without coming up, and so take no harm. This to me seems to stand to reason.

Season of sowing goar-vetches.

§. 84. I have found by experience, that it is not good to sow goar-vetches so late as the beginning of May ; for they will not, if it should prove a wet cold summer, come to a good growth and bulk, and yet will be very gross and sappy, and unfit for horses, especially when the heat of the summer is going off, as towards the latter end of August ; and, if you design them for dry fodder, they will be so late ripe, that their grossness will occasion their lying out so long, as to be in great danger of being spoiled.

§. 85.

§. 85. At autumn (anno 1719) I was so late in sowing that I could not sow winter-vetches till the 18th of October, and got finished by the 24th.—The season was too wet, and the ground ploughed and harrowed as heavy, but not heavier, than we generally desire it should for wheat, not so wet as to tread in when harrowed; the winter continued very mild to the beginning of February, when there came a little frost; yet the vetches never thrived, but looked very dwindling, and of a russet colour, which I imputed to their being sowed so wet, and so late in the year: I believe, tho' the ground had been as wet as it was, they had not succeeded so ill had they been sowed five or six weeks earlier; and yet this ground was in a very friable condition, not clay, but a mixed land, and lies on a descent to the south-east. The vetches continued in an unthriving way till the first of February, when a hard frost came with an easterly wind, which held for a month, and it killed the whole crop root and branch.

§. 86. If a ground lies a slope to the north or west, the earlier you sow it for winter-corn the better; because in August and September the days shorten apace, and such grounds have but the little sun then, not so much as to make early-sown corn winter-proud; besides, such corn will ripen the sooner, before the sun loses its strength over such grounds the following summer.—I sowed at the latter end of September, 1702, vetches in a field that lies from the sun, the ground being also poor; they kept blooming to the last of August, and yet were very short, and the land was white land. I sowed wheat, just by the said vetches, after Michaelmas, which ripened as early as any; but then the ground was very well maintained, which must make the difference.

§. 87. If vetches be dry they sow two bushels on an acre; if swelled with being moist, two bushels and an half, because they take up more room.

Three bushels of winter-vetches on an acre is more than is commonly sown, especially on white land, because they generally kid well on such land, but I think three bushels not too much for red land, because they may kid the better for it, and not run so much to halm.

§. 88. It is good to have such plenty of winter vetches, as to be able to save seed in halm for sowing the next year; because it is best to sow them early, i. e. by the beginning of September, vetches of the same year's seed being seldom ripe so soon, nor can they be got to be threshed till Michaelmas.

§. 89. A neighbour of mine was imposed on, and instead of the winter-vetch bought the summer-pebble-vetch-feed, which he sowed, and, though the winter proved mild as ever winter did, yet in March they were all dead, and the land was ploughed up again; which I mention as a caution to others. The pebble-vetch is a summer-

Mischief
from sow-
ing win-
ter-vetch-
es wet and
late.

Ground
sloping to
the north
but the north
to be sow-
ed early
for win-
ter-corn.

Quantity
of vetches
on an
acre.

To save
seed for
sowing
the next
year.

Care not
to be im-
posed on
in buying
a seed.

summer-vetch, different from the goar-vetch, and not so big; they call it also the rath-ripe vetch.

Vetches §. 90. I was telling farmer Pocock of ——— near Hunger-
two year old will housed, and that they came up well.—He replied, that he had
grow, also fown great partridge-peas the second spring after the harvest, and
peas. they grew very well; but, says he, I kept them in the mow till
near the time I sowed them, for otherwise, as he supposed, had
they been threshed long before seed-time, they would not have
grown so well.

OF S O W I N G T I L L S.

Tills--best §. 91. Going from Crux-Easton to Holt I observed in the fat
on good strong clay-lands between Pewsey and the Devises beans on one ridge
land. of land, and tills on another, and so to continue interchangeably
for some miles.—I thought tills had always been sown on light and
poor land; therefore I asked a farmer I met whether tills grew
well on such land; he said, the stronger the land the better the
tills.—I asked him if they sowed not tills on two earths, the
ground being so heavy; he said, sometimes they did, and some-
times on one earth, as the land worked. Again I asked him, when
they sowed the tills, he said before their barley, that is in March.
Time of I found by him that two bushels, and two and an half were
sowing. sowed on an acre: the tills on that land were the best I ever saw.
Quantity on an acre.

To sow §. 92. I was advised by the country-people, where tills are
barley much sowed, to sow a bushel of barley in every acre of tills;
with tills. they said it would serve the tills to climb up by, and the rudder
would easily separate them.

§. 93. I told my neighbouring farmers that between Pewsey and
the Devises, in mighty strong land, they sowed two bushels, and
two bushels and an half of tills on an acre. They replied, it
must then be because, their land being so strong, if not sowed
thick, they would run too much to halm, but in poor land they
thought a bushel and a peck on an acre was sufficient.

OF S O W I N G G R A S S - S E E D S.

Quantity §. 94. That seeds will not grow unhulled, or extra cotyledones,
on an see the Experiments made by Malpigijs in beans, lupines, &c.
acre. yet quære; for we know hop-clover unhooded grows well; but
then that hood seems the pod rather than the rind or cotyledon,
the rind going and growing with the seed still. The bran or
cotyledon is taken off of oatmeal; quære of that therefore, and
whether it will grow.

§. 95.

* See the author's remarks on Vetches.

§. 95. James Young, my tenant in the Isle of Wight, and I were Method talking of clover-feed: he said he had been acquainted with a huf- of sowing bandman who lived about Guilford in Surry, who told him, the clover in the method of sowing it there was, after the barley was sowed, to Surry. roll the ground, which laid it so smooth that the clover-feed might be delivered as even as you pleased, and then to sow it, and give it a tining-in.

§. 96. My bailiff, who was many years a farmer, assures me, Of sowing that in the hill-country of Wiltshire he has often known hop-clover-clover and broad-clover-feed sowed with wheat, and it has born seed with the winter very well; he has likewise sometimes known clover-wheat, seed sowed among green wheat in March, without harrowing it barley, in, with good success.—Another, a Wiltshire farmer, told me he &c. had often known hop-clover sowed with the wheat in Wiltshire, and he thought it the best way, especially if the ground was out of heart, for then it would pay better than taking a crop or two of corn after the wheat; one gets a year's forwardness of the clover by it.—He says likewise, that not far from Puckshipton, where the ground is pretty rich, he has known the hop-clover sowed a month after the barley, lest it should prove too rank.

§. 97. In September, 1719, I sowed broad-clover-feed with Of sowing wheat on twenty-nine acres of land; I dunged about seven-ing broad-teen acres of it with cow and horse-dung, and the rest with the clover fold, or with pigeon's-dung, or malt-dust; I laid, I believe, near with forty load of pot-dung on an acre: it proved an exceeding mild wheat. winter, with a cold and wet spring and summer, insomuch that near a month before harvest the wheat lodged: I had a very great crop of wheat, yet, notwithstanding the dunging, and the mildness of the winter, and the frequent rains throughout the spring and summer, the broad-clover did not at all injure the wheat, though the wheat-harvest did not begin till the 20th of August; then I began to cut this wheat, but the broad-clover was neither rank nor high, so as to prejudice the wheat, but seemed rather to be too thin set on the ground, nor had it made any effort towards flowering; yet by a fortnight after the wheat had been cut the broad-clover appeared very thick on the ground, even so as in many places to be matted; the leaf also was very rank, fat, and gross, notwithstanding much natural grass grew up with it.—What deserves farther to be observed in this case is, that in the spring of the year the wheat came up so very gross, that, for fear of a lodgment, I was forced to put my whole flock into it for three mornings to feed it down, and they without doubt fed on the young broad-clover as well as on the wheat, yet it seems Of sowing such feeding did the broad-clover no harm. ing broad-

§. 98. The 10th of October (anno 1720) I went into my clover in neighbour's wheat-stubble to view the broad-clover he had sown wheat in among spring.

among his wheat in the preceding spring, and before he had rolled it.—He was of opinion it succeeded very well.—I found the broad-clover to have come up very thick, but it had a very small leaf, and was less sappy than my broad-clover sown when I sowed the wheat, which makes me conclude, that the seed sown so late could not penetrate with it's root into the ground so well as mine, nor find nourishment and maintenance like my broad-clover sown with the wheat, when the ground was new harrowed; therefore it is my opinion, that when spring comes, the late-sown seed will decline and fall off.—I also observed his clover thrived better where the ground was mere clay than where it was a mixed earth; and note, this had been a very wet spring and summer; otherwise, sowing his clover as he did, he would have had but little come up.

Broad-clover damages barley, if a wet spring and summer succeeds.

§. 99. This harvest (anno 1720) farmer Crapp of Ashmonsworth, Hants, assured me, that, it having been a wet and cold spring and summer, he was worse in his barley by 40 l. for sowing broad-clover with it; for four or five weeks before harvest the broad-clover had so eat out the barley, that the straw dwindled, and carried no substance, and the barley had but a thin body, and, when it comes, said he, to be threshed on the floor, it will thresh so heavy, that there will be no threshing it out for the broad-clover, which will deaden the stroke of the flail.—He says, if broad-clover be sowed with oats, it does not do well on one earth.

Of sowing it with rath ripe barley.

It seems to me, that since broad-clover must be sowed in good strong clay-land, the rath-ripe barley is the fittest to be sowed with it, because it also requires good land, but more especially because it will be early ripe before the broad-clover can grow to that height as to prey much on the barley, or so that swarths of it must be cut with the barley, which may occasion the corn's lying out the longer, for the broad-clover to wither; it will also be cut before that time of the year, when the dew falls in great quantities on the broad-clover-grass, which would prevent the barley from being dry enough to be housed.

Of sowing it with oats.

Since so much has been said of the damage that broad-clover often does to a crop of barley, for the better security against such evils, it seems reasonable to me, to lay down to broad-clover with a crop of oats: first, because, being sowed earlier with oats than with barley, it will not be in danger of growing so rank.—Secondly, tho' it should grow rank, it will not prejudice the oats as it would do barley, because oats may lie abroad a week after they are cut, and take rain without damage.—Thirdly the ground laid down to oats is commonly in a poorer condition than ground laid down to barley, and therefore the broad-clover will be less liable to grow too rank.—Fourthly, oats are generally ripe before barley, and housed before the feeding weather of autumn comes, especially

especially on the latter-sown barley, which sets the broad-clover a growing, and makes it very rank before the barley can be cut.

The farmers of Wiltshire choose rather to sow broad-clover with black and white oats than with barley, provided the ground works up mellow, and they say, the broad-clover will be the better crop, and the more certainly so, for being sowed so early as the oat-feed-time, nor will it ever hurt the oats.

One of them, a very understanding man, speaking in relation to his sowing broad-clover with his oats, told me, that he always dragged them in with their country-drags (which are not so big as our's, and have six tinings on a harrow) and this he does, tho' his ground had been ploughed up but a fortnight before; but he commonly sows broad-clover on ground ploughed so long before as Candlemas, which never will, tho' it works mellow, fall too close for the drags to tear it.—

§ 100. Mr. Randolph and Mr. Short Baily of Wiltshire discoursing with me about hop-clover-feed, Mr. Baily assured me, that having once two or three quarters of hop-clover-feed by him, and having a wheat-stubble, which he observed the following spring to be pretty clear of weeds, and pretty hollow, he flung in his hop-clover-feed without harrowing it, and had as good a crop as at any other time. This he said on an occasion I gave him, by saying, I would try an experiment on my side-lands by sowing them with rye-grass at spring, on the oat-stubbles harrowing them in.

§ 101. A noted farmer, near Uphaven, informed me, that it was the best way to sow hop-clover with French-grass; that he sowed seven bushels of French-grass on an acre, and with it a good sprinkling of hop-clover; the advantage of which was, that it filled up those spaces that missed between the French-grass, and kept down the weeds till such time as the French-grass could overcome all.

§ 102. It is my opinion, that if the ground works light and fine, French-grass-feed ought to be sown under furrow, because (as I have elsewhere observed) if it be sown on furrow, it is apt not to be healed.—To which add, that French-grass-feed in it's husks, being very prickly, is not apt as the harrows move, to fall deep into the earth, and tho' fallen deep enough, yet by means of the prickles, which catch hold of the earth, it is apt to be harrowed up again.

About Crux-Easton the farmers think they cannot sow grass-feed too deep, sowing it often with corn, and harrowing it in afterwards; and I have known hop-clover mowed for feed, which, standing too long, flattered, and after the grass was mowed wheat was sowed under furrow; the ground was harrowed fine, and the hop-clover came up with the wheat as thick as could be desired,

so

so that I am satisfied, if the earth be light at top, there is no danger of burying it.

March the 12th (anno 1707) I sowed French-grass-seed under furrow : no rain material fell till the 22d of May, being near ten weeks, during which time the sun was very hot with dry winds and cold nights : in this dry time I often scratched up the ground, and found the lobes or seed-leaves out under ground, but, tho' sown under furrow, at a perfect stand, not able to advance farther without rain, and before rain came, the seed-leaves did a little languish, and seem to have spent their stock of juice, so that I began to fear the crop would die under ground ; but plenty of rain coming, I did between the 30th of May and the third of June observe the seed-leaves coming plentifully out of the ground, which was near three months after sown. I likewise observed some oats, sown under furrow the 18th of March, appearing the first of June ;—I also observed many stems of these French-grass-seeds to be bit off under ground, by worms, they not being able to get food above ground by reason of the drought : the insects of the field are a great prejudice.

Damage
from
worms.

Grass-seed
may fail
by sowing
it on wet
fallows.

§. 103. Many have sown grass-seeds when fallows have worked wet, and have had no grass, which might as well happen from the wetness of the ground as the badness of the seed ; for if barley, which carries so strong a blade, can hardly get through ground that binds by wet, how should it be expected of grass-seed so sown, the blade of which is so much weaker and tenderer ? I alledged this to a good farmer of my acquaintance ; he replied, that, as he thought, grass-seed could not fall in so deep as to be bound.—I answered he was mistaken, for the last tining of the harrows let in the grass-seed as deep as the first did the corn, of which I convinced him by going out and digging up the seed.

Broad-
clover, &c.
to be sown
thick.

§. 104. I hold, that, in the hill-country, broad-clover ought to be sowed thick, because the grass will be finer for sheep, not so gross as otherwise it would be, and consequently, if rain falls, it will quickly be dry, and, if rain should not fall, the hay, when mowed, will be the sooner made by four or five days, and being cut in it's juice before the flower dies, it will not take the damage that it would do, provided it was cut ripe.

I was complaining to farmer William Sartain of Broughton in Wiltshire that my broad-clover at Easton was very sour, occasioned by the coldness of the land—He said, if I sowed twenty pound of broad-clover on an acre instead of twelve or fourteen, I should find it the sweeter and finer for it, and it might be farther improved in sweetness, if I fed it very close, and did not let it grow to any height.

In

In discourse with Mr. Randolph, and Mr. Short Bailly of Wiltshire, Mr. Randolph highly commended the sowing all grass-seeds in a greater quantity than was practised, especially, said he, French-grass-feed; for, if it be not sowed thick, if a hot summer comes, it will burn, and other grasses, if they be not sowed thick, will grow gross, and then, if at mowing-time a difficult season should come, the crop must stand till it is a little over-ripe before it be cut, and so it will lose its goodness, whereas, had it been fine by means of sowing thick, it would take little damage.—In Wiltshire they generally sow three or four bushels of rye-grass-feed upon an acre, and Mr. Raymond advised me by all means to sow no less than three bushels of hop-clover on an acre; for, said he, if you sow but two bushels, you will find abundance of vacancies, which would have carried grass, had the seed been dropped there, the vacancy not being for want of strength in the land, but because it had no seed fell in it.

§. 105. Seeds or kernels that are conical, as much as I have observed, have their root and spear at the narrow end, whereby, when they fall, that end inclines most to the ground †.

EXPERIMENTS on the GROWTH of SEEDS.

§. 106. I had often observed in the spring-time, when the blades of barley first began to shoot out of the ground, dew drops standing every morning on the points of the blades, even when the grass of the field, which was run into leaf, had some mornings no dew thereon; this made me believe they proceeded not from the descending or circumambient vapours of the air, but from juices drawn up by the roots, which passed upwards thro' the tubes and issued out at the top, which according to my conjecture was true, as appears by this experiment I made.—I took a pot of fine garden-mold, and placed it in my study; the earth was but moderately moist, and I put into it a handfull of barley; when the barley shot up about half an inch or an inch, at the end of the points appeared the said pearly drops; I wiped them all off, and carefully took up half a dozen of the blades of barley by the roots, then with a pair of scissars cut off the roots close to the grains of corn, and covered them in the same earth again; the next day I looked on the blades, and found the pearly drops of water settled on the blades as before; but on the tops of those blades, whose fibrous roots I had cut off, not the least moisture appeared, though the blades continued in a good verdure through the moisture of the earth they were put in; this shews plainly, those

† See our author's observations on Grasses.

K

watery

watery globules are not collected from the moisture of the outward air, but from the juices drawn upwards from the roots. I again wiped off the said drops, and within three hours after found the tops of the blades were supplied with fresh drops, which trickle down the stalks when they swell to such a bulk as to break, and again soon renew themselves. This experiment was made in a mild-time in December. From hence it appears that moisture must hold proportion to the roots; and it gave me farther occasion of admiring the wisdom of God in this appointment; for observing that these exudations are, as soon as the sharp-pointed blade appears, continually sent forth, we may ground our judgment on reason and probability, that this moisture immediately begins to discharge itself, as soon as the spear is shot thro' the end of the barley-corn, which softens the earth upwards, as the blade pushes forwards, and facilitates the easy passage of the spear: I conjecture it is the same in all the grassy sharp-pointed plants for the same reason. The roots of corn and beans also terminate in a sharp point, as they tend downwards, and, seeing it is so in the spires which ascend, I do very presumptively suspect, that there is a continual exudation of a moist liquor from the points of the roots, to moisten and soften the earth before them, to facilitate the roots penetrating downwards, as it helps the blade to push upwards.

A cold soil will not ripen corn so as to make it fit for seed. Experiment in barley.

§. 107. Tho' this last summer (anno 1711) was a dry summer, yet it was not a hot summer by any means: I malted barley in November which had taken no wet in harvesting, and was seemingly very dry and hard: I wondered to find in every handfull I took in the malt-floor at least one hundred grains that did not come: I stayed till it came round to the kiln, and then took twenty of the grains which did not sprout with root, and put them the third of November into a flower-pot with very good mold, and set the pot in my study. Mr. Raymond came to see me, and, he being present, on the 13th I opened the earth in the pot, and found fourteen barley-corns of the twenty had put forth roots, but had not speared: the other six had not in the least made any proffer towards putting forth a root, which I concluded were dead corns. From hence we may easily judge how my land, being cold in nature, and coldly situated, ripens not barley to perfection but in the hottest summers, and that this barley, which came not till nine days after it had been taken from the last floor, would have proved very coarse and edge-grown barley, had it been sown in the field; it also seems plain from hence, that not only when the barley takes wet in harvest, and is cold by reason of a wet summer, but even in all but the very hottest summers our barley should be sweated on the kiln in order for malting.

It

It is now further to be observed, that the very same barley; out of the same field, and of the same goodness with the twenty grains abovementioned, and which also had not taken wet in harvest, after the floors had been seasoned with drying off two kilns, did so far root, that out of a handfull of it, when it had so past the floors as to be within a week of the kiln, I did not find above thirty grains which did not shew a root. Note, it is to be understood, that by drying off two kilns, and carrying the malt through the floors, the floors and house had been so warmed, which is very sensible to the smell and feel, that thereby the vegetative powers of the barley were forwarded and more exerted by such heat: this experiment still shews how wrong it is to sow such barley, especially in a cold ground and cold country, to the growing of which warmth is more necessary; and tho', as I observed, most of this barley did come, yet much of it did lie so many days backward, that it might be doubted whether it would make above half malt; it is to be believed therefore it might prove, if it came up in cold land, an ustilago or burnt ear.—From hence I conclude, that wheat, if it handles cold and heavy, will do better the earlier it is sowed, whilst the season is warm; for if sowed late, by reason of it's own innate coldness, it will grow much worse, and be longer coming up; from hence I also conclude, that peas cold or black by reason of a wet harvest, and cold oats, ought by no means to be sowed in cold land.

§. 108. I took nineteen grains of barley out of a heap that past the floors of my malt-house, and was to be dryed off in a week's time, which made no shew of a root, and on the 17th of November I put them into a flower-pot of earth; I observed three of them had shot blades in five days time above the earth, and on the 27th of November, which was ten days after I had put them in earth, I took them out, and found four more grains were speared under ground, and had not yet appeared, the spears being short; and I found the ten remaining grains rooted with four or five roots, but not speared, as yet appearing; but on opening the rind found the spears alive, and that they had run near the length of the grain under the rinds: these instances plainly shew the different degrees of virtue in the stamina of seeds, and how far some stay behind others, which must be of ill consequence when grain of the most perfection is not sown, especially when such indifferent seed is committed to cold ground in a cold clime.

§. 109. In order to make a fuller experient of this matter, I tried different grains from different soils.

February 8th 1711, I put into a flower-pot two hundred grains of black Poland-oats, marked numb. 8.—The same day I put into a flower-pot two hundred grains of Easton-oats, marked numb. 9.—March 16th both these and the Easton-oats were come up an inch in spear; by the eye I could

could discern no difference in the number of each come up; (they seemed to be all come up; viz. two hundred of each) but, on examining with the eye only, it was plainly discoverable that the Poland-oat came up with the stronger spear, and March 27th, after both sorts of oats had been some days in blade and leaf, it was as discernable, that the leaf of the Poland-oat was somewhat broader than the leaf of the Easton-oat, and the stem proportionably stronger.

Continuation of experiments, and cautions concerning seed.

February 8th 1711, I put into a pot two hundred grains of barley, being very coarse, cold, and thin corn, marked numb. 5.—And in another pot two hundred grains of Westover barley, marked numb. 6.—And in a third pot two hundred grains of my best barley from the down, marked best B. numb. 7.

March 13th there appeared but five of numb. 5, in blade, whereas of the Westover and my best barley appeared half an inch above ground almost all that were sowed.

March 18th of the worst barley appeared as near as I could reckon eighty-five blades.—Of Westover barley I told above double the number, which being thick I could not easily count right, but believe very near the whole two hundred grains were in blade.—Of my best barley I believe I might not have by thirty blades so many as there were of the Westover:—it was also manifest that many more of the blades of the Westover barley, and my best barley, had from time to time dew-drops on them than had the blades of the coarse barley; also the drops of the former were larger.—I could also easily discern, if I looked attentively, that the Westover barley carried a broader blade than my best barley, tho' my best barley seed seemed as full bodied as the Westover.

March 27th I opened the three pots of barley, and was surprized to see how the Westover-barley and my best had struck roots down to the bottom of the pot, the tap-roots were above eight inches in length and had matted in the bottom, wanting depth to strike deeper; most of the roots of the Westover barley had struck seven, eight, and nine roots; my best barley did not so often run to seven and eight fibres or roots, but more frequent than the Westover to five or six.—The coarse barley very rarely run to seven or eight, but more commonly to four and five;—and I commonly observed some of the collateral fibres or roots to be very short.

Conclusion.

From all the experiments I have made by sowing wheat, barley, oats, and peas in flower-pots within doors, I have found that, though the earth was rich and well moistened when I first put the corn in, yet all the said grains would hasten up to spindle with a maiden spear, without tillowing; which shews that when ground of the field wants either strength, thro' poverty, or convenient

venient air and moisture, it will do the like, and when corn in the field does so, it is a certain sign of some deficiency; for the tillowing of plants proceeds from a redundancy of humours, or a good quick air that agitates them, whereby the maiden stock being not sufficient to receive the vegetable juices, there must be an irruption into collateral branches.—I cannot but in a great measure impute the abovesaid defects in the seeds I sowed in the pots in my study to the want of, and the stagnation of the air; because the earth, when I examined it, did not seem so very arid and exhausted of juices, but that the plants might have better flourished, considering the goodness of the mold.—But I believe the collateral branches to be as perfect as the maiden plant in the seed; and this vegetation to be no new formation, but an extension of parts only.

As the experiments I have made therefore of sowing corn in pots of earth were within doors, where it seems to me, for want of motion of air and a quick succession of it, the juices stagnate in the plants, and are not pushed on to tillow, but run to spindle, and as by the experiments of malting barley, which in windy weather, when the air is plentifully forced into the bodies of plants, runs out to root and to spire in a hasty manner, I doubt not but, when I can make the experiments of sowing corn (as before within doors) in pots of earth placed out in the air in the month of April, when the earth shall be same, the water which waters both sort of pots be rain, the inlet of the southerly sun through the glass window the same position, and the warmth within doors rather greater, I shall then better discover the beneficial powers of air to plants, by comparing the difference; from whence just reflections may also arise of how great consequence salubrious and plentiful haustuses of it must be to our human bodies.

Of the great quantity of air contained in vegetables, and its various uses, see the articles Air and Seed in Mr. Miller's dictionary.—Lettice-seed, that was sown in the glass-receiver of the air-pump, which was exhausted and cleared from all air, grew not at all in eight days time; whereas some of the same seed, that was sown at the same time in the open air, was risen to the height of an inch and an half in that time; but, the air being let into the empty receiver, the seed grew up to the height of two or three inches in the space of one week.—When seeds are packed up for exportation, great care should be taken, that they are not shut up too closely from the air, which is absolutely necessary to maintain the principle of vegetation.

Seeds sent from abroad in sealed up bottles would not grow when sown.

Seeds being hung up a year in bags, and others from the same parcel being kept a year in bottles sealed hermetically, the former when sown grew well, but none of the latter came up.

Of vege-
tation in
general.

§. 110. It is a difficult task to unfold and ascertain the complicated principles of vegetation (as they are more or less in all sorts of earth, and as they not only quicken or impregnate the seed, but carry it on through all it's gradations, of woody, leafy, flowery, and fruit substances) so as to know how to proportion them, or say in what manner and proportion they act and perform their several offices.

For though experiments have been made of nitre, blood, foot, &c. all which have been found great forcers, so as to bring forward the leaves and branches of a plant, yet it may be the flowers or fruit, either in bulk or number, may not equally succeed by such manganism; few I believe having had the patience to make an exact experiment throughout the aforefaid courses of vegetation, or, if they have, they may not have rightly considered what other mixtures there are in the earth wherewith these menstruums may co-operate.

To make a just experiment of this kind, I conceive the naturalist ought to take earth very much emaciated by hard ploughing (if it were reduced to a caput mortuum it would be much the better) and to lay some loads of it in different heaps apart, and to impregnate each heap with a different and most simple manure, and by equal measure, and then to plant it with the same seeds; it would be also proper that one heap of this earth should be left in it's natural strength, and seed sowed in it, to see the difference.

I should also propose that many parcels of the same earth were taken out of a corner where the plough cannot come to stir it up and impoverish it, and that the same experiments were repeated, and a trial made as before what a parcel of this earth could do by it's own virtue;

Also, that in the like parcels of earth different mixtures were made and blended together of the said menstruums, in order to see the success of such compositions;

And when all this is done, if I may be allowed to anticipate the event, I may venture to pronounce the project will be in a great measure fruitless; for tho' by this means may be in a great measure discovered what are spurs to nature, and what will produce the desired increase, yet to transfer such discoveries into the course of husbandry will be impracticable, by reason of the expence, nor will it explain and discover the principles of vegetation, as to the cause, so as to make a person the wiser, though we know whereby to give the production; because I conceive these menstruums taking in with them the latent and concurrent powers and virtues of the air, earth, water, sun, and temperament of soil with which they are blended and digested, make a certain union and texture so incorporated and interwoven, that they are not easily separable (unless by fire) from whence results

a third principle, or quinta essentia, which performs these mighty wonders of nature; so that from these happy mixtures does arise a specifick which God wills shall do, and therefore does these great things.

Wherefore by experience we say of principles in vegetation with physicians in medicaments, that, as such and such simples are of themselves profitable towards curing particular distempers, so when taken in composition (as Sydenham professes) their efficacy is much greater.

This vegetable balsam, tho' so difficult to say wherein it consists, yet it may be averred, is as easily to be seen as understood; for tho' almost as subtil as a phantom, yet it's marks are easily discovered to the diligent husbandman conversant about arable land: we can easily perceive by the different colour of our land (as it turns up under the plough) whether it has born one, two, three, or four crops, and how in proportion the virtue is gone out of it; and as sensible we are by it's rest, and lying to pasture, how with it's vigour it renews also it's colour; we do not better see and know when the plumb or grape is covered with or has lost it's bloomy blue, than we know by the colour the fertility of our soil, which colour arises from the principles, before intimated, of dung, air, fire, earth, &c. mingled together, which by often sowing are absorbed into the corn in too liberal a manner to be renewed by a daily recruit from those elements.

§. III. There is one thing not easily reconcileable, and which Cause of may well afford matter of speculation to the curious, which is, good that very good earth, tho' exhausted never so much with plough-land's ing (so that it will not bear a crop of corn) yet will in a few years soon recover by rest; whereas land poor by nature, and yet capable of bearing as good a crop as the land good by nature, when it's strength was at lowest by being over-wrought by the plough, and bad land not making but a very ordinary improvement in proportion to the other land, and never exceed a certain fecundity, which is it's ne plus ultra; and yet both these soils equally exhausted one would think started fairly together, and stood on equal terms and advantage of imbibing the aforesaid elements, and these are all the materials and talents they have to improve from.——I am at a loss what solution or tolerable account can be given of this phenomenon, unless I say, the earth, which was good by nature, consisting of a just and happy texture of parts, fitted by a due continuity and unity to receive the aforesaid elements, and yet not so close as to retain and imprison the watery and fiery parts till they putrify and corrupt, but till by a kind fermentation the spirituous parts are converted into fixed salts, do then let through, and suffer the fæces to be washed away, or to be purified by the continual free access of the elements; whereas, on the contrary, the above-

mentioned poor land, either by too strict a bond of union, (as clays, before they are friable by art) are too compact and consolidated to admit the benign influences of the elements, or else they retain and imprison the immissions, till, for want of ventilation and circulation; the stagnating juices grow sour and acid, and, by reason of the coldness of the earth they are shut up in, are not capable of a sufficient fermentation to be converted into fixed vegetable salts.

The other sort of poor land, which being once impoverished is a long time before it recovers, runs into a contrary extrem, viz. that of too loose and light a mold, which may be compared to a person under a dysentery, who has no retentive faculty; through this the nourishment passes with that precipitation as not to abide long enough to receive a fermentation; but the spirits, and all the fat substance received is washed away and carried downwards undigested, and so such ground can receive but slow recruits from the elements.

Or shall we say, the recruit good land receives, after it is impoverished, seems in a good measure to arise from the effluvia of the layers or beds of earth, many feet deep, which are exhaled into the upper surface, and by the heat of the sun converted into fixed salts; for generally the better and richer the upper coat of the soil is, the lower veins of earth are in some proportion answerable and correspondent thereto.

R O L L I N G.

No roller among the ancients.

§. 1. I cannot find, as I observed before, by any of the Roman writers, that they used a roller in their husbandry, but only a crates, that is, a hurdle or flat timber, to draw over their corn, to level the ground. See Columella, lib. 2. cap. 18.

The Spanish instrument like the ancient crates.

§. 2. In Spain after their summer-corn is sown, a horse draws a broad board of about ten foot long, a boy standing on the board, and driving over the corn, which serves instead of a roller.

Whereas above, the long plank is described to be drawn as a roller, Lord Pembroke rectified my notion, and told me, that the plank is drawn at length after the horse, as he has seen it; for, said he, otherwise a horse, could not draw it, and this way there is an equal weight on the earth for the space the board covers, as there is on the breadth of earth covered by a roller, whereas, had the plank covered the earth, and been drawn the same way as a roller, it would be too light to signify any thing.

Treading wheat with sheep.

§. 3. Treading wheat, after it is sowed, by folding sheep on it, is allowed to make it closer, than rolling it, in regard rolling only lays

lays the ridge of the furrow flat, but the sheep's feet find every little hollow place, and tread it close.

I asked Mr. Edwards whether the farmers in Leicestershire roll- In Lei-
 ed both barley and oats; he said, yes, they always did, and wheat cesterhire
 too, except they folded it, but he never knew them roll peas.—
 I asked him why they rolled not the wheat they folded; he said,
 because that needed it not, for the fold trod it harder than the roll-
 er could press it, for which reason they endeavour, as much as
 they can, to fold on the light land. He said, a roller could not be
 too heavy, tho' it was as much as five horses could draw; that the
 land by good rolling, if there wanted rain, bore the hot weather
 much the better; the roller also broke the clods, and made way
 for the corn to come up thro' them.

§. 4. If corn be come up, and then rolled with a very heavy Caution
 roller, the five or six horses that draw it, going all in a line; and to roll
 treading in each other's steps, often bruise and hurt the corn very with hor-
 much, for which reason it is adviseable to draw such a roller with ses on
 horses on breast, side by side. breast.

§. 5. They are forced to make use of very heavy rollers in our Heavy
 hill-country to roll over the flints among the barley and oats, other- rollers in
 wise there would be no mowing them; they often use them like- Hants.
 wise in March to press the ground somewhat closer to the corn.

§. 6. Major Liver says, he rather approves of two rollers, that Two
 may be drawn by three horses apiece, than one heavy one that lighter
 requires six; for, said he, the light ones make double the dispatch; rollers ra-
 besides, if the great roller be used in clover-grass it will be apt to ther com-
 bruise the bulbous root too much, and if used on corn-ground; mended
 tho' never so dry, (whereon it will do most good) the horses will than one
 break it up so much with their heels in straining, that it will not be heavy one.
 healed again by the roller's coming over it.

As it is of great consequence in the hill-country, at seed-time,
 in dry seasons, to break in the earth after the sown corn, the same
 day it is sown, with a couple of harrows, so I think it is of as great
 consequence that a roller, or a couple of a small size, such as one
 horse, or two at most may draw, be kept in readiness, to settle
 the mellow and hollow earth close to the roots of the corn, with-
 out compressing it too close; for tho' corn loves to lie easy, it loves
 also that the earth should lie close about it, that it may go imme-
 diately on it's work of shooting forth it's roots to the best advan-
 tage. If the ground works any ways dry, or in powder, this will
 be found to be the best way in the hill-country, to prevent the
 sun's penetrating too deep by reason of the dry and light mold;—
 and then, after the corn is well come up, the great roller may go
 over it as usual.

§. 7.

Of rollers with nails in them. §. 7. My bailiff said, he had seen rollers, on which nails had been drove as thick as it could hold to save it from cracking, and from wearing with the stones;—but I think such a roller could not do well to roll stony land, when the corn is come up, because the nails would be apt to cut off the corn.

Rolling saves seed, a less quantity will do. §. 8. In conversation with several farmers on the subject of rolling, and in speaking in commendation of rolling after the corn was sowed, they said, that half a bushel of oats might be saved in sowing an acre by securing the earth, and laying it close to the corn; if a rascally team, said they, were bought for that purpose, and sold off again, it would pay the purchase of the horses.

* Loamy, ferny, loose, A heavy roller for wood-fer ground. §. 9. I believe that a * wood-fer ground should have the great roller, if it be never so big, go twice or three times or oftener over it, after it is sowed to summer-corn, and after rains, to consolidate, if possible, an iron-mold-ground, consisting of coarse harsh disjointed particles; for both cold and heat penetrate it, and by changes make the corn die to the root, but at length, getting more strength by this compression, the root may be enabled to live, and maintain it's blade.

What sort of ground to be first rolled after sowing. §. 10. In harrowing after sowing, it should chiefly be considered how smooth and fine your ground lies, in order to settle, and, if any of your ground lies rough and knobby hard, it seems that the smooth loose land should be first rolled, and the rough knobby land be deferred in hopes of a shower of rain to mellow and loosen it, not only because the knobs will then break, but also because their being so hard may bruise and cut off the tender blades of corn.

Rolling soon after sowing prevents edge-growing. §. 11. Rolling as soon as possible after sowing summer-corn will in a great measure prevent edge-growing, in case of a dry season; for the lower corn laying moistest, would, unless rolled, come up long before the other; but that which lies shallower, the crust of the earth being scorched, could not get away without a good shower, and perhaps be malted first, whereas rolling soon, if it be dry, brings it all up together.

Not to roll wet ground after sowing. §. 12. When the ground is wet, or after a little rain fallen, it is not proper to roll, because the earth will clinge and gather to the roller; and also when land is wet, rolling after sowing may be ill husbandry, because it keeps the moisture so much in the ground, especially if early in the spring, that thereby the corn will be chilled.

What corn to roll first when come up. §. 13. If corn be well come up, and wet fall, it is generally proper to roll the last sowed first, because such corn has less dew, and the earth dries fastest.

§. 14. They seldom roll their wheat about Holt in Wiltshire, Why they and observing the surface of the wheat-ground to lye very hollow roll not and dry, and one's feet to sink deep into it, it being in March, I their wondered at it, and spoke to Mr. Randolph about it.—He said, wheat a- about Holt in Wilts. in their country they seldom found their wheat suffer for want of rolling, because they ploughed round furrows, and laid their corn in deep:—on which he and I went into Mr. Byffy's wheat, and I found, tho' it was hollow, yet the corn lay about four inches deep, and from thence took root downwards; however we both thought rolling would not do amiss.

§. 15. Mr. Carter of Colehenly and Mr. Longman assure me, Of rolling that they have rolled their wheat soon after sown when they can wheat get a season for it, and it has always been much the better for it; soon after and farther, that wheat so rolled has this advantage, that there is sowing. generally more leisure for rolling soon after sowing wheat than after spring-corn, and it closes the ground to the roots, and prevents the winter-cold from penetrating, nor can the worms so easily turn up the earth from the roots of the corn; and by experience it has been found, that such grounds bear the high winds the better for being smooth; for the wheat itself breaks the wind, and each blade shelters the other, and more especially so the lighter the ground was before rolling, just as a drab coat is warmer to us than a spongier cloth of the same thickness; and, when the March-winds blow, the earth of such rolled ground is not so easily carried away from the roots of the corn as that of a rougher ground is. Mr. Carter says, about Basingstoke they always roll in the same manner.

At a meeting of several good farmers, I discoursed with them on the subject of rolling wheat soon after it is sowed, and said, I could not see any inconveniency in it, but that it must be good husbandry; for I could not apprehend how by laying the land flat the wheat should lie the colder, or, if it did, what signified the blade being taken off by the winter cold so long as the root was well fortified by the earth's lying close to it; yet I should not always approve of rolling till I saw the approach of winter, lest by rolling too soon after sowing, especially if the beginning of winter proved mild, it might bring the wheat away too fast, and make it rank. To this they all assented.

§. 16. The autumn anno 1715 was so very wet, the country Of roll- people could not sow their full crop of wheat, and, whereas I in- ing, in the tended to have sown one hundred and sixty acres, I could sow but spring and one hundred and twenty,—and one third part of that I could not after a get into the ground till between the 10th and 20th of October. hard win- The winter proved extream cold and snowy, and the snow lay ter, wheat deep and long on the ground: the wheat of the country in general, that was sowed late as well as mine, was pinched by the cold, and stopt in the ground and wet. during

during the whole winter, especially the latter sown, and in the spring, when the snow went off, from the end of January to April we had no rain, but drying churlish cold winds with frosts; so that towards the end of March the wheat was very poor and weak, insomuch that a traveller could hardly take it to be wheat. — Being sensible the ground must lie hollow from the roots of the wheat through such extreme frosts, and also want moisture by reason of such dry winds and want of rain, I rolled my wheat at a time I could ill spare my horses from sowing spring-corn, but it was wonderful how much it began immediately to thrive after such compressure of the earth to the roots of the corn, and how much it contributed to the colour, which was visible in a day or two after rolling, and it continued to improve proportionably, tho' the cold winds and drought still continued.

If wheat turns yellow, or looks unhealthy in winter-time by wet, it is to no purpose to say, the ground will lie too smooth and cold, if smoothed by rolling; the present distemper is to be consulted, and the ground, as soon as dry enough, ought to be rolled.

Best season of rolling wheat in the spring.

§. 17. As wheat should not be rolled too early in the spring, lest the frosts should hollow it again, so it ought to be done soon enough to give it the advantage of tilling; for doubtless the sinking the roots of the wheat deeper into the earth by rolling, and the closing the earth to the mores and knees of the winter or autumn-tillows makes them tillow afresh, and if rolled by about the eighth or middle of March, that will, as I suppose, be the best reason for rolling in the spring; nevertheless wheat may be in that unthriving condition, that it may be necessary to roll it sooner.

Of rolling barley.

§. 18. The first week in May (anno 1703) I sowed rath-ripe barley, and on the first of June I saw the barley falling off, and declining; the ground was very hollow, and as I thought needed rolling again; so I ordered it to be rolled where it was tightest, as on the head-lands, &c. — The barley had a good stem, and in going up the hill, the horses being forced to strain on their hoof's points in many places actually cut off the barley at the stem, insomuch that I could in some places take up handfuls; but examining it, and opening the valves, I found nothing but leaves rolled together, and that the ear of the barley was eaten lower, and not yet shot above-ground; however I staked down a stick or two in the places that suffered most, to see how the ears there proved. — In the evening of the next day walking in the ground I observed the barley to look much refreshed, and to be greatly improved in colour, which seemed strange in so short a time; but what wonder if a plant revives in twenty-four hours when, being gathered, it languishes in one. The considerable benefit it received

ceived was by compressing the ground, which by its sponginess had taken a great deal of wet, but the roller, by compressing it, squeezed it from the roots of the corn.—The corn I had marked with sticks came up well also, and carried as good ears as the other.

§. 19. Oats early sowed, if not rolled till towards the end of or after seed-time, ought, for the most part, to be rolled with the heaviest roller, for a light one will make but a small impression where the ground has been so long settled.

§. 20. I observed the great grey partridge-peas sowed in February had very little charlock among them, tho' not rolled: it seems to me the ground ploughed heavier then, than it did in March, and the coldness of the season obstructed the germination of the charlock-seed, and by that time the spring came, the ground was pretty well settled, and become too close and hard for much of the charlock-seed to push through;—but the blue peas sowed in March had abundance of charlock amongst them, especially where the ground had been dry and worked fine, to the prejudice of the peas, these peas not having been rolled neither; wherefore I conceive, that rolling of peas as soon as the ground is sown, or soon after, would bind and press it so close, as to prevent the charlock seed from coming up, and I do therefore hold rolling to be good to prevent the growth of this, and many other sorts of weeds.—And barley and oats, which with us are rolled, do doubtless thereby much more escape being infested with weeds:—but, as the coldness of the ground in February, and the moisture is a check to the growth of charlock, (for all moisture at that season is cold) so moisture and wet after the middle of March, and in April, is productive of charlock and other weeds, because such moisture is then tolerable warm by the power of the sun acting on it.

§. 21. To roll winter-vetches when first sowed seems to me to be as proper as to roll wheat when first sowed; as before noted.

§. 22. In light land, where clover is sowed, if in the winter-time the great roller was drawn over it, it would fasten the ground, and make the clover hold much better and longer.

Of CORN in GENERAL.

§. 1. **C**olumella tells us, that, except we take care to change the seed, corn will degenerate much sooner in a wet soil, than a dry one, and, after a third crop, wheat will become

Opinion of the ancient writers concerning corn's

a Celerius locis humidis quam siccis frumenta degenerant, nisi cura adhibeatur renovare semen. Columella, lib. 8. f. 102.—Nam omne tri-

ting-ticum

what he calls a *filigo*, a sort of corn fair in colour, but poor in substance. Palladius speaks to the same purpose.

Of many ears on one stalk

§. 2. Evelyn, as before hinted, reports that diverse ears may grow on one stalk, which is what I have never observed, except in Pharaoh's dream, (Gen. xli. 5.) where we read of seven ears of corn that came upon one stalk.

* Stem or stalk is supposed to be meant, or else there is nothing remarkable in it.

Heylin, lib. 2. fo. 133,—says, in Rezan, a great and goodly province in Russia, situated between the river Tanais and the river Occa, the most fruitful country of all Russia, and (if report be true) of the whole world, it is credibly affirmed, that one * grain of corn brings forth six ears, the stalks whereof are so thick that a horse may pass through, or a quail fly out of one of them; but with very much difficulty. This author also gives instances of the vast fruitfulness of Padolia in Poland, fo. 144.

Mr. Bobart of the Physick-garden at Oxford told me, he had in his herbal a barley-culm with three fair ears thereon, but the two outermost were shorter than the other; he inscribed or underwrote this plant

Thus;—*Hordeum spica multiplici,*
Found plentifully growing near
Sutton by Cranborn in Dorsetshire,
By Mr. Crop of Christ's-church college, an. 1697.

Concerning the above field of corn Mr. Bobart said, the story was, that a charitable woman in time of great scarcity had relieved the poor, and God gave this return.—The same day I saw doctor Frampton of the abovesaid county, who told me, he had never seen the field, nor any such ears of corn; but had heard of the thing, and the story.—However I give not much credit either to the fact, or the cause.—Mr. Bobart also assured me, he had once seen a wheat-stalk with two ears on it. Some time after this I sent him a spike or an ear of smooth-crested-grass, which divided itself in this manner *Y*, so that there were two complete ears nearly on one stalk. Refer this to Mr. Evelyn's prodigy of wheat.

Of barley bringing grain of a different species.

§. 3. Mr. Ray, in his Prolegomenon to his first volume of plants, quotes the opinions of several authors, that barley ears have here and there carried grains of oats, and other grains of different corn from it's species; but they, who made such observation, it seems, were bookish men, who were misled by the appearance

triticum solo uliginoso post tertiam sationem convertitur in filiginem, Columella, lib. 8. fo. 102.—Locis humidis semina citius quam siccis degenerant. Palladius, lib. 1. sect. 6.—Et infra dicit, omne triticum in solo uliginoso, post tertiam sationem in genus filiginis commutatur.

pearance to their eyes, and unacquainted with what is commonly observed in husbandry; it being true, that, in wet years, when barley runs thin, it is common for a grain, here and there in a barley ear, to have a deep crese along it, and to be as thin as an oat, and to resemble an oat very much, but in truth, if unrinded, has no oat-hull, but a barley rind on it; and doubtless, in case such oat they pretend to grow on the barley ear was sowed, it would produce a true barley ear.

§. 4. In the hot countries, where little rain falls, the dews fall in vast quantities, on which the herb of the field has great dependence for being watered; this was reckoned in those parts amongst the greatest blessings in the gift of the Almighty, and so Isaac blesses Jacob (Gen. xxvii. 28 and 39) God give thee of the dew of heaven, and Benefit of great dews in hot countries.

Mr. Garret who lived many years at Madrid assures me, their crops of corn in Spain are much thicker set than ours, and yet their ground is very light, at which I wondered, their country being hot.—He replied, they sowed very early, before the sun grew hot, and that the dews were very great.

§. 5. This year (1707) the spring proving very dry till June 13th convinced me, that not only peas, but all sorts of late sowed for seed will not feed well; for in our hill-country oats and barley, &c. tho' sowed early, yet not growing till above said rain fell, had all short ears; the sort of land could not bring on the corn fast enough, tho' the summer all-along afterwards had plenty of rain.—In very rich lands, it is likely this year the same defect was not observed. Late sowed corn will not feed well after dry springs, in the hill-country.

§. 6. It seems to me, and was apparent this (1708) that, if the month of April be wet and cold, the wheat will not tillow, or multiply it's issues, but the winter-spindle or shoot will run up; for that winter-stalk being hardened will keep growing, whereas, to form collateral buds, which are tender, warmer weather is required, not too quick growing weather by means of hot gloomy rains, but mild and mellow weather; for, when the flush of sap is impetuous by gloomy heat, it rises so fast upwards into the first maiden-stalk, that in it's hurry it stops not enough to fling out side-branches; as in the small-pox, if in the first symptoms the patient's blood be high inflamed and feverish, it hurries the morbid matter so furiously along the veins, that (unless by bleeding it be qualified) it is so carried on in a torrent as not to have leisure to kick out the pustles and the distemper; so then a hot wet season or a cold wet one are both unkindly for great crops of corn. Wheat will not tillow well in wet cold springs.

§. 7. The great fertility of Ægypt shews no country can be too hot where the land is very fertile; for our clays and mixed earths, that want the impregnating heat of the sun, are often burnt. No country too hot where the land is fertile.

burnt up; but their lands are so rich, that if there is but the least moisture at the bottom of the sll, when they sow, their corn will be brought up in twenty-four hours time by vertue of that moisture, before it can be dried up, at which instant it strikes it's roots into the moister earth, as before mentioned in corn sown in sand; —whereas in our country, where corn requires a week or ten days time to strike root in, the moisture may be dried up before the grain can be impregnated, and so, if rain comes not, it often lies two, three, or four months without striking root, as it did this dry summer anno 1705—and began but to grow just before harvest: If corn once grows, we see it is not easily checked by drought in good land: in the hot countries they have great dews.

Winter-corn bears drought better than spring-corn.

§. 8. By the effects of this very dry spring and hot summer (anno 1714) from March to July the 23^d, when we had a day's rain that went to the roots of the corn, I am sensible that winter-corn, as wheat and vetches, do bear up much better against the mischiefs by drought than the spring-corn, as peas, barley, and oats, the former being well established at the roots, during the winter, and the ground better settled to them.

May, a critical time for the lenten crop in the north of England.

§. 9. Being in the north (anno 1706) I had a mind more thoroughly to be informed what was most prejudicial to their lenten crop; so I asked an excellent husbandman in Leicestershire when rain fell most unseasonably on their summer-corn; he said, in May; if it proved a wet May they had always a bad crop of barley; for rain then either killed it, or starved it, and made it look yellow.—I asked him what reason he could give for it; he said, about the beginning of May was commonly the time that their barley took it's weaning, that is, said he, when the leaves of the barley begin to die, having till that time been for the most part nourished by the milk and flour of the corn; but then it begins to put forth new roots, and new leaves, and to betake itself wholly to it's roots for nourishment: though the weather should prove never so good, at this crisis it receives a stop and check, like a child taken from nurse, with whom it goes much harder if the nights are cold and long; so, if wet and rainy weather comes then, the barley will be so dashed, that it will never recover it, let what warm weather soever come after; for, said he, after such rains, the sun having baked the top of the ground does thereby so bind it, that the heat cannot penetrate to the roots of the corn, which by that means lie all the summer in a cold bed; —but a cold and dry May, said he, I never knew to hurt us, but rather do us good:—according as the spring proves forwarder or backwarder, so does this crisis of the corn's taking it's weaning come earlier or later, but generally about the beginning of May, unless the spring be very warm; but a wet May used not to hurt their wheat, excepting that it made it weedy; for, said he, if we have

have a good season to sow our wheat in, that seldom misses.—Mr. Clerk said afterwards, their having a season to lay their barley into the ground dry, and having a dry bottom the depth of the full, for it to take root in, was of great consequence towards a good crop.

§. 10. Lord Bacon in his Natural history says, that in the hot countries it is a frequent calamity, that the corn will not spindle, Corn does not spin—that is, will not come out of the hofe, by reason of the great dle well heat and drought ; and he is of opinion, that on this account the in hot latin word *calamitas* was derived from *calamus*.—But I rather be- countries.—lieve it also signifies any other misfortune belonging to corn. Pliny and Columella, speaking of blights and smuts, say, *Hordeum omnium granorum minime calamitosum* ;—but not spindling is a defect we seldom find in England.

§. 11. From constant experience of successive years I find, that Cold land cold wet years make the straw of all corn weak, small, and thin, and wet infomuch that it is apt to lodge and crumble down, which in the years oc- country we call being knee-bent ; on the other hand in dry hot-casion summers all straw is thick and strong.—The straw in wet years coarse runs the coarser, and that in dry hot years the finer, and then weak it has the more spirit in it ; which is the reason why in hotter straw: countries than England the cattle eat straw so much better than with us, and almost as well as hay.—As cold wet seasons make the straw run coarse, so cold wet land has the same effect ; therefore, when both these causes concur and contribute their force, the straw will run very weak, thin, and coarse ; as particularly, this year (1717) the rath-ripe barley did at Crux-Easton, where the land is cold and wet, as was the year,—and rain more than usual falling on the barley, about a month before harvest, lent a helping hand to the beating it down ; so that the barley-straw in a manner broke off a little below the ear, and before the grain was full plimmed or hardened, from which time all communication of nourishment stopt, and the corn rather shrank in that ripened, and consequently the barley as well as the straw in our cold lands ran very thin and coarse.—However I esteem it best on our cold lands to sow one half of the crop rath-ripe barley, because, though in such a cold year it might suffer as abovesaid in cold wet lands, yet, had it not been for the rain that fell, and the winds that beat and broke it down at that nick of time, before it was hardened, it would have carried a better body than the late-ripe barley, in the same case, and on the same sort of land, would have done.—The use to be made of all this is, that tho' there is no preventing this evil, yet knowing beforehand that in such a year your fodder-straw will be coarse, you must therefore apply it to proper uses, else it will deceive you.

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§. 12

The colour of corn denotes it's quality, and why.

§. 12. The colour of corn, viz. of wheat and barley, gives a great preference with the husbandman in a market, which does not a little puzzle the inquisitive gentleman, a stranger to husbandry, who hears it; but the reason for it is this; there is an uniformity between the colour of corn and it's weight, and the latter never fails to be accompanied with the former quality;— which therefore denotes it's goodness. Wheat weighs light, because it has not come to it's full maturity, and so has not sufficiently discharged the watery parts, which proceed chiefly from the coldness of the ground, that wanted spirit to carry the grain to a full perfection of ripeness; and the defect of colour may be occasioned by too much rain, which fogged the grain in harvest, whilst standing, or in gripp; for being often wet and dried again, every time it was dried, after being wet and full ripe, the moisture exhaled by the sun's drying it carried also away a tincture of, or the particles of it's colour along with the exhalation of the watery parts, and so consequently the grain must be more porous, less solid, and of course lighter: the same argument will hold for barley.

All corn is apt to grow brighter as it grows towards earing, but that, which then most holds the deeper green colour, is likeliest afterwards to have the largest and boldest ears, and to bring the grain best to perfection.

Damage to green corn by dry weather near earing time.

§. 13. It was a very dry burning time (anno 1702) from the first sowing of lenten corn to the 3d of June, at which time some of my neighbouring farmers were praying for rain: why, said I, you must be in a better condition than I am; I have not seen your corn, but I know your's was sown ten days before mine, and consequently must better cover the ground, and keep it cool. That might be, said they, but in another respect, because our's was sowed earliest, it may be the worse; in about a fortnight our's will be at the time for getting out of the hood, which it will not be able to do except rain come.

Of the blossom.

§. 14. I observe the white straw-wheat brings white blossoms, as the red straw-wheat does red ones, and I suppose it is the same with the white oat.

Prejudice from rain at blooming time, and why.

§. 15. The latin writers *De re agraria* observe, that rainy weather prejudices all sorts of corn at the blooming-time, except the leguminous sort; the reason of which, as I suppose, is, because the wet falls into the husk of wheat, barley, and oats, which at that time opens, and so is corrupted by the wet standing on it, whereas in the leguminous grain the pod lies within the leafy flower, into which the wet cannot enter.

Sign of good corn when growing.

§. 16. The whiter wheat, barley, and white oats, or the hoods of black oats look as they ripen, and when they are ripe, the better the corn; and the contrary, the coarser, or more blighted.

§. 17.

§. 17. The disadvantage that late ripe corn lies under in point of coarseness may be collected from the late ripe nuts hanging on the trees, in the beginning of September, or at least at Michaelmas, especially, if rain should fall about that time, for notwithstanding the kernel of the nut is secured by a shell, yet, at that season of the year, the cold damp air, the dews, and the rain penetrate the shells of nuts, whereby the kernels change their colour, become waterish, and in a manner tasteless; and doubtless the same evil falls on the late ripe corn.

§. 18. When September is come, say our hill-country farmers, there are frosty nights, and then the corn ripens as fast by night as by day: they always found it so at Easton.

But, notwithstanding this observation, with which our farmers comfort themselves, that in the frosty nights, at the beginning of September, the corn ripens as fast by night as by day, yet willingly I would not have corn to be so ripened, for in truth such ripening may be more properly called blighting; inasmuch as ripening implies filling the grain, and somewhat leading to it's perfection; but these frosty nights rather shrink, and dry up the grain, and stop it's filling and plimning: in like manner all sorts of fruit may be said to be ripened by the frosts, inasmuch as they precipitate to a rottenness, &c. And my opinion is, that such blighted or frost-bitten barley, not arrived to it's natural ripeness, can never have a goodness in it's flour like other corn that is ripened thoroughly, nor be so profitable for malting; it may possibly be as big as kindly ripened corn.

§. 19. If harvest proves late, as in the latter end of August, wheat and barley, that is then to fill, must run thin, and the same is true of all sorts of grain, and in a wet summer the vale-corn, which usually runs to halm, will keep the ground cold, and prevent the filling of the grains.

§. 20. A late harvest is seldom, as I believe, a hurrying harvest; because, though in such case there is reason to make all haste possible, yet the coolness of the days, and the long dewy nights will not let the corn ripen altogether, nor make it shed or brittle, as the early harvests cause it to do, all which I have experienced this year 1703.

§. 21. Barley, in carrying to market, say our farmers, need not be covered, rain it never so hard, but wheat is thought the worse for rain.

§. 22. Mr. Ray conjectures, that the reason why the grain is generally thin, when corn grows very rank and thick in straw, is, not only because it's strength is exhausted in the grossness of the blade, but says he, that grossness of the blade may hinder it from the cherishing rays of the sun, which are necessary to concoct the nutritious juices, and to convey them into the seed, and he

gives an instance of our sowing English corn in America. *Hist. of Plants*, vol. 2. fo. 1238.

§. 23. Since (as by former remarks does appear) the wheat-ear is worse for it's straw being broken, and for the sun's not coming to it's root, it follows that, where vetches run so rank as to finnow in their halm, the straw and the juices conveyed through it must be so prejudiced as to carry a thin grain.

§. 24. Anno 1707 the winter proved exceeding wet, and the spring and summer were the same, insomuch that the harvest was very backward, and it was the middle of August before we began to cut wheat: the consequence of these wet seasons, as I conceive, was, that the wheat in cold clay-lands blighted, of which I made a general observation: the reason I take to be, because, these three seasons proving wet, the harvest was backward and late; and the rains being frequent till harvest, the vegetable juices, especially in clay-lands, were heavy and chilled, and could not rise to nourish the grain and the straw; for which reason, both being starved, the straw turned white and speckled, and the grain shrank, and, as I observed, in such lands the straw of red-straw wheat did not that year look red, but from it's green colour turned to white; but in white or warm land the wheat escaped blighting, because there the vegetable particles were attenuated enough to ascend.

Tho' the wheat was so much blighted in the year 1707, yet barley and oats this year did not blight, but were full grained, whether, because they had not been pinched by the winter, not being then sown, or from their lying on a mellow mold and hollower from being later ploughed, whereby the sun might inject his comfortable rays the better, I know not.—We find no summer too hot for wheat, tho' it may for barley and oats.

§. 25. Of the cause of ustilago or the burnt-ear in corn Mr. Ray gives his conjecture, fol. 1241 and 1242;—But my opinion is that it proceeds from a defect in the root, but then that defect must be attributed to ill seed, with a distinction that makes no difference in the effect: the seed might be damaged before it was sown, or the nature of the ground might occasion the defect; for what difference is there between corn originally bad and that damaged by keeping, or taking damage in the field, before it could come up, by being almost malted, or otherwise injured in the ground by it's ill temper, or an unseasonable seed-time? What happened very observable to clear this matter was, in the spring-seed-time 1704 I sowed very good seed-barley in all my grounds; therefore no fault in my seed; so did many other farmers; I could find little ustilago in my oats; they being sowed early their seed came up, and lay not in the ground to take the damage above-mentioned, and the oats which were sowed early, on which rain came, had not the ustilago, nor the barley sowed early, except some

Thin-grained vetches from finnow halm. Why wet seasons bring blighted corn.

Cause of the ustilago or burnt-ear.

some little matter occasioned by their being sowed in white lands, but the middle sowing, when the ground had not moisture enough to bring up the corn, nor had had any rain fall on it for a long time, was injured in it's seed, and turned mightily to the ustilago all over the country, but the latter sowing, after which rain came, had little of it: hence may appear the great benefit of rolling. The ustilago is common to the ears of grafs as well as of corn, in which I have frequently observed it, especially in the gramen caninum nodosum avenaceâ paniculâ, or knotty-rooted dog's-grafs.

In June however (1705) I gathered diverse ears of black-burnt wheat, all burnt to a black powder; I also gathered several of the strong and good ears; I found the straw of the burnt ears drew with as much difficulty out of the ground as the best, and had, to my eye, as good mores; I cut every joint of the reeds in many places, both of the sound and burnt-eared straw, and found them to my eye equally sound, and as much verdure and firmness in the stems that bore the burnt grains as in the others, and many of the ears I found so burnt before they came out of the hoods; so that I am again at a loss to conjecture what the cause should be. By the bigness of burnt grains it should seem, that this misfortune fell on the ear, when it was of pretty tolerable length, and yet before it was half grown in the husk; for it is most certain that these grains could not grow after they were burnt. See farther of the causes of smut and blight under the article Wheat, §. 10. See also Barley, §. 24.

W H E A T.

§. 1. **A** Wheaten crop is the most unprofitable of any to a wheat-er farmer by reason of the charges,—and because a farmer sees not a return of that usually under a year and an half. en crop least profitable.

§. 2. It is commonly said, that ground, which has got a sward, is best for wheat,—and therefore farmers are apt to say, that land, which is not inclinable to grafs, is not fit to be sowed with wheat, till it has got a sward,—whereas the less sward any ground has the fitter it is for any sort of corn, except it be white ground that wants a sward to hold it together.—But a sward on ground is an argument that it has lain lay the longer, and lying out of tillage makes all ground the better: I know no other way of solving the above-said observation of the farmers. Why land with a sward best for wheat.

§. 3. This year, 1717, we had no rain from about the middle of March to the 22d of May, (unless, a moderate shower on the 7th of May, and some small thunder-showers, of which last our neighbourhood had no share) and yet my twenty acres of wheat

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on a side-long white-earth-ground of about six-pence per acre, and six acres more of wheat on the like sort of ground, did thrive something all the while, and lost not much of it's colour, which shews how hardy a grain wheat is: during the aforesaid time we had also for the most part very dry husky winds, hot sun by day, and frost by night: it is true we had an exceeding wet winter, which might beat the white ground the closer.

In cold dry springs and hot dry summers there is a great difference between the wheat and barley harvests ripening; for this year 1714, was such as abovementioned, when I began wheat-harvest July the 20th and ended August the 5th,—but did not begin to cut barley till August the 16th, and in a lingering manner ended the 30th. The reason was, because wheat, being a hardier grain, was not checked by cold, nor heat, nor drought, it's roots being well established and the ground well settled to them; but barley, being a tender grain, was pinched and retarded by the cold; the ground being late ploughed in the spring lay hollower and lighter, and consequently more susceptible of heat and cold.

Of it's til-
lowing.

§. 4. It is not easy to be convinced, if ground be in good heart, though wheat may look very thin all the winter, and till May, how strangely it will tillow and fill up, if not hindered by weeds: this I have often observed in my wheat.

Different
kinds of
wheat.

§. 5. * The Bluebury wheat is the red-straw-lammas, not the white-straw-lammas: there is another sort of wheat they call the white wheat, because the ear and grain is still whiter than the white-lammas.—Then there is the bearded or Poland-wheat, which has a stiffer and stronger stalk, and is therefore often sown in wet cold clay-lands about Wiltshire, because the stalk bears the wet better without rotting or lodging. These are the chief sorts I have any experience in.

Of red-
straw
wheat.

§. 6. Mr. Raymond assures me that he finds red-straw-wheat, if sown at the same time with any other wheat, will be ripe a fortnight sooner. Note—All precociousness in the same species implies a looseness of texture, and weakness in parts: I noted before that red-straw-wheat and rath-ripe barley were apt to fall

* Mr. Miller reckons up thirteen characters of wheat, viz. 1. White or red wheat without awns.—2. Red wheat, in some places called Kentish wheat.—3. White wheat.—4. Red-eared bearded wheat.—5. Cone wheat.—6. Grey wheat, and in some places duckbill wheat, and grey pollard.—7. Polonian wheat.—8. Many-eared wheat.—9. Summer wheat.—10. Naked barley, or triticum spicâ hordei.—11. Six-rowed wheat.—12. Long-grained wheat.—13. White-eared wheat. But some of these, he says, he takes to be only seminal variations, and not distinct species.

fall and be knee-bent, and therefore the one was often sowed, in deep lands that were apt to run rank, with great wheat, the other with battle-door barley to support them, these being stronger in stalk.

§. 7. Mr. Ray tells us of a certain Thracian wheat, which they sow there in the summer, to avoid the cold; this wheat, he, is sowed on light ground, and never has but one culm or stalk; it ripens in three months. What is more remarkable of it is, that it does not yield to any other wheat in weight, and has no bran. He thinks however, that this wheat is not of a different sort from the common wheat there, but that it alters it's nature, and grows tenderer by being sown in the spring, which is a property worth noting.

§. 8. I saw some branch-wheat, so called, because the ear is branched into smaller ears issuing out of the main ear: of this I have no experience; and can only say, that a gentleman, who is well acquainted with it's properties, tells me it makes the best frumenty that is, and the best pudding, and casts as yellow a colour without eggs as other wheat does with eggs.

§. 9. Discouring with farmer Bachelour of Litchfield about the best choice of seed-wheat; he said, he loved generally to choose a middle brownish sort of grain, not the largest bright and smooth fat corn.—I asked him why he was against a large fair grain; he said, because he observed such grain was apt to carry a smut.—If this be true, as probably it may, I know of no reason to be given for it, except that Litchfield-farm being generally a poor soil, and lying pretty cold, cannot maintain and feed the root, stalk, and ear of such fat seed so well as it can those of the small grain, and so the ear of the large-grained wheat mortifies and corrupts in the sap, for want of nourishment, before it comes to be flour, which is the time for wheat to take smut.—It is manifest from many experiments I have made, that the number of the roots, the breadth of the leaves, and the length of the ears carry a proportion to the size of the grain, but poor ground cannot maintain it, and so produces a smaller root, leaf, and ear than such seed would naturally put forth, all which impairs the stamina of the increase, whereby the ear is depraved, and liable to smut; but where (as at Crux-Easton) ground is strong clay, tho' very cold, this objection may not hold good.

Another farmer told me, he looked on the small-grained wheat to be better seed-wheat than the great yellow wheat; for, said he, the latter sort is apter to smut; besides a bushel of the smaller grain contains so many grains the more, which is a great matter: he added however, that the smaller the grain the earlier it ought to be sowed; because, if winter came on upon it, that might prevent it's shooting so many blades, as otherwise it might

have done. I soon after consulted two other very knowing farmers about this matter: they were of a different opinion, and said, the bigger the seed was, of either wheat or barley, it would give the greater more, and have more blades.

Of the
cause of
smut.

§. 10. I looked into Mr. Wilson's smutty and blighted wheat in order to discover what might be the cause of smut and blight. The smutty ears are perfect in the chests, and almost so in the fulness of the grain, even so far that the chests of many ears did strut; so that the smut must fall on the grain late, and when it is towards a fulness, for it cannot grow after it has taken smut. I could very rarely find a smutty ear but all it's tillows were so too; so that from thence I conclude the smut arises from the root, and not from any poison in the air, which would not distinguish between the tap-root and the tillow. I also observed in the fibres of the roots of the smutty wheat a general brittleness, and the earth more starchy and dry about them, and I perceived, for the most part, a stream or streak of a brown stain, the breadth of a pin, in the first joint above the root. So that I am apt to believe that a smut arises from a total defect of sap at the root, and a blight from a partial one, when some of the fibres may still live; so the grain, being feebly supported, does only shrink or wither.--- As for the early smut that falls on the ear, even before it is out of it's hose, wherein the covering or chaff is also smutty, and all in a light powder, this sort of smut seems to arise from the same cause as the former, only the ear having not as then obtained a firmness, it's rottenness becomes more hollow and powdery, and of less consistency than the smutty ears that have obtained a firmness. On the whole therefore, notwithstanding the latter part of my remark, §. 25, under the article Corn in general, where I say I could not discover any difference between the roots, stems, or joints of the stems of the burnt-eared wheat and the sound, I am still of opinion that both the ustilago and smut proceed from a defect in the root.

Some farmers were saying, that dunged land, as had been always observed, was more subject to smutty wheat than folded land. If so, the reason must be, because the dung hollowed the ground, and therefore the longer the dung the greater the danger.

I have in another place observed, that smutty dust on seed-wheat may produce smutty wheat, and no wonder, seeing the seed immediately after sown swells and imbibes the smut with the moisture, and the nib or chisum of the seed is corrupted and poisoned thereby. The nib of the seed is not one fourth part so big as a pin's head.---Seed blacked with ustilago does not hurt like smut, because the hot burning quality of the ustilago is wash-
ed

ed out of it by the rain, and purified from it by the air, to both which it is exposed.

§. 11. I sowed new wheat, but observing much of it to be withered and blighted, I shewed it to some of the farmers, and they, but particularly farmer Biggs, said, it was never the worse for that, and it would grow as well as if it were otherwise, and bid me put some into the ground to try whether his words were true or not.—I asked Thomas Elton about it, and he said, if it were not blighted and withered to a skin, but only so as to have very little flour, he also thought it would grow; but then, said he, I have known it to die away afterwards.—I asked him, how he knew it was that wheat, and how he knew it was for that cause it died; he replied, because he had in such case scratched up the root, and found that there was not flour or milk sufficient to maintain the blade till it could take root.

I met farmer White and farmer Bachelour of Litchfield in the market; I told farmer White how thin his seed-wheat proved that he sent me, and that it was exceedingly blighted; and that I was satisfied, let the farmers pretend what they will, that blighted wheat, if sowed late in the year, tho' it might come to a blade, yet the flour or milk that ought to maintain it would be spent before it could * more; and then, if frosts came, it would be in danger of dying.—They agreed with me, that, in case it was late sowed, it was their opinion also, but it would do well if sowed early;—but, said farmer Lake an hour afterwards, when I was speaking to him of it, let it be sowed early or late, give me a full bodied wheat.

§. 12. Many farmers, and indeed all I have talked with on the subject, agree that musty wheat, though not grown out, will not grow.—I suppose it is because the seminal part is malted, though it does not outwardly shew itself, as it does when it is grown out.

§. 13. Farmer Biggs says, he always sows the Bluebury wheat, that is the rath-ripe wheat.—The meal-men do not like the white-lammas-wheat; they say, it does not cast so fine a flour.—Thomas Elton also says, they seldom sow of the white-lammas wheat,—and both he and farmer Biggs say, the meal-men know it from the other better than they do who sow it.—Thomas Elton says, he has been at Reading with it, and could not have so much by twelve shillings in a load as for the Bluebury wheat though of the same goodness.—I asked him, if they did not observe to sow the white-lammas wheat earliest, because of it's being last ripe;—he replied, he found no difference in that, but that it was ripe as soon as the other to the full.

§. 14.

† Mr. Tull is of the same opinion with farmer Biggs;

Brining and liming to be purely an English practice ; for which there is a story.—wheat. Neither the *Rei rusticæ scriptores*, nor Pliny takes any notice of it. Vid. sowing wheat.

Sharrock says, brining and liming wheat may defend it against grubs, insects, and worms, and fortify the grain, but he cannot think it any security against blights, &c. See fo. 99.

I had wheat brined and limed for sowing, but much rain coming, and the ground being wet, I could not sow it for a fortnight ; at the fortnight's end I had sundry people with me about measuring harvest-work, so I asked their opinion whether such wheat would grow or not ;—one said, he had known wheat that had not been brined and limed above a week, and a great deal of it did not grow.—Another said, it depended on the high degree to which it was limed, for, if it was so high limed that it shrunk and shriveled, it would not grow, but, in case the rind looked plump and smooth, then there was no danger. A third was of opinion, that there was a great difference in the manner of brining it, for, if the wheat had been steeped in brine, it would be much apter to burn by lying in lime than it would have been only sprinkled with brine in the morning it was limed.—Note, this brined wheat was not sowed till November 7th, which was seven weeks after it was limed, and yet it grew, and came up so thick that it seemed to have received no prejudice.

Cautions —to sow wheat under furrow in the hill-country ; not to harrow too fine ; nor to cut hedges too early for fear of the cold winds.

§. 15. It was universally observed this last winter (anno 1708) that the wheat which was killed was not killed by frosts, though they were very intense, but by the winds, which drove the frosty particles in such a manner as to penetrate into the roots of the corn ; this may be supposed to be effected with their angles, which lanced the fibres and cut them in pieces, like as fire by it's sub-

Mr. Tull observes, that brining, and changing the seed are the general remedies for smut ; the former of these he has heard was discovered, about seventy years before he wrote, by some wheat being sown, that had been sunk in the sea, and which produced clean corn, when it was a remarkable year for smut all over England ; but he afterwards doubts whether this might not happen by it's being foreign seed, and therefore a proper change for our land. He tells us of two farmers, whose lands lay intermixed, who used the same seed parted between them, and from a good change of land, and asserts, that the one, who brined his seed, had no smut, but the other, who neglected it, had a very smutty crop ; but again he doubts whether this seed might have been changed the precedent year, and so might not be greatly infected, no more than what the brine and lime might cure. He adds also, that smutty-feed-wheat, tho' brined, will produce a smutty crop, unless the year prove very favourable ; for favourable years will cure the smut, as unkind ones will cause it.

subtle corpuscles in it's rapid motion may be supposed to penetrate and divide bodies.—It was plain the wheat on our hills in Hampshire and our high grounds was canonaded, for the driven snow, as it was carried to the hedges by the wind, battered the wheat and cut off the blade, and the wounds it made opened portals for the fierceness of the weather to enter the roots.—Where-ever the wheat lay out of or sheltered from the wind, in those places it was saved; and the furrows of grounds, where by lying wet (and this was a wet winter) the wheat is always worst, were, if the ridges cross the wind, the best, because the ridges sheltered the furrows, but if the ridges and furrows lay parallel to the north, or north-easterly wind, then the wheat in the furrows was also destroyed, but wheat lying under the shelter of hedges was saved.—From the sad experience of this year we may in our hill-countries conclude it to be good husbandry, to have a special regard, in the sowing of wheat-lands that lye exposed to the north or easterly winds (for it cannot be supposed any danger can come from the south or west quarter) first, to sow under furrow, or at least a cast over and a cast under, that thereby the wheat may lie the deeper both from the penetrating power of the winds and from their power of uncovering the earth, and laying the roots of the corn naked; secondly, to leave our grounds a little rough, and not harrow them too fine, it being observed that the wheat saved itself much better when the knobby clods sheltered it;—thirdly, to have a regard, where grounds lie bleakly exposed to those winds, not to cut down the high hedges, which may be a fence to it, before February.

§. 16. The 20th of November, (anno 1704) I observed the wheat on the ground, and that the first, or capital branch, consisted of an upright spire, between two leaves falling on the ground; but the issues or tillows, be they never so many, had but one leaf on one side of the spire, by which the issues are to be discerned from the main branch; and in both good and poor wheat the difference was the same.—I know not therefore what the Latins meant, when they said, wheat must not be raked till it has four leaves, nor barley till it has five.—The same day I observed the tillows of rye-grass, and found that both the capital germen and the tillows do consist of but one spire issuing from the middle of two grass leaves, and therefore different from that of wheat.

§. 17. It was the 23d and the 24th of June (anno 1703) I made the following observations with relation to the ears of wheat: in one field there were, for two acres together, generally in an ear ten chests on a side; about four of the middle chests on each side contained five grains, viz. two on each side the middle grain; but the uppermost and lowermost chests fell off gradually

Observation on the growth of wheat.

Observation on the ears and roots of wheat, and inference to sow little land to and good.

to four, three, and two grains in a chest.—I went into another field, and could not find above eight or nine chests in any ear there, nor in any of the middle chests above three grains, viz. one on each side the upright middle one; and so again the uppermost and lowermost chests fell away gradually into two, and but one grain in a chest; yet this land had been well dunged.—In another field it was manifest, that part that was dunged carried not so long an ear, nor so many grains in a chest as that part of it that was folded, and sowed on one earth; but there were many of the ears of the folded wheat that held out ten chests, and had five grains on each side of the two middle chests: how these ears might prove I knew not, very little of the wheat being blown.—I also observed the partitions of the chests to open, in order to let out the blossoms; which when shot out, they closed again, and the blossom hung dangling on the outside by a hair as fine as a cobweb: till I made this discovery of the chests opening, I used to wonder how so fine a thread could thrust out the blossom.—Then in another field I observed the limed wheat to be of a most vivid scarlet in the colour of its blossom, more lively than the flower of that in the first mentioned field, which was a more dusky scarlet; yet it exceeded the flower of my other pieces of wheat, which generally did not come up to the colour of that, having a more wan and sickly scarlet coloured blossom.—I also pulled up several roots of wheat, some of which had ten tillows; for I washed their roots, and found them all joined in one.

Now, if some roots of wheat have ten tillows, others but two or three;—if some ears of wheat have ten chests of a side, others but six or seven;—and some ears have five grains in the best chest, others but three, and two, I leave it to be considered what encouragement there is to sow little land and good.—The ten-chested ears at four middle-chests each side, with five grains a piece, make forty grains; the twelve other chests, at three grains in a chest, make thirty-six.—The weak wheat has but twenty-six grains in an ear, and six tillows less, and its two tillows must also hold but in proportion to the top ears.

Of the ears of wheat on land shaded from the sun.

§. 18. I went under a hedge, where my wheat was almost as high as my head in the head-land, the reeds very strong, the chests ten or eleven on a side; yet I observed the blossoms generally to be very pale and sickly, of the colour of ashes on a dying coal, and I seldom found above three grains in a middle-chest: these defects I impute to the head-land being shaded from the sun; for by the length of the reed, the many chests, and by my own knowledge of the ground, it was very strong; but doubtless those grains must run very thin at harvest.

§. 19.

§. 19. July 6th (anno 1703) I viewed a field of wheat, the Farther blossom being just over; I plucked some of the chests, and found, though provision had been made for three or four grains in a chest, yet in many of them there were not like to be above two or three grains, and I found in those failing grains their blossoms pent up and withered, the grains not having strength to emit:— and in those ears, that had the withered grains, I found the outmost grains in the chest on each side to be best maintained, nature having deserted the others, not being able to maintain them.

Whereas I had observed in the flowering of the wheat, that the ears being large and the chests broad, there were in the middle chest of the ear five grains that had flowered, which I apprehend to be the full complement in the middle chest of an ear; examining these ears and chests about a fortnight or three weeks after, I could in none of the middle-chests find above three grains of wheat, in many but two.—If you ask, where was the advantage of these ears producing so many cells, when but two or three grains, or cells in a chest came to maturity? I answer, the advantage was very great; for in the first place they are a sign of the fruitfulness of the root, and, if two cells do decay, the other three will be the better maintained, and have the fuller grain. Secondly,—where in the wheat flowering-time there are the more cells in a chest that blossom, they can the better maintain the loss by all accidents that may happen; for instance; if one or two grains in a chest fail at flowering-time by a fly-blow (it being often the case) there are blossoms enough in the chest to make good that loss by maintaining three good grains in a chest; whereas in ears that are weak, and produce but two or three blossoms in a chest, if those blossoms should be blown, all must miscarry.—I was apt to think however, that of the five blossoms produced in a chest there could but three prove good, nature not being able to maintain more; and this I concluded, because it could do no more by my wheat, which grew in general on exceeding good ground; and the chests were so constructed, that it seemed to me, there could be room for no more grains in a chest; but on coming from Illy to Oxford I observed some mighty rich land, that had large eared wheat, many of the ears containing twelve chests on a side; I am now therefore convinced, nature is not confined, as above hinted, to five blossoms in a chest, for in the middle chest of these ears there had been six, if not seven blossoms, the two middlemost of which nature was not able to maintain, and so they withered, but I told in those chests five compleat grains full kernald.

§. 20. In viewing my wheat, when it was near full kernald, I observed some withered ears, which in all their chests looked dead; the grain was shrunk and withered, tho' in other respects good, taken for tice of.

A defect
in wheat
not com-
monly
taken no-
for tice of.

for it had a sound flour, but the straw was dead to the root, and that drew up easily, the fibres seeming dead and dry; so that this is a farther, and another sort of defect in wheat than either smut or blight, viz. by worm, or burnt.

Of the tillowing of wheat.

§. 21. April 14th (anno 1705) I first observed the manner of the tillowing of wheat: the spring-tillows, for the most part, do arise from the foot of the root of the winter-stems or shoots, which may be two, three, or four, according as the wheat is in proof; they arise from that foot, and, when they break out at first, they may be perceived by the eye in a bud smaller than a pin's head, containing a crystalline pellucid juice; which bud is secured by the coat of the outward leaf of the mother or winter-shoot, between which coat and the inside-coat of the winter-shoot this tender bud passes along, as through a sheath, whereby it is protected from outward injury, till it is so well grown as to break forth with it's green spire; from the side of this winter-shoot now and then only one of the said spring-soboles does arise, and now and then another on the contrary side, and perhaps a third or fourth on the other sides, according as these winter or mother-shoots are in a flourishing condition, till at last they, being grown thick and strong, open the socket of the said outward leaf, which girds them close to the mother-stem, and so stand independent, wide off from it; and then that old leaf becomes useless and dies.—This day I also observed a new pearly brood of soboles at the root of the said winter-shoot, in the manner as the other before described, no bigger than a pin's head; but whether it be not now too late for them to come to maturity is a question: it is very probable warm and dry weather may very much conduce thereto.—The first and earliest soboles or tillows abovesaid, being at this time shot up into the open air in a spire, seem by their growth to have made a bud very early in the winter, which another year may perhaps give me opportunity to enquire into. From many experiments I have made, by sowing corn in pots, I find, that, when a maiden spear has been dead, no collateral spear has shot from the same basis, but that the tillows are properly off-sets from the maiden stem.

When wheat springs with a thin blade it seldom recovers itself in poor land.

§. 22. The autumn (anno 1714) wanting rain, the ground, at the beginning of wheat seed-time, was but just moist enough to bring up the corn: the farmers (who kept on sowing) observed that the corn, which came up before any rain had fell, had but a thin blade, and was of a dark colour, wanting the broad leaf and golden colour they expected: it fell out the same with me in the ground I sowed under furrow, tho' the moisture was sufficient to bring up the corn thick enough.—Farmer Iles and farmer Box, my tenants in Wilts, observed the same thing in wheat they sowed at the beginning of wheat seed-time.—It's not likely but this

this drought might do no prejudice where the land is very good ; for tho' the thin blade, &c. certainly shew the root and stalk to be weak, yet in rich land they might strengthen when rain came ; but where ground is poor, when wheat comes up thin in blade, it is a question whether it will ever recover, and get a good root, stalk, or blade, tho' rain should come.—This narrow leaf is occasioned from the earth's not giving up the juices freely at first.

§. 23. In turning up wet wheat straw (laid together in a heap Of the the beginning of November 1702) I found in January many loose length of grains speared out, but, on account of the thickness of the wadd the sheaths of straw laid on them, they were not able to shoot thro': I of wheat measured their white stiff sheaths, thro' which their blades pass, grains, and they were from four inches to five inches and an half long. Now, these grains having liberty to shoot their sheaths to their utmost extremity, according to the respective vigour of each grain, and not being hindered by the straw, I infer that those lengths are the utmost lengths their sheaths will reach to ; so that, if the grain is buried below such depth, the sheath cannot protect the blade, nor give it safe convoy farther, but it must venture its own self to get thro'. I observed however a round wiry substance the blade carried, an inch upwards from the opening of the sheath, and before it opened into the leafy blade, which, tho' less in compass, and less stiff than the sheath, yet seemed of a strength better able, than if it had been a leafy blade, to penetrate upwards, if the sheath could not carry it into air. I infer also from the different lengths of the sheaths, that these lengths depended on the respective powers of the grain, seeing they had the same bed of straw, and were all buried the same depth : it would be well therefore to try old grains and new, and lay them at different depths, and see what foundation it would give to farther conjectures. I observed the sheaths, which had ran out so far, were much weakened by it, and had not that stiff strength that the sheaths of common sown wheat has, which lies shallow. The grassy blade had shot forth two inches into the dunghill, but looked of a yellow sickly complexion.

§. 24. In cutting many wheat reeds I observed all their lower- Of the most joints were short, of two or three inches in length, and knots in without hollowness, and that they gradually lengthened and wheat hollowed ; which was in reason so ordered by God, for the better straw, and strengthening the reed to support the grain. The fourth joint in the all the reeds was very hollow and very moist ; several drops of growth of water came from most of them in that joint ; whether it was wheat. occasioned by the very wet May and June, or not, I cannot tell. Again, from that joint the next above grew less hollow, and the uppermost, that carried the ear, had no hollowness, but a green strong

strong hood, wonderfully contrived for strength, to support the grain. The hoods of the first joint were dead, (these I take to be the two dying leaves that begin to appear in May) so were the hoods of the second joint, that being of such strength as not to stand in need of them; but the two last and uppermost hoods seemed carefully to protect those whole joints respectively, and to strengthen them. I also observed the tillowing ears, which, tho' they were suckers from the trunk of the tall reeds, that bore the long ears, yet they had two or three small roots of their own, on which they seemed to depend. Quinteny observes, the sap shoots to the topmost branch most vigorously: so it certainly is in the wheat-ear; for, if any grains in the ear are wanting, they are the lowermost.

Of feed-
ing wheat
with
sheep.

§. 25. Being at farmer Sartain's at Great Chavel in Wilts, I said, that one advantage of sowing wheat early was, that it might fat sheep, if it was too rank.—Sartain replied, he did not approve of that husbandry; he thought it a presumption, and said, it would be very apt to make the wheat fall and lodge, and carry but a light ear notwithstanding.—I asked him how so; he said, it would shoot forth a small weak spindle after feeding it, and if the straw was small the corn must be so too.—I spoke to farmer Miles on this subject; he said, he looked on feeding not to hurt the wheat in the least, if it were not fed late: it is true, said he, if it be fed after the spindle begins to shoot, it would be the same as feeding French-grass, for then, as Sartain says, the first spindle being taken off, there would come up a weak issue or spindle by it.—Sartain gave me three or four instances on his side the question, and Miles the like on his; and the latter carried me to view a part of Mr. Brewer's farm, which was anno 1699 eat up bare, and had as good a burden of wheat as any in the county.—He looks on the difference therefore to be as above.

Major Liver and I discoursing of the mischief wheat might receive by being fed down with sheep,——especially, said the Major, to feed it as many farmers do, who seem to be cautious, and think to be sure to do no harm, and so they only put in a few; whereas, were I to feed wheat, I would put in as many as should eat it down directly; for, when there are but a few, they only crop what they should not, viz. the youngest spindles.

I cannot imagine why wheat should be fed at any time, unless it be by one evil to remedy a greater: if the wheat be not so forward as to have tillowed into small stiff spindles, long enough for the sheep to eat it, they can only eat the leafy blade; but I cannot see how that puts the spindle the backwarder; it rather seems to forward it, and strengthen it, forasmuch as the sap, which had the leaf to nourish before, has now only the spindle, which consequently must grow the faster and stronger.——But if the
wheat

wheat be so spindled, that the sheep can bite the spindle off, then it will put it backward to a great mischief, inasmuch as so strong a spindle will never grow up again from that more or root, nor carry so good an ear as that would have done: indeed if a favourable spring comes, especially if the ground be good, the country-man may think he can be no sufferer, because he may, notwithstanding this, have a good crop.——Yet it must be confessed, that one must resort to the evil of feeding, if the wheat be so exceedingly forward as to shoot into ear too early in the spring.

When I shewed farmer Crapp and farmer Ginnoway some young green wheat, and let them see there was a young ear above ground no bigger than a pin's head, they both confessed, it was madness to feed wheat with sheep, especially in our hill-country, where the land is not rich; for in such land, if the maiden-ear be eat off, it must be a weak brother that puts forth in its room, whatever better may happen in rich land.

Mr. Eyre tells me, that farmer Lake of Faccomb is very much against feeding burn-beaked wheat, and says it will occasion it to blight.——I asked Mr. Eyre why the farmer thought so. He said, he could learn no other reason for it, but that it would be the later ripe, and the backwarder corn is in ripening the more subject it is to blight.——Note, this observation, however he or any other notable farmer came to make it, pretty generally holds true, though the true reason, why feeding wheat should make it later ripe, the farmers are at a loss to discern.——The true reason hereof I have before proved, viz. that the ears of wheat in February and March are an inch or two above ground, which maiden-ears the sheep eat off, and then nature is put back to form other ears, which must necessarily put the harvest backward, it may be a fortnight, and also produce a weaker straw, more subject to lodge and fall, in the room of the maiden-stems bit off, and probably with a shorter and weaker ear, unless the ground be very good.——This is like to be the natural consequence of feeding wheat with sheep in the hill-country, where, by reason of the cold, the harvests at best are backward; but these ill effects may not happen where the ground is warm and good, and the country lies low.——If proud wheat were mowed two inches above the ground, this would prevent the mischiefs of feeding; but then I do not see how it would prevent the rankness and lodging of the wheat, since, the ear not being cut off, nature would not be put backward; for the cutting off the leafy-part signifies neither one way nor other; for that makes no advances after the end of May, but then rots.

Of the
sarrition
or raking
wheat a-
mong the
antients.

§. 26. Whereas the *Rei rusticæ scriptores* direct the sarrition of wheat when it comes to have four leaves, as taken notice of before,—I have been at a loss to discover the four leaves of wheat, because it puts forth only three leaves, nor could I ever observe more.—But note, the two collateral leaves die in about two or three months time, and then more leaves put forth; so that in England four leaves never appear at one time, but in a warmer climate, as Italy, the latter leaves may put out before the former are dead, and so four green leaves may be seen at the same time.

Sign of
good
wheat.

§. 27. When the ears strut, and the chests stand open, it is a sign the grain plims well, and is full.

Sign of
wheat's
being at a
stand in
growth.

§. 28. In the beginning of May (anno 1707) my servant said, my wheat, for want of rain, was at a stand in it's growth.—I asked him, how he knew it; he said, by the spikiness and speariness of the tops; for, when it does not thrive, it runs to a sharpness at top, and does not hold broad as when it thrives.

Time
when the
grain is
first form-
ed, April
15.

§. 29. It was the 15th of April (anno 1702) I first observed, that the ear was so early formed; for in pulling away the valves, which were five, at last I found the ear in it's cradle, or inmost valve, which valve was of the length of three pins-heads; the ear itself not above two pins-heads in length: I could not discover it's parts with the naked eye, but with the microscope I could distinguish it's parts plain as in a full grown-ear, and distinguish every seed to be of a watery pellucid substance; the grain being formed by the middle of April, the weather following seems to be of great consequence.

It was observed this year, 1700, that wheat carried a very short ear; for it had been a very wet cold May, and in that month, or near it, it was that the ear was formed, and, if the root be chilled in that month, it will not recover it.

The proverbial rhyme holds not good on cold hill-country lands, tho' consisting of strong clays, which yet is very true, when applied to Leicestershire, and other deep lands warmly situated;

“ I came to my wheat in May,

“ And went sorrowful away;

“ I came to my wheat at^d woodsheer,

“ And went from thence with a good cheer. ———

For, in cold hill-countries, whoever sees not the ground well stocked with green wheat by the beginning of May, will never see a good crop.

§. 30.

^d The word woodsheer is understood for the froth, which, about the latter end of May, begins to appear on the joints of plants, and is more commonly called cuckow-spit.

§. 30. There is a sort of land the country-people call * wood-Edge-feer ground ; in this sort of land, sown early or late, the corn will be edge-grown, that is, much of the blade, after it is come up, will die away, and then spindle up again : this must be occasioned by the root's being affected, and not only by the blade's receiving an injury, for then the blades of corn in the neighbouring grounds would be the same, as being exposed to the same air ; such ground therefore must be supposed to be of a hollow spungy nature, very susceptible of the air ; and tho' it may seem to be closer and more compact than chalky land, yet really it is not so, else the chalky land would suffer the same fate. In these wood-feer grounds the roots of the corn are injured by the cold winds coming to them in March, April, and May, whereby they sicken, and the blade presently discovers it by dying away.

corn on woodfeer ground.
* Spungy ; ferny ; poor

§. 31. The lodging of wheat is often occasioned by a weakness in the straw proceeding from the poverty of the land, it not being able to give nourishment, and so the straw grows limber.—And in very strong land the straw of red-straw-wheat will run to a greater luxuriancy in height than the strength of the straw will bear, and then it will lodge.

Of wheat's lodging ; and the

§. 32. This spring (anno 1720) being very cold and wet, and the summer by intervals rainy till harvest, and oftentimes the rain falling with that weight as to beat down the best of the wheat in most parts, a month at least, if not five weeks before harvest, yet it did not, as usual in such case, blight, which was wondered at.—The reason seems to be, because the ground by cloudy dark weather, and many repeated and frequent rains, was kept cool, and thereby it fed the corn, so that it did not scorch and burn as in other such years, whereby the green corn that lodged was not parched up ; for it is obvious, it must burn and dry up more in hot scorching weather, when it lies flat on the ground, than standing upright it would do ; because by standing upright it shades the ground from the sun.

Of blights on wheat.

The country-man observes the blight to appear on his wheat quickly after it's blossoming-time, and so concludes the blossoming-time dangerous for blighting ; and in all probability it may be so ; for the blight perhaps arises from the cold winds condensing the sap and choking up the pores of the straw, whereby all nourishment that should pass to the ear is intercepted : but if this blight proceeds from a mildew falling from the air, as many people imagine, it cannot be so ; for at the blossoming-time the straw is not dry enough to receive and suck in such mildew ; it abounds with moisture at that time, like green hay in swarth, and cannot be prejudiced by rain, as it may be after it is become hay, for then it imbibes the rain ;—but, as I conceive, the blight appears not on the wheat till after the straw becomes somewhat dry ;

tho' true it is, the mildew's lodging on the wheat at flowering-time, if not washed off by rain, may continue till the straw be dry enough to imbibe it.—The poorer the land is, or the lighter it lies, tho' rich, the less able will it be to feed the roots of the corn so as to overcome the blight.—Now the reason why wheat or barley is supposed to be past blighting when the grain comes to some hardened pith is, because the mildew coming on the straw then, it cannot affect the corn so as to blight it, it having by that time got such a substance, as to be maintained by very little communication of sap from the root, according to the degree of which the wheat will shrink more or less.—Perhaps the smut may be nothing else but the highest degree of blight, when the mildew comes so plentifully on the straw as totally to interrupt and stop the rising moisture,—or when the particular bit of dung, or such moisture as lies to the root of the corn is, by that time the corn comes to kern, wholly consumed by the heat of the sun.

Observing the wheat-ears at blossoming-time, I found, that, at shooting forth the blossom, each cell or cheek opens more than ordinary, and, when the flower is come forth, it closes again. This observation seems to account for the blight wheat is said to take at blossoming-time, inasmuch as at that time blighting winds and mildews are let into the cell where the grain is; these mildews whether they proceed from the air, and falling on the plant enter into it's pores, and prevent the sap from filling it, or whether they are nothing more than the sap itself, which, in it's passage thro' the pores of the plant, is checked and thickened by the cold winds, and, being unable to fly off, settles on the surface, however this be, they are of that gummy nature, that they may easily be supposed to choak the grain.

Of B L I G H T I N G A I R.

• Country people look on hot glooms and a warm vapoury air to be blighting and to bring caterpillars and green locusts; if so, this

• Mr. Miller gives the following account of blights from the learned Dr. Hales, which in a great measure is agreeable to our author's sentiments.—Blights are often caused by a continued dry easterly wind, for several days together, without intervention of showers, or any morning-dew, by which the perspiration in the tender blossoms is stopped: so that, in a short time, their colour is changed, and they wither and decay: and, if it so happens that there is a long continuance of the same weather, it equally affects the tender leaves; for their perspiring matter is hereby thickened, and rendered glutinous, closely adhering to the surfaces of the leaves, and becomes a proper nutriment to those small insects, which are always found preying upon the leaves and tender branches of fruit-trees, whenever this blight happens; but it is not these insects which are the first cause of blights, as hath been imagined by some; tho' it must be allowed, that, whenever these insects meet with such a proper food, they multiply exceedingly. The

this seems to be an argument for mildews falling from the air, and not proceeding merely from cold, for the reason thereof may be this; those insects eggs being laid on the leaves of trees and corn, the weather aforesaid coming, which contains glutinous and unctious particles, may fasten those eggs to the leaves, and secure them from being blown away, till the sun can bring them to perfection, whereas, if winds had come, or rains, instead of the aforesaid blighting air, most of them might have been destroyed; so that such glooms may well be supposed pernicious; and such air may penetrate into the cells of the chests of wheat, and choak all circulation.---But on the other hand the mildew may proceed from the cold nights that give a sudden check to the sap, which had before been attenuated by these glooms.

If strong winds come when the straw of the wheat is grown a little stiff, i. e. about three weeks or a month before the corn be ripe, a blight often happens; for the straw being then stiffened does not ply with the wind as when full of grassy sap, but by making resistance it loosens the mores or fibres of the roots, which give way or break, as may be seen by the wheat's reclining at the root from the side the wind set till harvest; whereby nourishment is not so well conveyed, and so the corn shrinks or blights, especially in loose ground, as it happened this year (1712) but, where wheat lay in a shelving ground, quite under the wind, no damage happened.

This year (1712) about the time the wheat was kernalled, and just got into milk, or passing out of it into soft flour, there happened strong westerly winds, which strained the roots of the corn, and made it recline; soon after which it was observed by the countryman, that the corn was generally struck with a blight, especially where the land was weak and light; for some of the fibres of the roots gave way, others broke, and the corn continued to lean from that point, from whence the wind came, till harvest, but in very good land the corn suffered little by the blight. On my clay-lands, tho' the fibres of the roots were strained, yet such of them as were not prejudiced were able tolerably well, from the moisture of the land, to feed the corn beyond what dry and light land could do:—However the straw of all the wheat in the country looked white, and not stained with black spots.—The reason was, because this

The wheat least liable to be hurt by these insects, says Mr. Tull, is the white-cone (or bearded) wheat, which has it's straw like a rush, not hollow, but full of pith, except near the lower part, and there it is very thick and strong. It is probable it has sap vessels that lie deeper, so as the young insects cannot totally destroy them, as they do in other wheat; for when the straw has the black spots (which he calls the excrements of these young insects) which shew that the insects have been there bred, yet the grain is plump, when the grey-cone and lammas-wheat mixed with it are blighted.

blight proceeded not from the fat gummy-juices of the air, nor indeed from the coldness of the wind, (either of which may choke the vegetable juices and hinder them from ascending through the straw to the ear, whereby the corn may be starved for want of nourishment), but from the strength of the wind damaging and weakening the roots, which are the feeders of the grain, and preventing them from doing their office.—I had such ground, which lay under a hill sheltered from the wind, that was not hurt. All corn, on light and dry ground, ought to be cut sooner than corn lying on a flat clay-ground, because from the cold ground a damp steam will arise, and in some measure feed the corn that leans down more than it can be supposed to do from a poor dry ground, when the corn has lost its support from the root.

Farmer Elton told me, that he had the straw of his wheat grievously blighted, when the ears were not touched.—I told him, I thought that must be, because the wheat was so near ripe that it no longer depended either on the root or the straw for its nourishment, and consequently any defect in either of them could not affect the ear.—To which he assented, and said, he believed it was the truth of the case.

Of
wheat's
handling
rough.

§. 33. The worse wheat is, tho' it be never so dry, it will handle the rougher; because thin and coarse wheat is not so plump and globular as fine wheat, and is often so coarse as to be pitted, and wrinkled, which must needs make it less slippery.

Of
wheat's
handling
cold.

§. 34. Wheat will handle colder out of a reek that is two years old than it will out of a reek of one year old;—for in that time, the mists and rimes, especially in the hill-country, will be drove into a reek.

Heavy,
cold
wheat
bad for
grinding.

§. 35. January (anno 1705) we had a month's season of very wet and rimy-weather, in which time my bread proved very white, infomuch as I was uneasy about it: the miller said, he ground the wheat as fine as usual; the cook-maid said, she used the coarse sieve, as she used to do: at last the miller said, the reason must be the dampness of the weather, which made the wheat grind heavy, and not so fine, whereby the bran was the larger and the flour the less.—From hence it appears, that wheat, which is heavy and cold, will not yield that flour that dry wheat will, nor consequently that price, which is another disadvantage besides that of not keeping.

Of wheat
that is
grown.

§. 36. Anno 1715, I observed in other persons wheat as well as my own, it having been a wet harvest, that most farmers had some wheat-corn grown, and that such wheat would not yield so much by three-pence per bushel as other corn that was not grown, and yet in such grown-wheat it may be there was not to be found above a grain of grown-corn in two or three handfuls.—I thought it proper to demand the reason of the farmers, why so few grains
of

of grown-corn in a large quantity of wheat should make so great a difference in the price; at length farmer Isles, of Holt in Wiltshire, gave me the best reason:—he said, where there is but a little grown-corn in wheat it makes a very sensible difference in the bread or pudding made of it; not that the grown-corn only, which is apparent to us, when so little, can make so great a difference, but where-ever, said he, so much corn is apparently grown to our eyes, a great deal more is damaged than appears to our eyes; for the flour of corn will be damaged and clammy, tho' it has not gone so far as to shoot either root or spear: it is enough to vitiate the flour if the nib or punctum saliens has swelled so as to crack or burst the skin.—I told Mr. Raymond farmer Isles's judgment of this matter, and he said, it was a notable observation.

Rain coming before I could thatch a wheat-reek, one fourth part of the ground being unthatched, the wheat there took damage by growing; and it is to be noted, that a little grown-corn will do a great deal of damage; 'tis not only the loss of those grains that actually grow, but a foulness and fustiness also, and a smut that they beget in the germen, that rots the corn, so that such ears will fly into dust, like a puff, when they are struck with the flail, and discolour the whole quantity of wheat threshed with them, tho' it had otherwise taken no harm.—It is farmer Bigg's opinion, that it is the best to mingle all together, for the buyers will give nothing for the bad.—All my wheat of that reek also felt heavy and cold, tho' not one fourth part had taken damage; for the unthatched part taking damage, the damp that was thereby received, and pent in when it came to be thatched, did, it is probable, strike a chill to the whole reek.

§. 37. In case the spring be far spent, and the summer so advanced, that an early and forward harvest may be expected, and the last year's wheat run coarse, by reason of a cold spring and summer with a backward harvest, it will be best to thresh out such wheat, and sell it before new wheat comes into the market; for the new wheat will carry so much better a body and colour, than the old wheat, when it stands in the market along with the new, will sell to a much greater disadvantage than it would have done, had it appeared by itself.

§. 38. In Moses's song on the overthrow of the Ægyptians, Exod. ch. 15. ver. 7. it is said,—“Thou sentest forth thy wrath, which consumed them as stubble,”—whereby it appeareth how an antient custom it was to burn the stubble.—Pliny takes notice that Virgil gives great commendation to the custom of burning the stubble, but he himself thinks it of no other use but that of destroying the seeds of weeds.

M 4

R Y E.

† Sunt qui accendant in arvo et stipulas, magno Virgilii præconio; summa autem ejus ratio ut herbarum semen exurant. Plin.

R Y E.

§. 1. **R Y E** is a grain seldom sown in the counties I have been most conversant, and, as for my own experience, it has been very little in it.

Rye carried by the sheep from one land to another. Farmer Marrant of Essex assured me, that in their common-field one of the tenants one year sowed rye in but two acres, and there was not that year one piece of wheat in the whole field clear from rye.—It was conjectured it must be the common-field sheep crossing over the two acres of rye, after it was sowed, that carried it about in their claws.

Of sowing rye in Leicestershire. §. 2. Mr. Putching of Leicestershire informs me, that they sow two bushels of rye on an acre, which is as much as they sow of wheat, because, he says, tho' it is a thinner grain, and so more of it goes to a bushel, yet it is also a tenderer grain, and therefore they give that allowance.—He says, in the common-fields in Leicestershire they winter-feed their wheat by consent, but they do not feed their rye, because it is too tender to bear it, and the sheep would make little holes with their feet in open weather, wherein the water would stand to the injury of the rye.

They never feed rye.

B A R L E Y.

Of rath-ripe barley. §. 1. **F**ARMER Biggs of Hampshire tells me, he sows much of the rath-ripe barley, that he sows it on clay-ground, because the fault of that land is that it's corn will be late ripe, which is mended by that barley: rath-ripe barley, he says, ought to be sown early, or the corn will be thin; he sows it in March. But farmer Elton, his neighbour, says, some sow it first, and some the last of barley: he also says, it ought to be sowed in good strong ground, else it's straw being very hollow will be weak, and so be beaten down and lodge.

It seems that rath-ripe barley should be sown on better ground than other barley, because, ripening the sooner, it may be supposed to exhaust the goodness of the land, and to draw it's moisture from it faster than it can well give it, the corn coming to it's perfection in so much the less time.—But Mr. Raymond assures me, that with them, near Patney in Wiltshire, they sow it in the poorest sandy ground.

Conformable to what Mr. Raymond had told me, a good farmer, and neighbour to both Biggs and Elton, is positive, that on his poor gravelly ground it is much the best to sow rath-ripe barley; for such land will not hold out in feeding the late-ripe corn long enough,

enough, but will give off before it is ripe ; therefore the rath-ripe barley does better, to ripen which there is not so much patience required ; but quære how far this may hold also with white earth, which is the sort of soil Biggs's and Elton's poorer land consists of.

I sowed this year (1707) rath-ripe barley in very poor white ground ; I also sowed the same in very good strong clay-land : no rain fell to bring it up till June, and after that we had frequent showers, and plenty of rain till harvest, and in harvest, and yet I observed my rath-ripe barley in the poor light land miserably bent, broken in the straw, and harled or fallen down : in the strong clay-land it did the same, but not so much, tho' the straw, and the leaf of the straw was blighted, and full of black specks, the ear thin, and it's colour lost in all the rath-ripe barley, whereas the straw of the late-ripe barley was both free from these spots, and stood upright with good strength.—I do infer from hence, that, seeing the clay-land in our hill-country, tho' in good heart, and the moistest ground we have, and in a moist year too, cannot sufficiently feed the straw of the rath-ripe barley, so as to enable it to stand upright, but suffers it to be languid and withering ; I say, from hence I infer, that rath-ripe barley cannot be a proper sort of barley for us to sow ; because in our hill-country, where the straw breaks or starves three or four weeks before harvest, it must needs be a thin coarse grain ; therefore in our hill-country it is best to sow late-ripe barley, though we should provide three or four horses extraordinary against sowing-time, in order to get the corn into the ground a week before May begins.

This year (1707) rain not falling to bring up the spring-corn till June, one half of the seed, that which fell deep, came up without rain, but the rest not till rain came.—This gave me the opportunity of making the following obvious observation on the misfortune that rath-ripe barley is subject to in such years, viz. that half that came up first, by reason of the weakness of the straw of such barley (as above set forth) could not wait for the ripening of the latter edge-grown corn in the same field ; but it's straw bent, broke, and harled, and the ears buried themselves among the broad-clover sown with the barley, so that I was forced to cut it, not being able to stay a week or ten days longer for the edge-grown corn to ripen ; whereas, the late-ripe barley stood so upright in it's straw, that the corn, which first came up, would stay ten days for the edge-grown corn.

In May, (anno 1702) I asked Mr. Raymond whether he was not of opinion that rath-ripe barley, by reason of the weakness of it's straw, was often apt to fall down to the ground, just when ready to mow. He replied, with them they had no stones, so that was no hindrance, unless by the bending down of the ears the scythe might cut off some ends of them, which mischief he had not observed

served to be more in that sort of barley than any other;—but that in rath-ripe barley there is this mischief, said he, we hold, viz. if the ground be good, and the year a feeding year, rath-ripe barley is apt to run rank, and to fall whilst very green in the ear, which occasions the grain not to fill, and is the greater mischief; therefore, said he, this year I sowed common barley; but such a hot dry spring as this there can be no danger.

It was very manifest to me, this year (1706), that the straw of the early-ripe barley is thinner and weaker than that of the late-ripe barley; for all my rath-ripe barley, (of which I sowed fifty acres in different sorts of ground, and some of it side by side with the late-ripe barley) did crumple down in the straw, when the late-ripe barley of the same forwardness and growth stood upright; and this year I also observed in all my rath-ripe barley, that the grain was thinner than that of the late-ripe, which I impute to the dry scorching summer; the straw, being thinner and weaker, was less juicy (as we find by giving it to cattle) and sooner dried up, and the want of nourishment sooner appeared in that sort of barley.—but farmer Biggs says, that in wet summers he usually observes the rath-ripe barley to be the fullest bodied corn.

It seems plain to me, that rath-ripe barley, as it should be sown early, for reasons before set forth, so it ought not to be exposed to the north, but ought likewise to be sown in pretty good ground, either by nature, or made so by art; for we know, the poorer the ground is the weaker and poorer the straw will be in all sorts of corn; and if the rath-ripe barley has by nature a weaker and thinner straw than the late-ripe barley has, and on that account is apter to crumple, to bend down, and to break in the straw before it is ripe, much more will it be apt to do so, when the straw is made much thinner and weaker than naturally it would be, by the poverty of the ground it is sown in.

It is very evident to me this year (1720), that rath-ripe barley ought not to be sown on poor ground, and much less so, in case it lie declivous from the sun towards the north.

Of middle-ripe barley.

§. 2. An experienced farmer of Somersetshire very much persuades me, that the middle-ripe barley would be the best I could sow at Crux-Easton, and that I should thereby avoid the inconveniences incident to rath-ripe barley; viz. that of crumpling and falling down, or being knee-bent, and that of the thinness of the grain, from thence arising; for if by much wet it falls down too long before it be ripe, the barley will thereby be stunted, and will shrivel and shrink; for no nourishment passes after the breaking or bending of the straw; but this middle-ripe barley, said he, will stand upright till harvest, and then the straw makes better fodder than the other.—I replied, I had tried it, having bought it for seed, in our neighbourhood, but found no success.—He said, he did

did not wonder at that, for he had done the same ; but, said he, you must buy it from about Bemerton, near Salisbury ; in that case I found it quite another thing : buy a load yearly to keep up change.

It was very evident to me, after I had sowed middle-ripe barley, that the corn which grew on that part of the ground declivous from the sun did not ripen so soon, nor stand so long upright as the rest, but in many places fell down flat into the grass ; so that middle-ripe barley, tho' it better bears late sowing, even on a ground declivous from the sun, than rath-ripe barley, yet it will neither bear the one nor the other so well as late-ripe barley will do, nor will it's stalk stand so long.

It is observable that the middle-ripe barley abovesaid, which was sown at the bottom of the field, lying on a flat, ripened altogether, and looked white and very * suant, being forwarder than * kindly that part of the ground which lay on the side of the hill declivous to the sun ; but again, four or five luggs wide, in the bottom between the hills, it ripened as soon, and looked as white and suant as in the abovementioned bottom that lay open to the sun and air ; but on the side of that hill that sloped from the sun the corn was more edge-grown, and lay backward, and neither looked so white, nor was so ripe. This shews that a bottom ground, or a vale pent in between two hills, tho' shaded by one from the sun ; yet, by means of the warmth and closeness of the air, will many times ripen as fast as a ground lying declivous to the sun.

§. 3. It does not seem very easy to make a conjecture of the nature of late-ripe and rath-ripe barley, and to give reasons why the late-ripe agrees best with cold, and the early-ripe with hot grounds, and with a hotter climate ; but I shall venture however to deliver my notion of the matter. I conceive the reason why one sort of grain is late-ripe, another rath or early-ripe, is from the stamina and constituent parts of each grain, which in the rath-ripe sort are of a looser and opener texture in the fistular parts and glands. The rath-ripe barley having finished it's course, and come to a maturity in less time by being committed to a warm bed, shews the vessels of the seed to be less compact, and the fibres and ligatures not so well strung, and their tones looser than those of the late-ripe ; for the quicker the growth of the solids are, in animals as well as plants, the parts which contribute towards such growth and increase are less solid and compact, as carrying with them a greater mixture of fluids, which are the necessary medium for consolidating the harder or drier particles, which united make the solids, and therefore, the cement being of a looser substance, no wonder if the fibres of such seeds are so too : thus the parts of the rath-ripe seeds are not corded, braced, or faggotted together with so strong an union or texture as the late-ripe

Of the nature of rath and late-ripe barley.

ripe seeds, which last being sowed in cold ground, and in a cold clime, the vegetable juices are sent up in less plenty, and the particles that contribute to the solids are not overflowed with so liberal a quantity of fluids, which are therefore the firmer matured and digested; from whence it must follow, that the passages of the fibres and glands in such seeds are straighter, and the juices are longer in filtrating thro' them; from whence it must appear (which is the question in hand) how the late-ripe seeds agree best with a cold clime, and cold ground, and the rath-ripe seeds with a warm clime, and warm ground; for the stamina of the late-ripe seeds are closer, harder, and more compact, and there is a stated time for every distinct progression in vegetation. The *Rei rusticæ scriptores* tell us,—that after so many days each sort of corn puts forth so many leaves, then has such a stated time for flowering, and such from thence for finishing the seed, and such for ripening it: so, agreeable to the constituent parts of the seed, through which the vegetable juices are to pass, there is such a stated time to be completed in each station and progression, before nature can rightly finish one work, in order to another, till the end of her intention is answered, viz. that seeds of increase are produced from a seed.—From hence it follows, that colder earth, and a colder air, answer the nature of late-ripe seed better, because the vegetable juices are not forced up the plant in a more furious manner than the vessels can receive them, or go hand in hand with them in growth; for the fibres and fistular parts of a plant, or a fruit, are to proceed gradually in an extension of parts, as well as in fulness of juices; and there ought to be such an increase of juices as is proportionably adapted to the extension of the fibres, that one work of nature may not outrun the other; for if the heat of the ground, or the air, hastens the juices of the ears of late-ripe barley to maturity faster than the fibres of the grain (being of a harder texture) will be extended, or admit of extension, it follows, that such grain will not arrive to it's perfection, or full growth, but must dry and harden before it is come to it's full body.—So, on the contrary, in rath-ripe barley (in which the fibres are loose, and consequently by nature disposed to a speedier extension) in case the ground it is sowed in be cold, the fibres of the seed of increase will run on faster in extension, and so to maturity or hardness, than the cold juices of cold land, in a cold air, will ascend to plim and plump up the seed, and from this ill match or marriage must arise a leanness of seed in the increase.

By what has been said of the properties of late-ripe barley, it is evident, that, if it be edge-grown, the ears that are first ripe will better wait for those which lye behind, or are greenish, than the forwardest ears of rath-ripe barley can do; for that will fall
down,

down, and be * more loose, if you delay the cutting of it when* loose at
ripe. root.

It seemeth to me, from the experience I have made, that late-ripe barley will better endure to be sowed when the ground is wet, than rath-ripe barley will do; the reason of which I take to be, because the late-ripe barley is (as all other late-ripe feeds of the same kind are) closer in it's texture, and more compact in it's parts, and consequently more resists moisture than the rath-ripe barley does, which is opener and looser in it's parts, and consequently drinks in moisture more freely, and is sooner chilled thereby, or made drunk therewith, and so it bursts.

§. 4. Mr. Clerk of Leicestershire informed me, that sprat or Of sprat battle-door barley required a strong good land, that it's peculiar or battle-property was, that it would not run up to a length of straw, door bar-though in good land, so as to lodge, as other barley would, and ley. that it had a stronger and more pithy straw, but not so good for fodder.

Mr. Ray, fo. 1243, speaking of battle-door or sprat-barley, says, it is thought to be more safe than other barley from the depredations of birds, because it's grains are more difficult to be torn from the ear than the grains of other barley.

J. Mortimer, Esq; F. R. S. fo. 100,—the sprat or Fulham-barley is the best for rank land, because it doth not run so much to straw as the common sort, and yields much better.

Mr. Johnson of Bedfordshire, of whose judgment I have a great opinion, after he had sown great-wheat in a new broken-up very rich pasture-ground (which sort of wheat he chose, because it was the least subject of any to lodge) and the next year had sown beans, the year following, being the third year of sowing the ground, took me with him to view it, in order to advise with me what grain he should sow: he thought it would be too rank for barley, because that is more apt to lodge than oats, and also too rank for oats, and was therefore inclinable either to sow great-wheat and red-straw-wheat mixed, that the former might help to support the latter from lodging and falling, it being a rank ground, or else to sow red-straw wheat alone, because, next to great-wheat, that supported itself the best.—I have known great-wheat and red-straw-wheat often sowed in the north, in good land, for the same reason.—I agreed with his reasons as being good, but told him, I should rather recommend battle-door or sprat-barley, if he would send for it from beyond London, it being not only a shorter, but also a stronger strawed barley than any in the north, and therefore fitter to sow on rich land, in order to prevent lodging, and was also good to mix with other barley, to help to support it:

§. 5. Mr. Ray, speaking of the square-barley, or winter-barley, called also big, says, it is commonly sown in the mountainous parts

parts of northern countries, where other kinds of barley will not bear the winter; but this sort is not hurt by the frost.

Of square-barley or barley-big. The six-square-barley, vulgarly called barley-big, is sowed in Leicestershire in small quantities, but tho' it is a great increaser, they told me they did not like it, because it was not good for malting, it had so thick a rind.—Mr. Glen of Hawthorne said, to sow a little of it for poultry did very well; but, said he, for the most part they sow it in Northumberland, and so far northward, because it will endure the winter, whereas the lenten-barley will hardly ripen with them.

Rich land makes barley thin. §. 6. Farmer Elton having been at Major Liver's to buy barley for malting, I asked him if he could deal, he said, the Major had good barley, but, having rented the parsonage of Husborne for six or seven years, he had so much bettered his own ground, that his barley was apt to run out too far in length and be thin. I asked whether the richer the land the thinner the barley. He said, yes, if the ground be not thick and full feeded.

The thin-rinded barley not owing to the richness of the land. §. 7. Mr. Smith of Stanton assured me, that eminent maltsters, whom he named, had told him, that the boldest barley and the best bodied for malting came off the strongest land.—I suppose their meaning was, where the land lay both very dry and healthy; not land of a cold clay nature, but such that had mellowness and lightness with it's strength, such as the Leicestershire and Northamptonshire-lands are, and such as the land is about Bishop-cannons in Wilts: what Mr. Smith said was on account of the preference generally given to hill-country-barley, which, as I take it, depends on this distinction, viz. the hill-country-barley is generally better esteemed by the maltsters than the vale-barley; because the hill-lands are often dry and mellow, as well as of good strength; but the vale-lands are generally too wet, cold, and clay; instead of which, did the vale-lands exceed the hill-lands in strength, and yet were of a mellow and dry mold, no doubt such vale-land would bring the best-bodied barley.—I speak this to shew, that poverty is no ingredient requisite in land, for carrying a plump and fine rinded barley; yet it is true, that poor land, lying dry and warm, must be allowed to bear better barley than rich land that lies wet and cold; for barley does not stand so much in need of strength in land as of the healthiness and warmth of the soil, though both are best, where they can be had.

Of barley's degenerating. §. 8. * Upon observations made on my barley this year (1711) after

* Mr. Tull, in his chapter of the Change of individuals, says,—Seeds in their natural climate do not degenerate, unless culture has improved them

after I had threshed some of different sorts, viz, that which was earliest, middlemost, and last sown, all of my own seed, as also barley from seed bought of Mr. Cox of Westover, I plainly see the reason why barley sown on our hills, from year to year, of our own seed, without changing, must in time so degenerate, as not only to produce a very thick-rinded, and cold glewish-floured barley, but as small also as a black oat: wherefore Crux-Easton, being cold both in it's lands and it's situation, is necessitated to be sown later, and the ground not forwarding the corn in growth, as warmer lands do, the harvest must be later, all which contribute to the producing a thick rinded, and cold floured barley: barley, being tender in nature, requires a warm soil and clime.— Now if you will sow the seed-barley produced from such a place, being coarse, thick-rinded, and cold in flour, it will require more days to root and spear in than the bought seed it proceeded from, which came from a warm land, and will also strike less bold roots to forward the grain towards maturity in the course of vegetation; from whence it is manifest it will still come to a later harvest, and consequently be every year coarser, and every year proportionably degenerate.—As for wheat and oats, they are hardier grains, and will bear sowing earlier in cold land, and so come to maturity in good time, and therefore will not so soon degenerate, tho' the seed should not be so often changed.

As I have taken notice of barley's degenerating, and becoming coarser and coarser every year, by reason of it's being longer coming up, so without doubt in such coarse barley the nib or germen,

them, and then, upon omission of that culture, they return to their first natural state. He argues in this chapter, that the reason why individuals of all kinds of grain, as wheat, barley, and vegetables in general, degenerate, is owing to the effects of different climates, as heat, moisture, &c. and instances, that flax-seed brought from Holland, and sown here, will bring as fine flax as there, but the very next generation of it coarser, and so, degenerating gradually, after two or three descents becomes no better than the common ordinary sort;—that common barley, sown once in the burning sand, at Patney in Wiltshire, will, for many years after, if sown on different warm ground, be ripe two or three weeks sooner than any other, and is called rash-ripe barley; but if sown a degree farther north, on cold clay land, will in two or three years lose this quality, and become as late ripe as any other. Note, he has no great opinion of this barley, as being of a more tender sort, and thinner bodied than the late-ripe, and not recovering a check from cold or drought so soon as the other.—Weeds, acorns, hips, haws, &c, says he, are thought to have been originally the only natural product of our climate: therefore other plants, being exotics, many of them, as to their individuals, require culture and change of soil, without which they are liable, more or less, to degenerate.

germen, and all it's parts, even the seed of the seed, is coarser in it's texture.

Caution
—to sow
good feed.

§. 9. Anno 1699, after barley-feed-time there was for about a month a very dry season, so that but very little barley came up, and, except rain came, it was very likely the whole crop might be lost, and, in case a very wet season had come, it had been the same; from whence I observe, of what great consequence it is to put very good seed into the ground; for without doubt such seed will better endure all sorts of extremities of weather than bad seed can do.

Experi-
ment to
shew the
advantage
of sowing
full bodi-
ed good
feed.

§. 10. About the middle of April (anno 1705) I sowed twenty-six acres of barley with seed that came out of an unhealthy cold ground, that usually run very thin; so that, however suitable the change of the ground might be, I doubted whether so thin a grain as most of this was could be so profitable as a full bodied grain.—To try the experiment, I took sixty grains of this corn, of three different sizes, viz. twenty grains of the biggest, twenty of the middle size, and twenty of the smallest corns: I put the twenty of each sort into three several pots, with rich mold of the same sort in each pot: in eight or nine days time I found thirteen of the fuller bodied corns were come up, nine of the middle-sized, and but five of the smallest; but the fullest bodied corn, both in colour and breadth of blade, exceeded either and both the other sorts.—In three days after I found nineteen blades of the biggest sort come up, seventeen of the middle size, and thirteen of the least: in three days after the twenty blades of the best and the middle sort were all come up, but of the worst only seventeen blades; but as these blades of the worst sort carried a manifest disadvantage in colour and breadth, and doubtless many of them would never have come up at all in poor ground, though the better sort might all have grown, so I question not but I shall find the same disproportion in all the tillows, ears, and body of the grain.

Of sowing
grafs-feed
with bar-
ley.

§. 11. If you sow rye-grafs, or French-grafs with barley, it is to less purpose to be curious in your barley-feed; when you sow grafs-feed with barley, it matters not if there be any trumpery of oats, &c. in it.

Caution
—not to
buy bar-
ley-feed
till near
sowing-
time.

§. 12. At Christmas-time (anno 1700) several good farmers being with me, I was enquiring for peas and barley for seed.—They replied, that the housing of corn had been so good this year, the buying of seed might be ventured on the earlier, else they used not generally to buy their seed-barley, nor feed-oats, but just before sowing time, lest they should smelt by heating, and so not grow.

Of sowing
malted
corn.

§. 13. Mr. Thomson, malster, assured me, after barley is malted, and the coome and dust taken away by screening it, and some time after past, the malt will grow; for, said he, I have sowed

sowed it in my garden; but it will come to nothing; from which I conclude, first, the great consequence of the flour in corn, to strengthen the root, and to nourish the grain in flinging out good roots, which in the malt is spent and wasted before it is laid in the ground; secondly, I infer from hence, that the seeds of many weeds, after they have lain some time in the dunghill, may grow, tho' thereby malted.

Farmer Bond assures me, that Mr. Edmunds, the receiver of my Hampshire-rents (being a malster) having taken lands in the beginning of May, and no barley being to be had, he, by the persuasion of his malting-servant, made use of barley he had wetted, and was just well chitted or sprouted; he says, he saw the crop, and it came up very well, and was as good corn as any he saw that year (1703.)—So that it seems to me, barley a little forwarded by the malster may be good to sow, though malt throughly made is stark naught.

Cook, the gardener, fo. 9.—I do advise my country-men, if late in sowing any of their grains, especially barley and wheat, to steep them; if your grain be speared, it is never the worse, provided you sow it before the spear be chilled or dried.

§. 14. It is agreed, that is the best sort of barley, that is not blackish at the tail, nor has a deep redness, but is of a pale lively yellow colour, with a bright whitishness in it, and if the rind is a little curdled, so much the better. The marks of good barley.

§. 15. It is said, that the curdled-rinded barley is the finer sort, and has the thinner coat.—Being in the barn, and handling both the smooth-coated barley and the curdled-coated, I perceived the reason thereof; for if barley comes to sweat in the mow, and to dry, if it be thin-coated, it will curdle, but the rind of thick-coated barley, being stiff, will not shrink, but will lie smooth and hollow, tho' the inside flour shrinks from it. Cause of curdled-rinded barley.

§. 16. The 2d of May (anno 1720) farmer Sartain went out into the fields with me, and on viewing three or four fields of barley, which had been come up about a fortnight, he observed, that the barley of their country, i. e. north Wiltshire, came up with a stronger green colour, and did not look so pale or yellow as in our country, of which I am also very sensible, and do judge it proceeds more from the coldness of the land and country, in the first sown barley, than from the poverty of the ground; because such manifest difference will not be at the first coming up of the latter sown corn of our hill-country, nor will so great a difference appear between our barley and their's by that time June comes. Barley, at first coming up, of a paler colour on cold land.

§. 17. When barley is ripe, it will double and bend down its head; at the same time you'll find some ears to stand upright, tho' the grain may seem full hard and dry, but the straw of such ears, when barley is ripe for cutting. To know when barley is ripe for cutting.

ears, especially at the knots, will be greenish, and will therefore be apt to heat in the mow.

Of the number of grains in an ear.

Showers before harvest make the rind fine.

Knee-bent barley—it does not mow well.

§. 18. Mr. Ray, fo. 1243, speaking of barley-ears, says, they sometimes contain twenty grains in each row.—Note,—I never yet saw above seventeen or eighteen.

§. 19. This year (1706) not only in Hampshire and Wiltshire (where I saw abundance of corn, and had good intelligence from others) but also in Banbury-market (where I saw the sacks of corn) as well as in Leicestershire, and by account from Mr. Clerk, in all the counties northward, the barley carried a coarse and thick rind.—For three months before harvest no rain fell; so it seems, that some showers before harvest are useful to make the rind fine.

§. 20. The barley this year (1702) was knee-bent, and would not therefore mow well; for in such case, it being loose in the ground, the scythe, instead of cutting, carries the straw away with it root and all, which deadens the scythe's cutting what is farther on before it.—This proceeded from the dry summer, whereby the earth being loose, it loosened the roots of the barley, and consequently the grain could not fill.—I observed what they call knee-bent, and that the stalk was bent from the root in the manner of a bow or hollow for two or three joints, like leaning on the ground, which must arise from the corn's falling by being loose, and then it rises upwards again from upwards of half the straw, toward heaven, as all trees and plants do that fall along; their shoots will still arise perpendicularly, and this occasions the bow in the straw, which is called knee-bent.

When the barley (as above described) is knee-bent, in such years, by the breaking and bending of the straw, not only the grain is much thinner and coarser, by having its nourishment intercepted, but the straw also is, for the same reason, much poorer, because by those breakings and bendings the juices are stopt from rising: such years you must expect great waste to be made in the straw; the cattle by refusing much of it will make oughts; and in such cold wet years, in the cold clay-hill-country, the barley is apt to look reddish and stained at the germinating or sprouting end.—I would advise all husband-men to avoid sowing such barley, especially in cold land, for tho' it be not dead, 'tis too much like it, and will come away very untowardly in malting, much of it lying behind on the malting-floor, and should it come away no better when sown, it would be edge-grown, and as very many grains of such barley will never make malt, so neither can they be fit for feed.

Of hares biting off barley.

§. 21. July 20th (1704) I observed many full grown ears of barley lying along in a tract of a field, and withered, which seemed to be a great spoil; I took them up, and found the hares had

had bit off the straws at the ground, to make a more convenient track.

§. 22. The same day I observed several grains of barley, almost ripe in the ears, to have worm-holes in the out-side, like those in nut-shells; the flour of these grains was eaten up. Of worms eating barley.

I have observed that a worm is blown by some fly in the spring underneath the barley-ear, when young in grass; I do not suppose however the same happens to wheat, that having endured the winter, and being coarser to their tooth; but I suppose the same thing may happen in black oats.

§. 23. Edge-grown barley (i. e. such as is not full ripe with the rest, tho' all cut together) is very discernable, tho' it should dry in the swarth never so well; for such edge-grown barley, when threshed, will look of a horn colour, and have a sleek smooth white coat like good wheat, but it will stand hollow from the flour, because that, being pulpy, is shrunk away from the coat. Of edge-grown barley.

§. 24. August the 15th (anno 1703) I observed much burnt barley, and opening the black grains I found a maggot in many of the wholest of them, where the grain seemed to be preserved somewhat intire; the maggot lay towards the top of the corn, was of a blewish colour, and had little legs to crawl with.—I suppose the other grains in the burnt ear might have had maggots too, but they being moldered away, the maggots were gone.—And yet it is strange that burnt corn should proceed from this maggot blown by a fly, seeing in burnt corn of all sorts every grain in the ear is burnt, and so is the ear of every spindle from the same root, and the ear is burnt before it gets out of the hofe;—and yet it is strange a fly should chuse a sooty burnt place as a fit matrix to lay her flie-blow in.—Quære of this earlier in the year. Of burnt barley-worm eaten.

§. 25. If corn come into the barn greenish, and is trod in the mow, it will be mow-burnt; for which reason it should be laid light and easy.—The inconveniency of mow-burnt barley is very great, for it will neither make malt, nor will the hogs eat it freely.—It is as bitter as foot, and when the malsters bite it, it is as red as a fox within-side, and if you sell a parcel of it to a malster, tho' at a low price, he will never come again. Of mow-burnt barley.

Airiness therefore is convenient to a barn, to keep the corn from heating, for if it be hastily brought in, as it often must be, and before it is full dry, it will through heat be parched, and sometimes set on fire: this heat will make the barley red at one end, so that it will never come in malting, and a reek in the barn will often be so hot that there is no enduring to be upon it.—Farmer Elton once thought that he should have had a reek of barley fired in the barn by heat, and he was forced to cut a

great hole down to the bottom of it, but could never stay at it above a quarter of an hour at a time for fear of being overcome by the heat.—It is barley and oats that are chiefly subject to heat, because the undried-weeds are brought in with them, whereas there are not so many weeds among wheat.

O A T S.

Why oats
impoverish
land.

§. 1. **A** Farmer dining with me, I was giving the reason why oats impoverished the ground beyond other grain, and said, that it was not only because the farmer generally sowed oats, when the land would bear nothing else, and so, it being the last grain sowed, he was apt to impute the following poverty of the ground to that only, but that grain is commonly sown on one earth, and consequently does not fall so deep into the ground as corn sown on two or three earths, and therefore oats prey more upon the goodness of the land, than any other corn; for they eat up all the fatness that the sun, dew, or rain give to the surface of the ground, they lying so shallow, and for the same reason ground will bear oats that can bear nothing else; that grain lying so shallow lives on the nourishment the sun, rain, and dews daily administer.—And the farmer added, that a load of oats in the straw was heavier than a load of any other corn in the straw, and may

* Mr. Miller, in his Gardener's Dictionary, reckons four species of oats, viz. common or white oats,—black oats,—naked oats,—and red or brown oats.—The first sort here mentioned, says he, is the most common about London: the second sort is more cultivated in the northern parts of England, and is esteemed a very hearty food for horses: but the first makes the whitest meal, and is chiefly cultivated where the inhabitants live much upon oat-cakes.—The third sort is less common than either of the other, especially in the southern parts of England; but in the north of England, Scotland, and Wales, it is cultivated in plenty. This sort is esteemed, because the grain threshes clean out of the husk, and need not be carried to the mill, to be made into oat-meal or grist. An acre of ground does not yield so many bushels of these as of the common oats, by reason the grain is small and naked, and goes near in measure; but what is wanting in the measure is supplied in value.—The red oats are much cultivated in Derbyshire, Staffordshire, and Cheshire, but are never seen in any of the counties near London; tho', as they are a very hardy sort, and give a good increase, they would be well worth propagating, especially in all strong lands.—The straw of these oats is of a brownish red colour, as is also the grain, which is very full and heavy, and esteemed better food for horses than either of the former sorts.—Our author speaks nothing of the naked, or of the red oats, but only of white and black, excepting that he mentions the Poland sort, which is also a white oat, and of a shorter grain than the common.

may therefore exhaust the ground more,—and note further, the increase of oats is greater than of any other grain.

Virgil, and the Romans who wrote of agriculture, often use *uro* for *emacio*; (as, *urit avena*) yet we find fire in all cases en- burning riches the earth: but the old signification of *uro* was also *to chill*. quality of And cold is analogous to burning, as having the same effect, oats. which we see by it's withering up leaves.

§. 2. April 30th. (anno 1705) I first observed; that from the Of the oat many rooted-fibres shoot forth, and the stalk that rises up- roots of wards takes new root again on the surface of the ground, at a oats. certain distance from the first root, according to the depth the oat lies in the ground, so that the oat has two ranges or tires of roots; no wonder then that oats should draw off the nourishment of the earth more than barley.

§. 3. According to the best observations I can make, white oats require a fat and feeding ground; for the halm, or straw running to a great largeness cannot be supported without good juices and moisture; I have also observed, that white chalky ground, tho' in never so good heart, will be unfruitful with white oats; nor will a mixed mold, between white earth and red clay, of which we have a great deal in our hill-country, be feeding enough for them: our red clays, and white clays, when in good heart, carry moisture enough, and are very fit for that grain.—It seems to me, that white oats may be sowed when the ground is moister than barley will endure it to be, because barley, having a thinner coat, is sooner chilled by quick imbibing the wet, and many of it's vessels may perhaps burst, whereas white oats resist the entering of the moisture; they, having a double hull, are protected, and cannot so soon be drowned. White oats require fat ground.

§. 4. I took in a reek of black oats of thirty-eight loads, and White a reek of white of twenty-eight loads, and, when they were oats yield threshed, I found the reek of white oats yielded more than the better reek of black oats, of which I spoke to some farmers; they all than agreed, that white oats always yielded better than black oats, and black. said, that an ordinary crop of white oats was accounted as good as a good middling crop of black oats.

§. 5. Anno 1703, having sowed white oats they proved blight- White ed, but, as I thought, none had britted; yet in November I saw oats said a multitude of oats springing up very thick; I seemed concern- to spring ed, as thinking I had had a great loss by the shattering,—but an again from old husbandman said, it was the nature of white oats, when cut, roots. to spring up again from the old root, but they would die away when the frosts came, but that black oats would not shoot forth blades from the old root.—Some time after I dug up many of them, and found no such matter, but there was an oat-hull at the root of all of them.

Farmer Wey, and farmer Farthing of the Isle of Wight told me, that they, and several other farmers in the Island had cut oats this summer (anno 1707) which came from the roots of the last year's oats, and had shot roots, and tillowed from thence notably, and yielded very good crops; but, that I might not be mistaken, I asked them over again, if it was not from the brittings of the last year's oats; but I found they were well acquainted with a bastard-crop of oats; and they both said, that they had pulled up the stubble, and it appeared plain that they were issues from the roots of the last year's stubble.

Black oats
liable to
blight
sowed on
lay-
ground
in cold dry
springs.
Of the Po-
land-oat--
loves
moist
ground.

§. 6. In dry cold springs, and hot summers following, black oats sowed on lay-ground, tho' clay-land and rotten, will be as subject to blight as winter-vetches sowed in such lay-ground, as it happened to both anno 1714.

§. 7. Anno 1709; in some of my wheaten-ground ploughed up this year, because the wheat was killed by the hard winter, I sowed, in the beginning of May, in part of it rath-ripe barley, and in part of it a white Poland-oat: both grains were put into a ground of equal fertility and moisture, and on the same day.—I doubted not but the Poland-oat would be first ripe, and was therefore surprized to see the rath-ripe barley come up four or five days before the oats; I observed also in other grounds sowed the same day the barley to do the same.—I soon concluded the reason to be, that the oat having a double hull, and so better guarded from moisture, could not so soon imbibe the vegetable water as the thin-rinded barley could, though doubtless the texture of the flour of the oat, and the infolded fibres of the inclosed plant being softer would consequently grow faster.—The collorary from hence is, that if you would be secure of the growing of Poland-oats without the help of rain, they must be committed to the earth with more moisture in it, or before it is so dry as it ought to be for barley to be sown in it; not only because the oats require more moisture to make them grow, but also because they lie so many days longer in the ground before they come up than the barley does. The drying ground by the heat of the sun may be greatly exhausted of the moisture in a few days, which otherwise had been sufficient to have set the Poland-oat a growing.

Oats will
not keep
well—
therefore
dearest at
seed-time.

§. 8. One of my neighbours was telling me, he thought oats would be cheapest at Christmases, and he would buy them then against seed-time.—I answered they would never keep, for oats of all grain keep the worst, and they would not grow if fusty, for I knew a great many farmers would lay up barley about Christmases for seed, in order to kill the oats that might be in it, presuming the oats by seed-time would be spoiled for growing. It is manifest that oats take heat in a heap, and by the great wet
which

which comes from them, when heated over the kiln for oat-meal, it is plain they have great moisture in them; otherwise one would think their hulls would preserve them better than any corn.—From hence it appears why oats are generally dearest at seed-time.

§. 9. I was speaking to another farmer about pined or musty Musty wheat, and saying that it would not grow. He said, it was true; oats will but added, that pined or musty oats were more difficult to grow not grow. than any other sort of corn, and yet, said he, I have known musty corn grow well enough.—I replied, it was because it was sown on it's first growing musty, before it had received any check by growing cold again, it being then taken in it's growing condition.—He was of my opinion for the reason I gave.

I had an oat-reek, which, taking wet before it was thatched, when it was brought into the barn seemed to be in an ill condition, and three weeks-threshing lying on the floor in the chaff, the heap grew very hot, which I had observed for two or three days; and before I winnowed them I thought they had been spoiled.— Yet my bailiff would persuade me to sow them, assuring me, that he had known heated oats grow very well, though heated much longer after winnowed than these had been.—I got Mr. Bachelour of Ashmondsworth to look at them; he said immediately, when he saw them, they would grow very well; for, said he, they have not lost their colour, whereas oats, that have taken heat so much as not to grow, will look as red as a fox in their hulls.—All who were in the barn said so also, and that they had seen vetches that had been heated look so too.

§. 10. Being in company with two farmers, we were talking Of white of white oats: they both assured me, they had often heard it oats and said, that white oats came up single from their roots, and did not their tillow as the black oats did, but—— lowing.

I could not find by Mr. Raymond (though I had noted an opinion to the contrary in Hampshire) but that white oats would tillow as much as black, and he sows as many on an acre as he does of black oats;—but of all oats whatever, if a ground works rough, so that many grains are like to be buried, they sow the more, viz. instead of a sack, five or six bushels.

§. 11. July 17th (anno 1703) I observed to-day, that the burnt Of burnt oat-ears have the straw perfect, and of a good green colour, and oat-ears. their pedestall also, on which the grain hangs, the same, and the grain seems to have arrived to a good bigness, as in wheat and barley, before that blight fell on it; for certainly the grain could not grow after.

§. 12. White oats are most apt to shed as they lie; and black Of oats oats as they stand. J. Mortimer, Esq; F. R. S. fq. 104. shedding.

Oats will not ripen if cut green.

§. 13. It is commonly said, that oats cut green will ripen lying in swarth.—If by ripening be meant shrinking, drying, or withering, I must allow the position; but if the country-man will have it that the green oat cut a fortnight or ten days, or be it but a week, before it is ripe, will proceed in it's vegetable increase, and swell as well as harden by lying in swarth, I must deny it.—This year (1707) I made a full experiment of this matter; for when the spring-corn was sown, the ground being generally dry, half the oats and barley came not up till the latter end of May, when rain came, whereby in most places half the crop was edge-grown.—So, the forward-oats being in danger in britting, we were forced to cut down the greenish corn with the ripe, when otherwise we should have waited ten days longer: I let them lie in swarth above a week, and, when I carted them, I found the hull of the greenish oat had got a riper colour, and the pith was well hardened, but pitifully lean and shrunk; so that, though this is to be done on necessity, yet it ought not to be practised with such indifferency as is usual among the farmers.—Note, the pith of these green oats was well past the milk and come to a floury substance.

B U C K - W H E A T.

Of it's nature and use.

§. 1. ^a **M**R. Ray speaking of buck-wheat says, there is no soil but what agrees with it; it loves moisture, comes up soon, and ripens in a short time. The grass of it, when green, serves to feed black cattle, and the seed itself when ripe is excellent for fattening poultry.

B E A N S.

Of the nature of the bean.

§. 1. ^b **C**OLUMELLA thinks that land is not much fructified by leguminous corn, but that they do not much damage the ground. lib. 8 fol. 103. And Palladius has a quotation from him, in which he says a lay-ground is better to sow corn on than a bean-stubble.

§. 2.

^a Nullum fere solum refugit: gaudet imbribus, cito provenit, celeriter maturefcit: herbam viridem, priusquam semen maturuerit, boves, jumenta que pascuntur: semine gallinaceum genus pastum citissime pinguescit. fo. 182.

^b Palladius, fo. 114. De faba, dicit, satioe ejus generis, sicut opinio habet, non fecundatur terra, sed minus læditur. Nam Columella dicit, agrum frumentis utiliore præberi, qui anno superiore vacuus fuerit, quam qui calamos fabaceæ mæssis eduxit.

§. 2. I find it is an observation with Somersfethire-men, that Observati- when (as it proved this year, 1709) their beans are very good, on in So- they are with them very dear, and then wheat also is dear, merfet- because the wet springs, which make their beans good, hurt their shire— wheat, and they find by experience that wet and cold springs in when the poorer and lighter lands runs the bean out into stalk beyond the bean-crop staple, and then they never kidd well, whereas, their deep rich is best grounds will support the bean under it's freest growth. dearest.

§. 3. I very much doubt whether horse-beans will ever ripen Beans not kindly in our hill-country of Hampshire; their pod is so very proper for moist and thick, that, before it can be well dried by the sun, the the hill- cold days and dewy nights so increase the moisture, that the country. bean will rot before it can grow dry.—I the rather be- lieve this, because I sowed garden-beans in February, but could never get those that I designed for seed to ripen.

§. 4. About Bishop's-cannons, All-cannons, and Stanton they Different sow horse-beans in their common fields without any laying the sorts of ground down to a sward, but about Holt they do not venture to land used to sow ground to beans, unless it has lain down two or three years for beans. to grass, and has got a sward: the reason the farmer there gives is, because the land about Holt is not so strong as about All-cannons, &c.

§. 5. After the fertility of wheat mentioned by Pliny, he says Quantity of the bean-stalk, that one has been known to produce a hundred of beans beans. *Inventus est jam et scapus unus centum fabis onustus.* on a stalk. *Plin. lib. 18. fo. 277.*

§. 6. Mr. Smith of Stanton says, horse-beans are abundant- Of the ly a more certain-grain than peas; that there are three sorts, viz. different the kind of horse-

As Mr. Lisse has but few observations on the culture of horse-beans, and as Mr. Miller is more particular on that subject, I judge the follow- and their ing note, taken from that author, may be acceptable and useful to those, manage- who are desirous of information in this part of husbandry.—“ The ment. “ horse-bean delights in a strong moist soil, and an open exposure; for they never thrive well on dry warm land, or in small inclosures, where they are very subject to blight, and are frequently attacked by a black insect, which the farmers call the black dolphin: these insects are often in such quantities as to cover the stems of the beans intirely, especially all the upper part of them; and whenever this happens the beans seldom come to good; but in the open fields, where the soil is strong, this rarely happens.—These beans are usually sown on land, which is fresh broken up, because they are of use to break and pulverize the ground, as also to destroy weeds, so that the land is rendered much better for corn, after a crop of beans, than it would have been before, especially if they are sown and managed according to the new husbandry, with a drill-plough and a horse-plough.—The season for sowing beans is from the middle of February to the end of March, according to the nature

the Somersethire horse-beans, which are the largest, and a middle sort, and the least or smallest sort.—He says, the largest sort

nature of the soil ; the strongest and wet land should always be last sown : the usual quantity of beans sown on an acre of land is about three bushels ; but this is double the quantity that need be sown, especially according to the new husbandry : but I shall first set down the practice according to the old husbandry, and then give directions for their management according to the new.

The method of sowing is after the plough, in the bottom of the furrows, but then the furrows should not be more than five or at most six inches deep. If the land is new broken up, it is usual to plough it early in autumn, and let it lie in ridges till after Christmas ; then plough it in small furrows, and lay the ground smooth : these two ploughings will break the ground fine enough for beans ; and the third ploughing is to sow the beans, when the furrows should be made shallow as was before mentioned. Most people set their beans too close ; for, as some lay the beans in the furrows after the plough, and others lay them before the plough, and plough them in, so, by both methods, the beans are set as close as the furrows are made, which is much too near ; for, when they are on strong good land, they are generally drawn up to a very great height, and are not so apt to pod as when they have more room, and are of a lower growth ; therefore I am convinced by some late trials, that the better way is to make the furrows two feet asunder, or more, which will cause them to branch out into many stalks, and bear in greater plenty than when they are closer : by this method half the quantity of beans will be sufficient for an acre of land ; and, by the sun and air being admitted between the rows, the beans will ripen much earlier, and more equally than in the common way.—What has been mentioned must be understood as relating to the old husbandry : but where beans are planted according to the new, the ground should be four times ploughed before the beans are set ; which will break the clods, and render it much better for planting : then with a drill-plough, to which an hopper is fixed for setting the beans, the drills should be made at three feet asunder, and the spring of the hopper set so as to scatter the beans at three inches distance in the drills. By this method less than one bushel of seed will plant an acre of land. When the beans are up, if the ground is stirred between the rows with a horse-plough, it will destroy all the young weeds ; and when the beans are advanced about three or four inches high, the ground should be again ploughed between the rows, and the earth laid up to the beans ; and if a third ploughing, at about five or six weeks after, is given, the ground will be kept clean from the weeds, and the beans will stalk out, and produce a much greater crop than in the common way.—When the beans are ripe, they are reaped with a hook, as is usually practised for peas ; and, after having lain a few days on the ground, they are turned ; and this must be repeated several times, until they are dry enough to stack : but the best method is to tie them up in small bundles, and set them upright ; for then they will not be in so much danger to suffer by wet,

fort are too big for his land, and that he chooses to sow the middle fort.——They never sow them, he says, till the middle of February, or the latter end; they sow five bushels on an acre, and are not in danger of rooks after they are full come up; he cuts them a little before they are full ripe, otherwise, in mowing the ripest are apt to shed; that, take one time with another, he has double the crop of beans to what he has of peas; that he never plants them, because planted beans must be houghed, and, where ground is apt to bind, and bake, the hough cannot easily enter to raise a grete, especially where the land is stony.——He assures me, that broad-clover will grow very well with beans; and that he has often seen the experiment of it.

§. 7. When Pliny and the *Rei rusticæ scriptores* say, that the bean delights in much wet weather.——It must be considered, that they lived in Italy, a much hotter country than ours; for in England we know that beans desire a moderate season: in hot summers, like this, anno 1707, their lower blossoms only kid, and in wet summers they do not blossom well.

P E A S.

§. 1. **A** N N O 1708.——When the field and garden-peas Of the this year were near a foot high, I observed on the very growth top of them a purse or nest of buds of blossoms, lying in a bag and blof- together; and observing farther that there was no shew of blof- sowing of foms putting forth at the lower joints, I concluded our crops of peas. peas would this year miscarry, and that we should only have some top-kids, all expectation of the lower kids being vain, because the kids on the lower joints are always forwarder in blossoming

wet, as when they lie on the ground; and they will be more handy, to carry to stack, than if they were loose. The common produce is from twenty to twenty-five bushels on an acre of land.——The beans should lie in the mow to sweat before they are threshed out; for, as the halm is very large and succulent, so it is very apt to give, and grow moist; but there is no danger of the beans receiving damage, if they are stacked tolerably dry, because the pods will preserve the beans from injury; and they will be much easier to thresh after they have sweat in the mow than before; and after they have once sweated, and are dry again, they never after give.——By the new husbandry the produce has exceeded the old by more than ten bushels on an acre; and, if the beans, which are cultivated in the common method, are observed, it will be found, that more than half their stems have no beans on them; for, by standing close, they are drawn up very tall; so the tops of the stalks only produce, and all the lower part is naked; whereas, in the new method, they bear almost to the ground; and, as the joints of the stems are shorter, so the beans grow closer together on the stalks.

ing and kidding than the upper, or top joints, and, as I said before, there was no appearance of blossoms in any of the lower gradus of joints: this afforded me some amusements in reasoning, but, not being satisfied, in a day or two after I looked into these upper pods or bags of blossoms again, and dissected them; wherein I found sometimes near thirty blossom-buds, two or three of which usually seemed to have got the start of the rest, and to be bigger in bulk, and higher in stature; most of the rest seemed to lie in a huddle, without making any gradations; but as I never had seen, unless in the crown-pea, (which carries all it's blossoms in a tuft at top, like a nosegay) other peas put forth above two blossoms and kids at top, which seldom come to good, so I suspected in this pod, there being so many blossoms in it, that they must form the successive gradations of blossoming joints, which did arise from that stock as from a common root, and so, that every blossom in order, as it grew forwarder than the rest, did shoot forth, above which the main stem still advancing made the blossom left behind the subaltern blossom of a lower joint;—to try which I tied scarlet threads just under many of the said pods, that I might know them again, and, according to expectation, I found in four or five days time that I had several gradus of blossoms, arising from joints with lobous leaves above my scarlet threads, and the pod of blossoms still advanced on to the end, leaving behind farther joints of blossoms, till the whole stock was spent.

Inferences
from the
foregoing
observation.

This observation was very pleasing to me, as being obviously fruitful of many corollaries, which I shall set down in order.

(1.) By looking into this pod, or purse of buds, while as yet it is so in it's infancy as only to be viewed by a magnifying glass, we may judge what hopes there are of a future crop, provided the succeeding months prove seasonable.

(2.) We may learn from hence what sort of peas to adapt to every sort of ground;—but, before I enter on that part and use of the abovementioned observation, I must, for the better understanding thereof, premise, that the farmers vary in their judgment in no one point so much as in the nature of the pea: it is a common thing in the same parish to have many sorts of peas sown; and the persons respectively shall every one have a great prejudice to any other sort of pea, but what they sow, having, it is likely, been disappointed of the return other sorts of peas made, when they sowed them, and it is likely, may soon grow out of opinion of the pea they have made choice of, from the great uncertainty of the produce of a pea-crop; so that the pea, in the country-man's understanding, has got the character of a very * kittle grain.

* Subject
to acci-
dents un-
certain.

But if the farmer would consider, from the foregoing observa-
tion,

tion, how early or rath-ripe a pea is, or how late in ripening in it's nature; and that (seeing all it's stock or posse to put forth blossoms lies within the foliage of one pod) the art must result from thence, so to sow the peas, in such ground, and at such time, that each sort of pea, according to it's nature, may have time before autumn and cold weather come to check them, to send forth all the gradations of joints or blossoms, that none may become abortive, for want of summer enough for nature to bring her embryos to maturity, and finish the bud-blossoms into kids.— If so, then it is apparent (as all great peas are late ripe, and run to a great halm or stalk, and the smaller the pea is, the earlier ripe, and of smaller halm) that the great, or late-ripe peas should be sowed as early as the elime you live in will permit; for thereby such pea will get so forward as to have time to exert all it's gradations of kids and blossoms, and to have them perfected before rainy autumn comes and puts a stop to farther vegetation.

— Again, such great pea ought to be sowed on a white, or some mixt land, not too gros of juice, but not on a cold clay; for such moisture will keep feeding the halm, and be inconsistent with the first design of sowing them early, that you might have all the blossoms ripen, seeing such land will retard it's progression to such maturity; but the said white, or mixt mold must be in good heart, otherwise it cannot maintain a great pea; so, vice versa, it is from hence apparent that a rath-ripe pea should be sowed in strong feeding-land, because such land will maintain the pea more vigorously, and there is no fear of it's halm growing too gros, it being naturally short, and, notwithstanding the coldness of the soil, there will be no doubt but the kids will all ripen.

§. 2. There are a great many sorts of field-peas, whereby the country-people are puzzled, and are governed by humour in their choice for sowing, and make great distinctions between the sorts to be ranged under the same class, from their good or bad luck, or good or bad judgment, in managing their ground; insomuch that a neighbouring farmer, on the same situation of soil with another, shall be out of patience to hear such sorts of peas commended by his neighbour, with which he has had ill success.— The sorts of field-peas then I take to be ranged under two heads, viz. the tender and the hardy small sort, and the tender and the hardy great sort, not doubting but all sorts of peas, to be ranged under either of these classes, will equally agree or disagree with the same soil: the tender pea is improper for a cold country, or for cold ground in a warm country, which amounts to the same thing; the great pea, by reason of it's great halm, is not proper for a strong and fat ground, for the halm will increase to so great a length as not to bear kids. I am satisfied from my peas this year (1704) sown on strong cold ground and

peas-

peas-stubble, and others sown on barley-stubble, that to lay peas on a mellow light mold, made so by ploughing, is much the best way to bring along, and make a full-kidded pea; for the latter, tho' not on so good ground, had both those advantages of the former.

Of the hotspur-pea.

§. 3. Mr. Raymond, who lives near Patny in Wiltshire, says, in those parts they had used to sow hotspur-peas in their fields, but that now (anno 1708) they grew weary of it.—I asked him the reason; he said, those peas did not run out to so long and leafy a halm, nor lie long enough on the ground to improve and mellow it, but the other peas did much better.

Of the cotshill-pea.

§. 4. Farmer Elton, Mr. Edwards, and I fell into discourse about peas; it was anno 1700.—They agreed that Cotshill-peas were about twenty years ago the only peas sowed in this country, i. e. in Hampshire; they are a very large pea, near as big as a horse-bean, they grow exceeding rank, and kid wonderfully in a year that they take in, but are a more * kittle grain than the partridge-peas; they must be sowed early, and run out so rank that they are late ripe, and therefore subject to blights: the farmer used to sow them in the middle or latter end of February, and to take a very dry time for it; no matter if snow should fall afterward, he has had three quarters on an acre; but they both agreed, that of late years the partridge-pea has been more in esteem; it is so called from its reddish speckles; it is a more certain grain, and earlier ripe, and so less subject to blights than the Cotshill-pea, which is nevertheless the better pea to fat hogs with, because they will not be so apt to swallow them whole.

* uncertain.

Farmer Crapp, and farmer Biggs say, the Cotshill-pea does not well in the hill-country of Hampshire, because the country is cold, and the halm of that pea runs so large, and to such exuberancy of juice, especially if the field lies to the north, that the sun cannot ripen it, nor dry it, and check it; so that, especially in a moist summer, it will keep on blowing, but not kid well.—I take this to be true, and yet very reconcileable with what is said in another place of the great increase of the Cotshill-pea in a certain field, for that is not a feeding cold clay-ground, but lies warm: on the other hand, why the farmers should say, that the small partridge-pea required the best land and the Cotshill-pea the poorest, is easily reconcileable;—for the good land in the hill-country is generally the strong clay, but the halm of that partridge-pea will not run out so rank that the sun cannot check and dry it. Again; the mixt sort of earth, running to a whiteness, is generally poorer than the strong clay, yet it is not in truth poor, for where the Cotshill-pea thrives there must be good strength in the ground, to maintain such a halm.

§. 5.

§. 5. Mr. Randolph of Woolly, who has been a great sower of all sorts of peas, gives it me for a certain rule, that all white-blossomed peas, whilst green in the kid, will boil green, and all blue or red-blossomed peas, whilst green in the kid, will boil russet-coloured.

Of white and blue and red blossomed peas in boiling. Of partridge-peas.

§. 6. Regard is to be had in sowing great partridge-peas under furrow (where the ground is subject to run to grafs, or is knotted with grafs that is pretty thick set on the ground) to what may happen to them in case of a wet summer; as for instance, if in ground that has born broad clover for one summer you sow peas under furrow the following February; for though perhaps such ground may break pretty well in ploughing, so as for the peas to come through, yet in case there should come a cold and wet spring, and a wet summer, the grafs will, long before harvest, so grow through the peas, after they begin first to fall, and at last so overtop them, that you will be amazed, when you come to stack them at harvest, to see perhaps what was a very promising crop of peas in May and June so devoured by grafs, that the very halm as well as the kids shall seem withered away, and almost blighted to nothing.

If ground be apt to run to grafs, or be knotted with grafs before it is ploughed, and be sowed to peas on one earth, if a very wet summer should come, the peas will be over-run, and eat up with grafs; to prevent which, and to fence against this inconvenience in wet summers, if the peas are sowed on one earth, the ground must either be knot-fine, or else be fallowed to kill the grafs, and sowed on the second earth.

§. 7. The blue peas, with us, run much larger than the small partridge-peas, and consequently fill the bushel better: they kid, as I have observed, better than the other, and are a * rather fort, and will therefore bear sowing the later, as about the beginning of April, when the inclemency of the air is over; and being to be cut greenish, they may be stacked the earliest, which are good properties in our cold hill-country.

Of the the blue pea. * earlier ripe.

§. 8. The Burbage-grey or popling-pea is much sowed in the deep lands of Somersethire, and called there, the clay-pea.

The Burbage-grey,

§. 9. I find by all the judicious farmers I can converse with, or popling-pea. that, though peas will not grow on poor light land, but require some depth of soil and strength, yet at the same time peas will not thrive well in a cold wet clay-land, but love a dry healthy soil.

Peas love a dry and healthy soil.

I observe about Holt in Wiltshire, where the land is generally wetter than at Crux-Easton, that they lay up the pea-lands in small round furrows, and they sow the great partridge-pea under furrow, if they can have a season as early as Paul's-tide, i. e. the 25th. of January; and the reason they give for

for it is, because been sown so early they would lie too cold, if they laid the lands flat.—Though I lie not so wet, yet, my clay-lands being cold, I am of opinion that I ought to imitate this husbandry, when I sow peas-early.—The coldness of the situation of Crux-Easton is also a farther reason for so doing, because the cold air will not have so much power of chilling the earth, when laid in this manner dry, as it will have when lands hold wet by lying flat; for earth will not freeze, nor receive any impression from cold, but on account of it's moisture, in which the more it abounds the colder it will be, according to the degree of the coldness of the air.—In Wiltshire, if the land breaks tolerably rotten or mellow, they omit a tining with the harrows, which would also be the best way in our cold country.

Of green
peas.

§. 10. A farmer in my neighbourhood having most excellent boiling-peas, which they call green-peas, I proposed to sow of them on a lay-ground I had grubbed; but the farmer forbid it, and said, if they were sown on lay-land, they would run to halm, and not kid: light barley-ersh, he said, was best for them, and that, if they hit, they were mighty increasers; that they must be sown about the beginning of April, and they yielded as good-money, and as certain as any corn, but they were a ticklish grain.

Peas do
best on a
barley-
ersh, and
why.

§. 11. The country-people say, peas do best on a barley-ersh; the reason of which must be, because how much finer the ground works so much the more does the earth, every part of it being opened, communicate of it's goodness to the peas-halm, which being gross requires good nutriment to feed it; and where the ground lies lightest, provided it be not thereby liable to the evil on the other hand of burning, there the rain will wash the goodness of the land to the roots of the corn, and feed it; and I do believe the sun in summer prepares the thin topmost crust of the earth with rich spirits, which, when washed into the earth, must fructify plants.

The only reason I can give why peas should thrive so well on barley-ersh, (tho' possibly the land may be much poorer than lay-ground) is, because barley-land has for the most part been mellowed by a wheat-crop, the year before, and also fallowed, if not thwarted the barley-year: the ground for these reasons is very mellow and light, and easily admits the rays of the sun, the rain, and the dew to penetrate to the roots of the peas; whereas the grossness of the peas-halm so over-shadows the ground from those three powers, that, where the ground lies more close and hard, those powers are not so accessible to the roots of the peas; for this reason it follows, that land, if not of a very light nature, is to be fallowed and thwarted for peas: peas ought also to be sowed early in the year, that they may ripen between

tween sun and sun; the grossness of the halm so much resisting the powers of the sun, and obscuring him when he grows weak, that the peas cannot ripen in good time, and, if the ground lies not mellow and warm, they run out to halm and do not kid well; for the juices of the ground ought to be well digested also, to be fit to make flowers come in the joints of the peas-halm, in order for blossoms: besides, the earlier you sow your peas, the more hopes you have of the blossoms in the upper joints coming to perfection, which by their backwardness are generally lost; and if these upper kids can get forwarder than the coming of the locusts or green louse, so as to be too hard for their teeth, they will (by being earlier sowed) escape all that damage; and note, as it is in the green herb, so the early coming of all insects depends on the clime, and the nature of the soil, be it cold or hot, if the insects are such whose seeds are laid in the earth.

• Pliny, speaking of the bean, says, in some of the northern islands and in Mauritania it comes up of it's own accord, and without tillage, but that it is of a wild sort, very hard and unfit for boiling.—I note this, because it's seed sowing itself falls on untilled ground, and therefore boils hard; for we observe in peas, that the more mellow the ground is, the better they boil, therefore boil well from barley-erthes.

Farmer Biggs observed to me, that last year (1702) he had the experience of sowing peas after barley, in a ground where peas had been sown the year before the barley, and that, though it was in a bottom, yet he had poor halm, and poor kids, whereas on two or three lands adjoining, and much poorer land, where peas had not been sown some years before, he had a very good crop of peas.

§. 12. Mr. Raymond says, he has always observed, that land, Land which has carried peas one year, will not be fit for them again in sowed to less than six years time: if you sow them sooner, they may possibly run to halm, but will not kid well, and so, said he, our neighbouring farmers have observed.—I suppose white or light peas well land, being so much the sooner robbed of all the specifick nutriment of the grain by the crop of the same grain it carried last, cannot be so often renewed to peas as clay-land may, and the oftener land is dunged the sooner it will recover, I judge, that specifick nutriment adapted to each grain. again for six years.

§. 13. Peas, of all sorts of grain, degenerate soonest, at least Peas degenerate. in two or three years, be the land never so good. Evelyn, fo. 324.

O

§. 14.

• Nascitur et sua sponte plerisque in locis, sicut septentrionalis oceani insulis, quas ob id nostri fabarias appellant, item in Mauritania, silvestris passim, sed prædura, et quæ percoqui non possit. Plin. lib. 18. fol.

The honey-comb or pitted pea.

Hop-clover not to be sowed with peas.

Of the blue vapour on peas, and of the weather that best suits them at blossoming-time.

To turn the wads in rainy weather after hacking the peas to prevent britting.

§. 14. The honey-comb or pitted-pea ought not to be sown on the hills in Hampshire, for such pea is a cold pea, as not being fully ripened, but shrunk, and will not grow well in cold ground.

§. 15. It is said hop-clover ought never to be sowed with peas; they'll cover the clover so as to kill it: peas will kill the very weeds, and that is one of the reasons why peas prepare the ground for barley.

But farmer Biggs asked me why I had not sowed a certain field, sown to peas, to hop, or broad-clover; and on my answering that I doubted whether the peas might not have killed it;—he replied, there was no fear of peas hurting it, where the ground was not rank,—and so I found; for at the lower end of the field, where the farmer sowed his goar-vetches, I sowed hop-clover, and it came up as well as any where.

§. 16. I observed the green halm and leaf of my peas sown on a summer-fallow carried a strong deep green, and had a blue vapour on the halm and leaf, like the blue steam on plumbs, which accompanied them to their flowering; but on peas less in proof, the leaf is of a paler green, and has less of that blue vapour.—I take this blue vapour to be an exudation from the plant, and is the effect of a good insensible perspiration, and denotes health in the plant, and such plumbs and corn as have least of it are less in proof.—This blue exudation goes off of the leaves and stalk a little before blossoming-time, and then they grew paler.—We had a cold cloudy dripping season during the blossoming-time of these peas anno 1715) and it was very observable to me, that both my sorts of peas (of which I had an hundred acres, great grey partridge-peas, and blue popling-peas) blossomed very blindish, as peas will do in hot scorching dry weather at the blossoming-season; so that I fully concluded that neither of the extremes, either of wet or drought, were so agreeable to peas as moderate rain with heat at their blossoming-season; but the continuance of many days cold rain must be prejudicial;—yet whether the hot burning dry weather be not worse than the other is a question.

§. 17. If it be a dripping and rainy harvest, in the pea-season, between the showers, when the upper part is dry, tho' the rain may have wet the ground through the wadds, to turn the wadds of peas will save the kids from britting and shedding; for nothing makes peas more subject to open the kids than lying sogging in the wet; therefore, in hacking them, to make the wadds small, is a preservative, if the weather be showery, against their britting, because the smaller the wadds are the sooner they dry.—Of this I was very sensible this harvest (anno 1707) it being very showery; for the Newbury-men's wadds being hacked large britted much, when our people's lesser wadds suffered no damage: add to this, that the smaller the wadds the sooner will the peas be fit

fit for carting, whereby a day gained often saves a whole crop from damage.

§. 18. When peas are well blossomed, there are two blossoms that divide themselves in forked-foot stalks on every stem; whereas many years there is but one blossom on each stem. Mark of peas being well blossomed.

§. 19. Monsieur de Quinteny says, fo. 156.—That the blossoms of peas commonly spring out from the middle of the fifth or sixth leaf, from whence there springs an arm or branch, that grows exceeding long, and produces at each leaf a couple of blossoms like the first.—On reading this I went and viewed my peas, in a field where they were extraordinary good;—I found for the most part that no blossoms appeared till, reckoning upwards, you came to the sixth or seventh leaf, but where the pea-halm seemed not to be in good heart, no blossom appeared till you came to the eighth or ninth leaf, nor could I in any of the field-peas find any collateral bearing branch to issue out, as described by Monsieur Quinteny, but I did observe such a branch to issue out in my hotspur garden-peas. Mr. Quinteny's observation on peas blossoming not true in field-peas.

§. 20. The top blossoms of peas bring forth but a small blighted kind, and hang late on the halm before they kid at all, so they seldom come to good;—but in my vetches I observed many collateral tillows on the stalks; even from the root upwards, so that there were commonly five or six collateral branches arising, one above another, in two or three joints on a stalk.—I also observed a downy cotton bud to arise from the second and third joint, just above the leaf, and so for the most part all along, where there were no kids: this bud, though but small, seemed to me to be a bud designed for a flower, but miscarried by the unhappy season of the year.—So I infer from hence, that vetches, where they hit, are much greater increasers than peas.—Whereas I was of opinion, that the miscarriage both of peas and vetches happened from the eggs of flies laid in the upper pod of each, I am now of the contrary way of thinking, viz. that the miscarriage of the crop, both in peas and vetches, is in their lower blossoms; which ought therefore to be earlier looked into, it being of no great consequence how the upper pods are destroyed, because their kids never come to perfection: nevertheless it is not unlikely but the maggot bred in the upper pods, whether by flies eggs, or not; may travel downwards, and eat up the lower kids and leaves. Vetches greater increasers than peas, and of the fly that breeds in them.

§. 21. It is said by Quinteny, (as before cited) that peas commonly blossom at the fifth or sixth leaf; which is, as I suppose, in dry and hot summers, when the halm is checked from running too gross, and to so many joints; but, when in a wet year the halm runs out to a great length, the stalk at the fifth, sixth, or seventh leaf, is so gross and over-shadowed by the other leaves, that the juice is not concocted enough till it has advanced more More on Mr. Quinteny's observation.

into the sun, so as to emit the blossoms.—And it stands to reason, that peas set on sticks should kid better than those that lie all along,—and the well blossoming of beans seems to depend on the same reason; therefore field-peas when sowed thick do the better uphold themselves by their strings, to let in the sun and air, till they fall by the weight of their kids.

If the blossoms open not full, it is a bad sign.

Of the spur at the end of one of the stalks of the pea.

§. 22. It is observed both in Hampshire and Wiltshire, that peas never kid well that year, in which they blow blind, that is, when their blossoms open not full, as it happened anno 1705—a wonderful dry summer.

§. 23. When I was at Holt anno 1712—I observed in the peas, while blossoming, that where there was but one single blossom on a foot-stalk, there generally grew up a little spur, near an inch behind the blossom, on the same stalk, in height about the length of a barley-corn.—I suspected that another blossom had grown thereon, and that the clasps of the peas had taken hold of it, and pulled it off by the power of the wind, or that some other accident had destroyed the blossom; but at this time, looking a little nicer into the matter, I laid open some cases, wherein the blossoms unblown lay in a cluster, as in a purse, and there I observed, that generally to the foot-stalks of the single blossoms there also grew a spur; only here the spur was very small and short, not of half a barley-corn's length, and very tender; these spurs advance in stature and substance as the contiguous blossom grows, and by that time the kid grows full, it will be as long as two or three barley-corns, and of strength proportionable, like a pea's-stalk: so that one might well suppose a pod had grown on it, and been pulled off by some violence, but doubtless it is an effort in nature towards producing a blossom, since it is seated in the very place where a blossom grows, whenever the foot-stalk carries a double blossom; and I presume in rich land, and a hotter country, there rarely fails being two blossoms on every foot-stalk.

The leaves of the blossoms turning back a good sign.

§. 24. I have observed, when ground is in good heart, and rain falls seasonably to feed the peas, that their blossoms blow strong (as before taken notice of) and further here I add, that the two outermost and larger leaves of the blossoms, which look like hoods, expand themselves in so strutting a manner as to bend backwards; when they do so, it is a sure sign of vigour; from such blossoms there certainly will come a noble kid; whereas, when the blossoms blow blind or faint, some of them fall off, or though they should be strong enough to produce a kid, 'tis commonly but a poor one, and often of a ram's-horn figure;—and it may often be seen, that, when the first blossoms blow vigorously, in a hot dry summer, (but to effect this, there must be good heart in the ground too) if the dry weather continues, the latter

fatter blossoms shall blow very sickly, and make but starved kids, and many of the buds will want strength to put forth a blossom, and wither; yet, if a lucky rain comes in time, it will save them, and so strengthen them, that they'll go on blowing with a lively colour.

§. 25. By the expansion or contraction of the leaves of peas the degrees of the cold nights may be seen; their flowers also, if put into warm water, will in an instant open; which shews the wonderful consent of parts, and communication of particles in some plants, analogous to the spirits of men, by which there is such a quick sensation through the nerves. Sensation of plants, particularly peas.

§. 26. This year (1716) I housed my peas, as I thought, in excellent order, they having taken no rain, and being thoroughly ripe; yet, when carried to market, they were softer than other peas, nor would they rattle when handled in the sacks like some others.—The reason of which must be, that in our hill-country the weather towards autumn is not hot enough to push them on to that thorough ripeness as in the vale, and as they must lie some few days in the field, after they are cut, to be thorough dry and hardened, so our days are cooler, and our nights both colder and more dewy than in the vale, and therefore our peas are not dried to so great a degree of hardness as theirs; and this difference (cæteris paribus) holds good in other corn between the hill-country and the vale. Peas not so well ripened nor so hard in the hill-country as in the vale.

§. 27. In Leicestershire they set all their peas abroad in stacks, and house none, because (as they say) setting them abroad gives them a good colour, whereas laying them up in a barn makes look dark. Custom in Leicestershire.

V E T C H E S.

§. 1. * ACCORDING to Columella, if, when you cut up vetches and lupines green for food, you leave the roots to grow dry in the ground, they will impoverish, and take away all it's strength; and he says, it is the same of beans. Opinion of the ancient writers concerning vetches.

§. 2. Farmer Biggs said, vetches were the most profitable grain that could be sowed; that a load of them would go farther than two load of hay; he said farther, if they were sowed on land somewhat light, where they would not run up very rank, they were excellent for sheep, being reaped a little earlier than they are for the horses, and when dried the sheep would eat up every little bit of stalk.—Thomas Elton said, vetches were the most profitable Opinions of various farmers of the profit from vetches.

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* Si lupini et vicæ radices defecto pabulo relictae inaruerint, succum omnem solo auferunt, vimque terræ absumunt, quod etiam in faba accidit. Columella, lib. 2. cap. 14. Pallad. ad idem, lib. 1. sect. 6.

fitable grain that could be sowed, but he held that goar-vetches were apt to scour too much, especially if the weather was wet and cold.—Farmer Lake and farmer Bond agreed, that goar-vetches were best for horses when they were just in kid, but earlier than that, especially in cold and wet weather, they were too gross, and not so hearty.

Vetches will grow even without harrowing. §. 3. I was telling the above-mentioned farmers, that some of my vetches seemed to be uncovered, and not to have been harrowed enough.—They said, if vermin did not meet with them, vetches would work themselves into the ground, and that they had sown them when so much rain followed that they could not harrow, and yet had as good a crop of vetches as at other times.

Vetches improve strong, red clay-land. §. 4. I had a very fine crop of vetches in a falling white land, of about three loads upon an acre, yet the succeeding crop of barley was but ordinary; and indeed it seems to stand to reason, that a good crop of vetches is only a considerable improver of strong, or red clay-land; for in such land they do not only run ranker, whereby the halm betters it, but it also mellows such land, which is very material towards a barley crop; whereas in poor white land, tho' the vetches may kid well, yet they seldom run to a good halm; nor is it material for white land to be hollowed and made light by the vetches, it's heaviness being no defect before; therefore I hold, that tho' a good crop of vetches be on a white and poor land, yet it is not a soil to be depended on, without folding, toward a barley-crop.

White land bad for vetches. §. 5. I sowed winter-vetches (anno 1703) on poor white land, and had but eleven load of vetches off seventeen acres, beside the tythe, and yet it was a very wet dripping summer, which favoured their growth extremely; otherwise there might not have been two load on the seventeen acres: this ought to be a caution not to sow vetches on poor white land.

Not to crop vetches. §. 6. Wheat will endure the winter better than winter-vetches; for, if wheat loses it's top by the cold, it will grow again, but if vetches are cropt, tho' they come to halm, they'll neither blossom nor kid.—It is the same with peas as with vetches, if they are bit; and if they kid not tolerably, the best way is to give them to the horses.

Of the great profit of winter-vetches. §. 7. By sowing a good quantity of winter-vetches there are several advantages, the least of which, and the most obvious, is to render the ground fit for a barley-tilt, and so knot-fine as to be capable (after it has been, if you please, winter-folded, as an additional richness) of being ploughed up and sown on one earth.—And if the summer be wet, so as the meadows afford grass enough for hay, and the year is not encouraging, through frequent rains, to cut the vetches for dry fodder, and make them into hay, the feed

seed however (preserved for sowing) is profitable.—But the greatest benefit arising from vetches (in case the summer be burning-hot, so as the meadows afford little hay) is that in such time the vetches cut, when the flowering is just over, or when the pods are half full with seed, are of great use to supply the defect of hay, and make the nobler fodder for the year's being scorching; for at such time the vetches are not apt to run to such lengths as to rot on the ground, and you have commonly a good season for making them into hay, and by cutting them thus early for fodder, viz. by about the 20th of June, you may hope to have ploughed up the ground again by the beginning of July, and sown thereon a crop of turnips.

§. 8. It is admitted by all knowing persons in husbandry, that a Winter-good crop of winter-vetches enriches land more, and prepares it better for a crop of barley than a good crop of peas does.—One reason of this may be, because a crop of winter-vetches covers the ground longer than peas do.—But another reason seems probable to me, because honey-dews are bred and generated in great quantities in the joints of the stalks of winter-vetches, and in the foldings of their leaves (which in case the bud of the blossoms) partly by the exterior dews, partly by the exudations therewith mixing, being condensed by the heat of the sun, and boiled into a syrup, which contains fixed salts, and are afterwards by great rains washed off the vetches, and carried into the earth, to its great enrichment.

§. 9. It is the general opinion of farmers I have talked with on this subject, that winter-vetches always do best after a barley-crop: I have tried them after oats with good success.

§. 10. I have found by experience, that if winter-vetches are sowed on one earth, and on lay-ground, though clay-ground that turns up pretty mellow and rotten, yet they will, if a hot summer comes, be more apt to blight than winter-vetches sowed on a clay-ground, which breaks small, after two or three former crops have been taken from it: such ground closes better to the roots.

§. 11. Farmer William Sartain of Broughton in Wilts says, the rule in the vale for spring-vetches being dear is, when there is a wet spring, when, if the barley-land does not work well for a barley-crop, they like to sling in a crop of spring-vetches in order for a winter-crop of wheat at Michaelmas; and from this principle a wet spring has occasioned such a demand for spring-vetches that he has, in such case, sold them for seven shillings a bushel.

§. 12. As the driest summers make seed-vetches dear at Michaelmas, so they are more so in case of a bad summer for sown grasses, that is, in case the spring of the foregoing year was so

dry that the sown grafs-seeds did not come up well ; for then, in the hill-country, the scarcity of grafs, made more scarce by a hot summer, must occasion the scarcity of vetches.

Caution
—to sow
them, if
oats be
dear.

Tufted-
vetches a
sign of
rich land.

Or
plough-
ing-in
vetches.
Vid. sow-
ing
vetches.

§. 13. If a husbandman finds by the course of the winter that oats are dear, and like to be dearer in summer, he is not wise, who takes not care to sow a good quantity of goar-vetches in the spring, especially if they are cheap.

§. 14. *Vicia multiflora*, apud Ray, vol. 1. fol. 903.—Anglice tufted-vetches.—Mr. Bobart of Oxford assures me, that wherever this vetch grows in the meadows, it is a sign of the land being very rich.

§. 15. I have sometimes known many quarters of goar-vetches sowed only to the intent of ploughing them in : the best way is first to roll them, before you plough them, or else you could not make good work, that is to say, the way is to roll one land upwards, and the other land downwards, that so the plough need never to go against the grain, the vetches being first laid flat before the plough in the rolling.

I spoke to Mr. Bishop of Dorsetshire of the husbandry of sowing goar or summer-vetches, and ploughing them in instead of dunging.—He commended the way very much, and said, in many countries, where they had more arable than they could dung, they had no way better than so to manage it ; but doubtless the winter-vetches are more advantageous for that purpose, because the summer-vetches would come up so late, that they could not plough it up again early enough to summer-fallow it, whereas the winter-vetches would come up so early, that the cattle might feed them down, and they would afterwards be got up high enough to be ploughed in ;—but this husbandry is for deep land ; for in light land upon a rock, where the rock is but four inches beneath the surface of the land, the vetches so sown would never come up.

If any think fit to sow vetches for ploughing in under the furrow, in order to improve the land, I think it easy to prove, that winter-vetches are properer for that purpose than goar or summer-vetches are ; for though goar-vetches run much grosser, and in that respect would be better ; yet, in regard they are tender, and will not endure being sowed till spring, they cannot get to a sufficient growth for ploughing in till towards August, by which time the vigour of the sun, which should precipitate their putrefaction by raising noble salts from them, will be so much abated that little can be effected that way ; whereas winter-vetches being sowed before winter, and having a root confirmed before spring to proceed on, will be forward enough to be ploughed in by a week or a fortnight in June, and the quantity of their salts, lying so
much

much more under the power of the sun to extract them, will amply compensate the ground for want of the larger halm.

^b The antients practised this husbandry of ploughing in winter-vetches, esteeming it equal to a coat of dung, as we learn from Columella.

§. 16. I took a view of my vetches in blossom to see in what ^{Observa-} different manner they blossomed from my peas (taken notice of be- tion on fore;) and I found, that whereas good peas, that blow well, the have two blossoms on the same stalk, on divided pedestals; so, growth good vetches have two blossoms growing close to the stalk at every and blos- joint.—I observed under the uppermost tuft of blossoms in some of sowing of the vetch-halm two blossoms at every joint of the four upper vetches. joints, and at some of the five upper joints; then three or four lower joints had but one a-piece, and the halm carried four or five joints lower, on each of which there were very small woolly buds, but such as might blow afterwards, if the weather proved favourable.—From whence I infer, that, if vetches have their complement of joints, they amount to fifteen, and, if they carry their complement of blossoms, there are two at each joint; I observed no more on any joint, and much of the halm had two blossoms only on the two upper joints, and but one on the joints beneath, and possibly left off blossoming at the fifth joint: again I observed, that many seventh and eighth joints carried two blossoms, when the uppermost had but one blossom on each, and I found many of the fallen or falling-off blossoms of the lower joints blighted. Note, this was but in white land.—In another field of vetches I afterwards observed but four or five joints in a halm, and but one or two of the uppermost joints to have two blossoms.

It was this year (1712) observed by many farmers, that the vetches kidded at the top and not at the bottom, that is, they run on, and spent many more joints than usual without putting forth either blossom or kid:—I thought the peas also did the same.—I am at a loss how to assign the reason why vetches and peas should

^b *Vice fimi lupinum certe præsidium expeditissimum est, quod cum exili loco circa idus Septembris sparserit, et inaraverit, (which is sowing under furrow) idque tempestive vomere vel ligone succiderit, vim optime stercorationis exhibebit; succidi autem lupinum sabulosis locis oportet cum secundum florem, rubricosis cum tertiam egerit: illic, dum tenerum est, convertitur, ut celeriter ipsum putrescat, permisceaturque gracili solo; hic jam robustius, quod solidiores glebas diutius sustineat, et suspendat, ut eæ solibus æstivis vapqratæ resolvantur. Columella, söl. 109.—But it seems that advantage cannot be made of the lupine-vetch in England; because it will die if sowed before winter; and if sowed in the spring, it will not be forward enough to answer these ends.*

should some years run out into kid at the lower joints first, and other years leave many lower joints unfruitful; unless it be, that the blossoms being all formed in a cluster, as before described, the clusters in wet years run on so fast and furiously into joints, that they pass on too quick to make a due formation of the lowermost blossoms; by which means the unformed bud of the blossom, which nature designed for fruit, is converted into a false birth, and an imperfect essay; and so the same evil happens from blossom to blossom, and makes it late before this fury of the sap is spent, and fruitful blossoms perfected.—Again,—when a very dry spring happens, as this year it did during the three latter weeks of April, and the whole month of May; it seems to me, that the buds of the lowermost blossoms of the cluster, which doubtless are first formed in embryo, are starved through drought; and so the joints, on which they should have grown, are left naked; but by the coming of more favourable weather the upper joints prove fruitful; so that a due medium in the temperature of the year between drought and wet seems to me to be the most fruitful season.—Again,—I have observed, when two or three joints have blossomed and kidded, and more blossoms, perhaps two or three gradations, remained unkidded, the season of the year being early enough, and the weather at the time being warm enough to finish them into kids; yet, if a season of cold rain then came, those blossoms would not produce kids, because, as it seems to me, a good medium or temperature of the air is necessary for that purpose, in order to digest the juices, which are chilled by cold rain, and dried up by hot burning weather.

Of frost ripening goar-vetches.

§. 17. Walking with a farmer in some goar-vetches in September (1700) they seemed very backward, whereupon I asked him if he thought they would ever ripen for seed; he replied, when the frosts came they would ripen; by which he meant, that till then (the sun now declining in it's strength, and there being great dews and long nights) the halm would keep feeding on; but when the frosts came and checked the gross nourishing of it, then the kids would fill better.

Vetches, when blighted, not so apt to open and shed.

§. 18. I was questioning whether some winter-vetches cut for seed should not be brought in, lest rain should fall and make the kids open, many of them being dead-ripe;—but the farmers said, no fear of that, for, tho' they might seem to be dead-ripe, yet they were also blighted, which is apparent by the smallness of the grain [and such I observed them to be] and therefore their kids will be tough, and not so apt to open as at another time, when of the same ripeness.

Profit of vetches and broad-clover compared.

§. 19. After all that has been said of the great profit arising from vetches, yet, if we compare it with that arising from broad-clover,

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clover, we shall find the advantage on the side of the latter, viz.

Vetches	{	Sowing an acre of vetches at two bushels per acre, and two shillings and six-pence per bushel	0	5	0
		Ploughing and harrowing an acre	0	6	0
		Hacking or mowing	0	2	6
		Total	0	13	6
Broad-clover	{	Sowing twelve pound to an acre, at 3d. per pound	0	3	0
		Mowing an acre	0	1	0
		Total	0	4	0

The difference in favour of broad-clover is 0 9 6

The labour of carting, reeking, thatching, and sowing are the same; but, if you buy the seed of each at market, the vetches are in carriage vastly greater than the clover; for a load of vetches, reckoning five quarters to a load, will sow but twenty acres, whereas a sack of clover will hold two hundred and fifty pounds, which will sow more than twenty acres. Again, the second year's crop of clover, (if you let it grow the second year) is a very great profit beyond the rent of the ground;—so that there is no reason to sow winter-vetches in any ground that will well bear broad-clover; for it is certain, every thing considered, there is near twenty shillings disadvantage, communibus annis, by sowing vetches in land that will bear clover.

REAPING and MOWING.

§. I. ^a **T**HE antients reaped their corn before it was full-ripe, ^{Of the} as Pliny informs us. ^{time of}

It is certain there are very great disadvantages in letting some ^{cutting} sorts of corn stand till it is full-ripe before it be cut.—First, both the chaff and the fodder are worse,—and, if such ripe corn takes ^{corn.} wet, the increase in malt is lost, if barley, it having already spent ^{To be cut} itself,—and if it be wheat the flour is much the worse, and the ^{before it} weight diminished,—but if corn be cut greenish, it will bear a ^{is full-} pretty deal of wet without damage, for it will not drink up the ^{ripe.} wet like corn full-ripe, but rather only take in so much as to be kindly fed by it;—but if any sort of corn be blighted, the sooner it is cut down, tho' but half ripe, the better, for nourishment

^a Secandi tempus cum spica deflorescere coepit, atque roborari: secundum antequam inarescat. Plin. fol. 314.

ment can no more be conveyed to it by the straw, whereas, by lying in gripp it will be fed:—it is like feeding sick persons with clysters, when they can take no nourishment at their stomachs, or turning a child to weaning, when it will thrive no longer with the nurse's milk.

Especially weedy corn. Corn that is full of weeds ought to be cut three or four days sooner than ordinary, that the weeds may have time to wither, and yet the corn not suffer by being over-ripe; whereas, if the corn in such case be full-ripe, it will be liable to take damage by britting as well as loss of colour, or by rain, if it be kept out till the weeds are withered.

Manner of cutting corn or grafs that is lodged. §. 2. If corn, or grafs is so long as to lie down, they observe to cut with the corn, not against the head of it that is falling;—but if it stand upright, they observe as much as possible always to cut cross the furrows, and the same in meadows, if there be any furrows, that they may cut the the bottoms; for, if they cut along the furrows, the rising lands will carry the scythe over the bottoms, so that it will leave the grafs uncut.

Wet corn to be fold as soon as threshed. §. 3. If corn comes in wet, or not well dried, though it will not take much harm in the mow, yet as soon as threshed, and laid together on an heap, it will in a week's time sweat and cling together; and be as white with moldiness as if flour had been strewed on it,—such corn therefore ought, as soon as threshed, to be sent to market, and sold.

Corn is better for lying a day in swarth after it is cut. §. 4. It is said, for corn to lie in swarth a day is very good though a shower of rain should come; for it makes it feel dry and slippery, and thresh the better;—and Mr. Edwards blamed a neighbouring farmer much for hurrying in his corn so fast, if there was but any likelihood of a shower; whereas, said he, a day's rain never did it harm, but rather good, and wheat after cut was the better for a wet day. But, said farmer Biggs, there is nothing lost by carrying it in before such shower of rain may fall; for, tho' it will feel cold, yet, not having laid abroad to take the sun and rain, it will not be shrunk so much as if it had done so, and the fewer grains will go to fill the bushel, and that will make amends.

Not to make great barley or oat-cocks, and why. §. 5. Mr. Edwards cautions me not to make great barley-cocks, nor great oat-cocks, but middling ones: if the corn be thick, said he, the task-workers will be for making great cocks, which the men cannot pitch into the cart, when they take off the tops, unless they trample on the cocks, which makes the corn brit, especially when dead-ripe.

In hot summers to employ the more reapers to make expedition. §. 6. In hot summers you are to consider, that wheat is plump, and full in berry, and the glumes or chaff starchy, and not tough, as in cold wet summers, whereby it holds the corn the closer, and you ought to man your harvest accordingly by setting on in hot

hot summers the more reapers; for such corn, when scorched up by the sun, and full in grain, will soon take a stain, and damage by wet, and brit, and be blown out by the wind: when you have it dead-ripe, and of a good colour, it is all you can desire; therefore in such case the less it lies abroad in gripp or shock the better; to which end the higher they cut the wheat, so as to cut the less grass, the better; that it may be the sooner in order for carting.

§. 7. The chief reason, as it seems to me, why in Leicester-Why they shire, Northamptonshire, and such deep lands, the farmer cuts the leave a wheat high from the ground, and leaves a high stubble, is, be- high stub- cause in low vale countries, where the land is rich and deep, and ble in inclosed countries, the wheat, after it is cut, and lies in gripp, Leicester- does not lie so exposed for the sun and wind to dry the gripps after shire and being fogged with wet, as it does in the hill-country; therefore North- the higher the stubble is left the gripps are thereby born up the ampton- higher, and lie the hollower from the ground, and consequently shire. are the easier dried by the sun and wind.—It is also to be remembered, that the fatter and richer the land is, the sooner the gripps will grow after they have taken wet, in case they lie on the naked ground, and sooner than they would in such case do in the hill-country, where the land is poor;—therefore it is very proper to leave the wheat-stubble the higher, that the gripps may thereby be born up from the ground; besides, the shorter the sheaves are made the more the barns will hold, and the use of the after-stubble, which makes excellent * elm, will compensate * thatch: the loss of the straw. In some places they mow it for drying malt.

§. 8. The forwarder any countries are in their harvest, whe-The for- ther by the forwardness of the year, or the natural heat and warder warmth of the soil, so much the bolder may the husband-man be and warm- in leaving his wheat the longer abroad in the field, to take it's er any airings, and grow mellow, which makes it thresh better and look country finer: for example, when the wheat-harvest falls out in the middle of July, or at least before the latter end of it, as it did is, the anno 1714, there can be little danger in letting the wheat lie longer the abroad four or five days, or a week, in case it be not cut over- corn may ripe, even tho' a rainy day or two should come; for at that time lay in gripp. of the year the sun is so hot, the days so long, and the grass so short, and the dews for the most part so little, that the corn, tho' it has a good rain, soon grows dry; whereas, in the middle, or the latter end of August the rainy season generally comes in, the dewy nights grow long, the grass rough, and the sun's drying-power much abated, so that, if rainy weather should come, the wheat will be much more apt to grow.

§. 9.

Red-straw wheat to be cut greener than white-straw. §. 9. Red-straw wheat ought not to stand till it is so ripe as white-straw may do, because the red-straw wheat is much apter to brit, if wind should come; therefore the common saying is, that red-straw wheat must be gathered knot-green, that is, whilst the knots in the straw are green.

Beyond Winchester they cut red-straw wheat greenish to amazement, a fortnight earlier than we should do, and let it lie in gripp a fortnight, often turning it; and for reaping, turning, and binding into sheaves they pay six shillings per acre, whereas at Crux-Easton we pay four shillings,—but they think their's the best husbandry.

Blighted wheat should be the sooner cut. §. 10. It is agreed, that wheat should be cut sooner for being blighted; because the straw of blighted wheat, by standing till the corn is full-ripe, will become so brittle there would be no handling it. And it is farther agreed, that blighted wheat should lie longer in gripp than other wheat that it may plim, which it requires more time to do: it will make it thresh better, and come the clearer from the hull.

Blighted corn known by the mowers. §. 11. In mowing, a blighted patch of corn is known as soon as the mowers put the scythes into it; for it is soft and tough, and they had as good cut against wool; besides it is more-loose, that is, loose at root.

Wheat for seed should be cut riper. §. 12. Wheat designed for seed ought to be cut riper, or at least to lie a longer time abroad in gripp or sheaf than otherwise it need to do, or else, being for present threshing, it will not come clean out of the straw, and the softest grains will beat flat; but, if it be designed for a reek-staffold, and for keeping, it will by lying and sweating in the mow, tho' carried in somewhat greenish, and without lying in gripp or sheaf, come out of the straw, and thresh very well.

It is certain, that the gripes of wheat, tho' laid as light and hollow as possible, will by the weight of the ears fall to the ground, and take harm, if suffered to lie long out in wet weather; though the ear of the gripp be set hollow, yet it will fall lower than the root-end of the straw.

Straw worfe for lying out. §. 13. Though most corn is the better for lying in swarth or gripes to take the dews, yet the straw is the worfe for it for fodder, except it was cut before it was ripe, and only lie till sufficiently ripened to be carried in.

In hot dry summers wheat need not lie long in gripp, and why. §. 14. Take notice,—in hot dry summers, when corn ripens fully, and it's own virtue gives it a colour, and plumps up the berry; there is no need to let wheat lie out in gripp before it is sheaved, nor in sheaf, as you would do in a cold summer, unless it be very grassy or weedy: but in cold summers the wheat is horny, and wants a colour; and the berry is thin and wants to be plumped; and the chaff of the chesses is clung, and wants to be mellowed

mellowed in order to make it thresh the better : whereas in good and fruitful years the grain is full and swells the chaff, even till it opens, and so the wet will soak in the sooner, and stain the colour of the wheat ; and in such good years it ought to be considered, that the ears are heavy, and, when they are in shock, they spread and hang over, being lop-heavy, whereby the sheaf opens wider, and lets the rain into the bonds sooner than in cold summers, when, the wheat being light, the ears in the shock stand more upright, and closer together.

§. 15. It is most adviseable to turn gripps of wheat lying out very early after being cut down, in order to get them dry as soon as possible ; by this means you keep them the longer from growing, in case of rain ; for when gripps have lain some time fogged with wet, if dripping weather, or only driving mists should continue, all the art imaginable cannot prevent their growing. Caution--
to turn
the gripps.

§. 16. In a hill-country, especially where there is cold clay-land, singular regard ought to be had in harvest-time, not to gripp up the wheat into sheaves too early in the day ; for in such a country the gripps take so great a damp by having laid on the ground, that tho' the straw, and chaffy ears may seem to be dried, when the dew is first gone off, and after the sun may have shined an hour or two on the gripps, yet there will remain an inward dampness in the corn, and in the inside of the straw, which being so reeked up will come damp from the reek at threshing-time.—Therefore the afternoon is certainly best for gripping and binding into sheaves, but so that they may be finished before the heat of the day is over ; yet the bonds ought to be laid in the morning, that they may not crack.—My opinion farther is, that in such a country corn can never be better housed, if thorough ripe, and hard, and not weedy, than by gripping and carting as fast as it is cut down ; for the dampness it takes by lying on the ground in the cold nights is not so easily recovered. Not to
gripp up
the wheat
too early
in the day,
in a hill-
country.

§. 17. The farmers do not always look well after the binding up their sheaves, but suffer the reapers, for dispatch, to bind the bonds just underneath the ears, instead of binding them at the other end ; the consequence of which is, that they will hardly hold together to be slung into the cart at harvest, and will certainly be in great danger of falling to pieces before threshing-time. To carry
as soon as
reaped.

I was telling one of my harvest women, that she must rake oats for me on the morrow morning ; she replied, it must be after the dew was off the ground, for till that time she should be making bonds for the sheaves she had gripped for the farmer ; for after the dew was off they could not be made.—I asked her why ; she said, the straw would not twist after the sun was up, but would be brittle, and break off below the ears. Of bind-
ing.

It

It rained in the morning while my wheat lay in gripp, but seeming to hold up a little, I told one of my reapers, he might make bonds. He replied, unless it was like to be dry it was to no purpose to make bonds; for, when the bonds are made, they must lay a gripp or two on them to keep them in their places, otherwise the heat of the sun will make them untwist; and therefore, unless it were likely to be fair, it is improper to lay the gripps upon the bonds, for the bonds being pressed down will grow sooner than any other corn, if rain should come, because they lying undermost cannot dry.

Sheaves ought not to be bound up wet; if they be, they will be moldy: tho' the bonds must be made in the morning dew, yet the sheaves ought not to be bound up till perfectly dry.

The reapers were complaining, the weather was so hot, that their bonds laid in the morning would not hold at noon, when they came to bind; but, said they, old Cole's held; for he turned three or four stubble or bottom-ends of the straw to the ears of the bond, which made them hold, they being thereby tougher, greener, and stronger.

If in harvest-time you foresee a little rain, it is best to gripp, and bind up into sheaves, because a little rain will so wet the grippings that they cannot be bound up, and it may hold so on and off, till greater rains come, but the sheaves being bound will soon be dry; but if you foresee a hard rain it is better not to bind up into sheaves, for the sheaves will then be wet to the bonds, and must all be opened again.

Driving wind with the most dangerous of any weather for sheaves of wheat, and for rain the sheaves that are wet to the bonds it is worse, as all farmers do worst weather for the wheat-sheaves. Of making small sheaves in a wet harvest. For weedy corn.

§. 18. If rain comes in harvest-time with a driving wind, it is the most dangerous of any weather for sheaves of wheat, and for sheaves that are wet to the bonds it is worse, as all farmers do agree, than down-right soaking rain.

§. 19. In a wet harvest, there is this benefit in making small sheaves, that being thinner at the top, and falling closer, the rain does not fall down into the middle of them, and so go through them into the bonds, as it is apt to do in great sheaves, which lie broader, and take a larger compass.

Care ought to be taken that the sheaves are made small, in case you are obliged to gripp and bind up wheat that is weedy, or thistly, into sheaves, as for particular reasons you may be, viz. for fear of rain, or on a Saturday night because you fear the weather on Sunday, that so the air, wind, and sun may have the greater power to dry them, which they could not do if they were made large.

To lay sheaves flat the first night

§. 20. Mr. Whistler and Mr. Edwards, men of very good judgment in farming matters, were of opinion that it was best the night after the wheat was bound, if the weather was not catching,

to

to lay the sheaves, one by one, flat on the ground, whereby the straw would close together, and stand with the ears stiff and upright, and not be apt to lay open, and then five or six sheaves being put into shock would abundantly better keep out the rain.

§. 21. Some of the reapers had laid the ears of the grippings in the furrows of the lands, and the halm-end out, whereas they ought to have laid the straw-end in the furrows, and the ears out, and then the ears would have stood flogging-up, and have lain dry, though rain had come, but the other way it would quickly have grown,—and so I found it to do.

§. 22. In Hampshire they never cock the wheat in the field, as they do in Wiltshire, whereby they may leave it out a month without damage; and, if they did so, the wheat would thresh much the better, for the air dries it; whereas, when carried forthwith into the barn, it is tough, and sticks to the chaff.

In making the wheat-pooks in Wiltshire the sheaves are set with the ears uppermost in the first circle, and so on in every bundle, till at length it draws into a point; and then a sheaf is opened and turned with the ears downward, like a shackle for a hive; for an ear turned downwards will not grow, nor take wet by half a year's wet weather, and the bottom of the sheaf being broader than the top, every uppermost circle hangs over the sheaves of the undermost circle, like the eaves of an house.—In a pook may be put a load or two; it is a very good way to secure corn against rain, and to give the weeds that may be amongst it a drying time.—In my opinion however, this method is not to be used where the wheat is designed for a staffold, because, if the weather prove wet, mice will run thither for shelter, and be carried in with the pooks.—Farmer Miles says, in that fashion, without thatching, they make wheat-reeks in the Isle of Wight.

§. 23. In wet harvests, I advise, when the weather clears up, to send some of the most diligent and skilful persons into the field to search the tythings of sheaves, and to observe well which lie most on the weather-side, and stand most hollow, and open at top, and to remove all such together by themselves, and place them to such advantage, that the sun and wind may best go through them, moving them off from the sides of hedges, &c. and taking up such sheaves as may be blown down.

After rainy weather, tho' the wet should not have gone to the bonds of the sheaves, yet is good, when dry weather comes, to set the sheaves of every tything apart, so that the air may come to every sheaf, and particularly to take care to turn the weather-side of each sheaf to the wind to dry the sooner; for tho' the wet may not have gone to the bonds, yet the sheaves are inwardly cold and damp, but will by this method be much the sooner fit to be carted.

Damage from opening the sheaves to dry them.

§. 24. My next neighbour, anno 1696, unshaeved some of his wheat to dry it, and opened it, and turned it so often, that the ears broke off, whereby he lost half his corn;—caution therefore ought to be used in this case, lest by curing one evil we create a worse.

Wheat, if wet at bond only, will be damaged in the reek.

§. 25. A smart shower of rain fell on my wheat-sheaves, and it was thought it went down to the bonds; whereupon, the next day being fair, the men took apart each tything, and set the shocks upright at some distance asunder, spreading open the ears of the shock to let in the sun and air;—but afterwards my bailiff found that the rain had gone through the bonds, so that he was for unbinding them, and opening them to the sun; for he argued that if the inside of the sheaves were but wettish only, and from the ear to the bond were dry, such sheaves would grow moldy in the reek, and strike such a damp, that would cause many ears to grow, and therefore he advised to open them.—I did open them, and found them to be dampish, and some of them wet beyond the bonds: this was done to six load of wheat, and the sheaves were bound up again without much loss of time.

Wheat long eared and lop-heavy should be carted soon for fear of wet.

§. 26. One of my reapers, when he had made up some wheat into sheaves, the wheat being long-eared and lop-heavy, said, rain had not need meet with those sheaves before they were carried home.—I asked him why so; he said, because the ears being long and heavy were busle-headed, that is, did hang their heads downward into the sheaf, so that (in case a rain should run down to the bonds) neither sun or wind could enter in to dry them, whereas, said he, when the ears are short, and not heavy, they stand upright and hollow, so that the sun, and the air may easily dry them.

Caution in mowing corn.

§. 27. I ordered my mowers to set their cradles down as close to their scythes as they could, for the benefit of the swarths, the barley being very short; if they had not done so, they had lost half the corn; but their cradles carried the short barley together in a swarth abundantly the better, by which means it might be raked with less loss.—N. B. To see that other mowers do the same in such case.

Cut grass in stony ground with an old scythe.

§. 28. If one cuts grass where stones are, with a new scythe, and it should strike against a stone, the scythe would break out into flakes, but an old scythe that has been seasoned will only be blunted, and may easily be ground out again.

A scythe for cutting lodged corn.

§. 29. If corn harles or lodges, a scythe cannot carry a cradle, because the fingers of it will be pulled to pieces by the harled corn in drawing the scythe back; but in that case, a bow on the scythe is most proper, which will carry the swarth away before it all together.

§. 30. The thinner and poorer barley and oats are, and the weaker in straw, they ought to be cut a little the sooner, and lie in swarth; for otherwise the straw, if they are full ripe, will not stand against the scythe. Thin and weak barley and oats should be cut the sooner.

§. 31. I sowed broad-clover with barley, and, by all the country-men's judgment, it was deemed proper to mow this barley a week sooner than otherwise it need to have been, because the clover grew up rank, and it was agreed, that, if the barley stood till it was full-ripe, or but near it, as the clover would require four or five hot days to dry it before it could be housed with the barley, it would in that time, in case two or three days rain should fall, be turned black, whereas, being cut thus early, it would take no damage by such weather, but require to stay abroad as long as the clover. If clover be rank in the barley, should be sooner cut.

§. 32. I had barley this year (1702) knee-bent in a very extraordinary manner, and, being dead-ripe, it was crumpled down and harled by contrary winds; I added my own men to the mowers for dispatch; but my men having only grass-scythes, which are not so long as the others, could not dispatch like them;—but farmer Biggs and farmer Knapp said, that in this case the shorter scythes were more profitable to mow with than the others, and missed less of the corn. Knee-bent barley to be mowed with a short scythe.

§. 33. Barley has been so rank in some places in a wet spring that it has been thought fit to mow it, and in such case it may be better to mow it than to feed it, because the scythe only takes off the rankest, but the sheep feed upon all indifferently. Better mow than feed rank barley.

§. 34. This year (1702) the weather being encouraging, I left out barley five or six days in swarth, which, though both blighted and edge-grown, plimmed, and gained very near as good a colour as the best. Of letting barley lie out in swarth.

§. 35. The 30th of August (anno 1708) I cut barley from day to day, and continued to do so for a week; from the 30th of August, for three weeks together, we had every day rain, more or less, but most of the time rain fell plentifully every day.—I ordered my barley in swarth to be turned every other day during these three weeks, to keep it from growing; and though the swarths during this time, that lay uppermost to the air, were hardly dry for any six hours together,—and the undermost barley of the swarths, which lay next the earth, was generally fogged every day, and dungish till turned, as abovesaid, yet I had none of my barley grew.—This was chiefly owing to the late season of the year before our barley ripened, and the continued cold rains, which did not much forward the growing of the barley, as they would have done, had the harvest been forwarder; for had the rain been accompanied with hot sun and glooms between; it would in half the time have made it grow.—I mention this, that in such Benefit of turning the barley swarths in wet weather.

case, when such a year may happen again, I need not be frightened, as we all were this year: in our hill-country the winds also contributed much to save us.

Oats on a side-land to be mowed earlier than on a flat. §. 36. The first year that I took one hundred and forty acres into my own hands, I had the side-land sowed to oats.—It was agreed by every body, that those oats ought to be mowed two or three days sooner than if they were on a plain, because, say they, if you let them be as ripe there as in a plain one should do, the straws will be so hard and dry that the scythe will skim over them.—The reason of this is, because in such ground a man has not so good a stand, nor can put that strength to the scythe, his swing being weaker, as he might do in a plain, and so the straw yields and bends.—Two acres of oats mowed per day in such land is accounted as good a day's work as three acres in plain land.

Peas hurt by mowing. §. 37. My labourers came from mowing vetches to mow peas, not having their hackers with them, and they were loth to go home for them for a piece of a day: I soon came to them, and found that the scythe made great waste, and cut off abundance of the kids in the middle,—and they themselves could not but be ashamed of their work. I mention this, because I am told it is the custom in some parts of England to mow peas.

Peas plucked up in light land. §. 38. I am told, that between Caln and Chippenham the land is almost as light as ashes, and of about six shillings per acre, and that there they neither mow nor hack their peas, but pluck them up.—Quære, whether this was not, for the most part, the condition of the eastern-country-land; and whether there wool will not pull off better than with us.

The blue or green pea for boiling should be cut early. §. 39. The blue pea, or green pea, which is for boiling, is to be cut green, when the peas are thoroughly full-kidded, before the upper side of the kids toward the sun be turned, as they will turn white; for then that whitest half will not boil well, nor the peas sell in the market for boiling.—An old experienced farmer told me this, whereupon I went and gathered some of my own peas, which I thought not ripe enough to cut by ten days, according as the partridge-peas are cut, and when I shewed the kids, he said, by all means, it was fit they should be cut.—I wondered at it, and asked if they would not turn black; he said, no, they would keep their green colour, though wet weather should come upon the halm, and turn it as black as a hat.—But they ought not to be threshed any time before they are boiled, or sowed; for in four or five weeks they will finnow.

Partridge-peas, if cut green, turn black. §. 40. Mr. Jackson of Tackham assured me, that he sowed partridge-peas, which by having been cut green were turned as black as a hat, and yet he had as good a crop as he ever had: this crop I myself saw, and they were very good peas.

§. 41. The different opinions of my two ox-hinds divided me much about the season of cutting my winter-vetches.—The one was for having me cut them when near full-kidded, and seemed most to regard the kids.—The other regarded the halm more than the kids, and said; the horses were as fond of the halm, if taken in season, as of the kids, therefore the halm ought not to be suffered, if one can help it, to rot on the ground.—Farmers Elton and Oliver agreed, that if the vetches fell out of the kids into the manger, the horses would not eat them, and said, if vetches in the grain were set before horses, they would not care for them; so said Mr. Edwards's servant;—but Elton added, there was moderation on both sides to be regarded, and extreams to be avoided, but, if the vetches did not kid well, he thought the best way was, especially if the season was like to be dry, to cut them the sooner, for so they would make the better fodder.

§. 42. My winter-vetches were very well kidded, and almost fit to be cut, and housed for winter-fodder.—Several farmers were of opinion, they were then in very good order for horses; but if whilst I gave them green to my horses, they were cut and laid on the ground two or three days to wither a little, they assured me they would be more hearty; for it would take somewhat from their grossness.

§. 43. When you cut winter-vetches for winter-fodder, in the time of timing it you ought to consider, that, when they are cut green, they require a long time to dry in, during which, especially if the weather be wet, the vetches will continue growing, and the kids, tho' lean when you cut them, and but two rinds, yet will fill out, and almost perfect their seed in the fortnight's time that they must, for the most part, lie abroad; therefore of whatever size you would have the berry of, you must cut the vetches at least a week before they come to that growth.—You ought always to cut them so early that there may be no danger of their kids splitting, and shedding in the foddering with them, which they will do, in case you suffer them to be near ripe; besides, the riper you suffer the seed to be the coarser will the straw or halm be at the bottom, especially if the vetches through a wet summer are grown gross.

§. 44. If vetches are short, as being blighted, or otherwise and dead-ripe, it will be difficult to hack them, but impossible to mow them, because their halm, which will be hard and dry, having no weight to bear against the scythe, will yield, and the scythe will slip over them.

§. 45. When I was mowing my meadows at Easton (anno 1701,) about nine in the morning, one of my mowers began to complain, that about this hour, when the dew went off the best at grass, was the worst time of all the day for mowing grass; and

fo it is, said he, for corn too.—How, said I, worse than at noon, and after? he said, yes.—Then I went to the other mowers, who were mowing in another part of the meads, and asked them at what time of the day the grass mowed best; they all said at noon. Why, said I, your fellow says—, &c. (as above) and therefore before the dew is gone off, I thought had been the best time.—They said, no; a hard scythe will cut the grass best at noon, but a soft scythe while the dew is on the grass.—Why then, said I, do they say (if noon, which is in the heat of the day, be best) that the grass cuts best after rain? for in this dry time we have at present, I hear you complain of the ill mowing of the grass.—They said, that is, because the drought has lain so long upon the ground as to make it hard, so that when the scythe cuts close, it dances upon every little roughness, whereas, was the ground a little moistened with rain, the scythe would cut it, and every little excrescence would be pared off; and then the scythe would not scratch so often, nor be so often blunted.—I went to the first, and asked him of the truth of what he said, and he said it was so.—So that it seems they were both in the right; and though grass mows best at noon, yet it mows worst, when the dew is just going off: the reason they could not give me, but I suppose, that on the first going off of the dew the grass is not stiff enough to stand so strong against the scythe, nor so heavy, nor weighty as when it was loaded with dew, which made it lie close; yet at noon, when the grass was become dry and stiff, it stood closer than when the dew was on it.

Better to mow by the day than the acre in the hill-country.

If grass be not fed clean against spring, the old rowet damages the grass and blunts the scythe.

§. 46. In our hill-country, where grass is short, I hold it best to give one shilling and six-pence per day for mowing; I rather choose to do so than to agree by the acre, that the work may be more carefully done.

§. 47. As one of my labourers, an old experienced hind, was mowing, he every now and then complained of the old rowet, that hindered him, and deadened his scythe.—It was some time before I knew what he meant; at length he pulled up some spiry tough capillary grass, about three inches long, which was the old winter-grass: It seems I had not fed the grass down so low as I should have done against spring, which did harm to the young grass that was to be cut; for, if that had been fed better, the young grass would have come away thicker, and not have choaked up the scythe. He compared it to the young wool, which (when sheep have been pretty well kept in winter, and then checked in the spring) comes up under the first wool, and deadens the shears, so as to make it troublesome to cut with them.

§. 48. I was mowing broad clover, where some of it in gully-places was short, and I proposed to miss those pieces, and not mow them, but the mowers were against it, and said, the shortest, when mowed, would come away much better for mowing, and fill towards the next crop.—Mr. Edwards being present said, that farmer Elton had once some poor patches in his mead, which, being short, he would not be at the charge of mowing, but those patches were thinner for it afterwards in future crops.

R A K I N G.

§. 1. **T**HOUGH mowing and raking of corn are the same price per acre, yet you must have double the number of rakers that you have of mowers, in order to make equal dispatch, because the mowers have not the lets and hindrances that the rakers have: the mowers can continue mowing in moderate rain, as well as begin early in the morning, whereas the rakers are stopped with every shower, and commonly lose two or three hours in the morning in staying till the dew be off the ground.

Two rakers to one mower.

§. 2. If the land be stony, and the straw of the barley short, it will do well to rake up the barley and cock it soon, lest rain should come; for rain will so beat the barley into the ground, that there will be no raking up half of it.

soon in stony land.

§. 3. Anno 1701, my broad-clover came up with my barley so high, that they were forced to cut the barley under the ear: I thought the barley would rake much the better for the broad-clover, inasmuch as it would be kept up from sinking into the ground.—But the mowers said, no; that the broad-clover was so long and thick, and the stubble left so high, that it would be hard work to run the fork along under the swarths, as also to draw the teeth of the rake through the mattings of the grafs.—I believe therefore it would be more for the farmer's interest to employ men at this task than women.

To employ men rather than women at raking barley.

§. 4. One person is counted sufficient to rake oats after the cart; unless in a very high wind, but to rake after the barley-cart, be the wind never so still, two persons are always reckoned necessary.

One to rake oats after the cart—two to rake barley.

C A R R Y I N G of C O R N.

1. **W**HEN the barley-straw runs very short, it is good husbandry to have two pitchers to one loader in the field; otherwise time will be lost.

When barley is short, two pitchers to one loader.

Wet corn to be put round the sides of the barn. §. 2. If a load or two of corn comes in wet, in case your barns are boarded, it will do well to scatter it round about the sides of the barn.

Blighted wheat to be carried as soon as can be. §. 3. If wheat be stuck with the blight, the straw in such case is hollow and spongy, and easily drinks in wet; therefore, if the corn be tolerably dry, and in order, and the weather be anywise suspicious, it is advisable to get it into the barn as fast as possible; for if such loose straw should once soak in wet, and showery weather should follow, it will be much longer before it can be got dry, and fit to be carted, than other corn.

To carry oats in a rainy weather. §. 4. A rainy day is better to carry home oats in than a hot day; for in hot dry weather the oat-straw will be so sleek, that it will be troublesome loading and tying it together, so as not to slide off from the cart, or not to swag to the side the cart may lean on, and so over-turn it.—Again, oats will be tougher, and less apt to brit in carrying on a rainy day than on a hot burning day.

Carry light loads near home, and bigger loads farther off. §. 5. Mr. Hillman, and another experienced farmer, said, it was most profitable at harvest to carry light loads near home, and the larger loads take up more time in binding them, but also because one man can pitch down at the barn faster than two men in the field can pitch up, especially after the load rises to a height.

T H R E S H I N G.

Threshing floors of the antients, and in hot countries. §. 1. **I**T appears from Hammond, on Mat. iii. 12.—the Jews threshing-floors were on the mountains, and open fields, where the wind could have free access, and so it is, he says, in some parts of Spain.—By Varro it appears the threshing-floors were generally uncovered, yet some were otherwise, but the uncovered threshing-floors were laid round that the water might run off. Lib. i. c. 55.

* In some places they threshed out their corn with flails on a floor, in others they trod it out with mares, and in others beat it out with poles.

Used chaff or straw in their floors.

§. 2. It seems the antients had some use for chaff, viz. in making of floors, though *palea* signifies indeed straw as well as chaff. Cato, fo. 18.

§. 3.

* *Messis ipsa alibi tribulis in area, alibi equarum gressibus exteritur, alibi perticis flagellatur.* Plin. lib. 18. c. 30.

§. 3. ^b In countries subject to rain they had their barns contiguous to their threshing-floors, and their floors also were covered, of which see Varro, fo. 34.—Some, he says, fortified the sides of their floors with stone, others made an entire stone pavement; he agrees with Cato, that rubbing the floors with the lees of oil was necessary to prevent the growth of weeds in them, and a protection against vermin, particularly ants and moles, to which oil is poison.

§. 4. Mr. Tate was finding fault with the stone and earthen floors of Leicestershire, and said the farmers were wedded to them, notwithstanding one Sturt (as I think he named him) who lived at Wickham, and had been the greatest commissioner in England for buying up corn, had assured him, that those floors communicated such dampness to the wheat, that it was the worse, either for keeping or exporting, by six-pence in the bushel.

Earthen floors in Leicestershire.

§. 5. In Italy, and other hot countries, they usually thresh and winnow their corn as soon as they have cut it down, or at least a great part of it, and this is done, before they bring it into the house, on a floor made in the open air.—Being kept poor they have but very small farms;—and I am apt to believe that in Judea they did thus, because their possessions were cantoned into so small divisions. See Ray, fo. 402.

Threshing in hot countries.

§. 6. Iron-clayted shoes do not well to thresh wheat in, especially if it be new corn; for such shoes squat and bruise it much: a thresher's shoes should by right be soaled with an old hat.

Of the thresher's shoes.

§. 7. One of my servants being threshing peas, I asked him whether the floor was not too small for two men to thresh in together; he said, no, not to thresh peas in, but it was too small for two men to thresh barley, or other corn in, because the flail makes the straw of light corn fly away, and the threshers must keep moving to follow it, and so would be streightened for room; but a wad of peas, when laid down on the floor, not only lies heavy, but harles together also, and lies for the most part in the same place it was at first laid down in, and so the threshers need not keep moving, but stand in one station, by which means they will not stand in each other's way.

Two threshers require a larger floor for barley than for peas.

§. 8.

^b Amurca perfundere solent areas, ea enim herbarum est inimica, et formicarum et talparum venenum; quidam aream ut habeant solidam, muniunt lapide, aut etiam faciunt pavimentum: nonnulli etiam tegunt areas ut in Bagiennis, quod ibi sæpe id temporis anni oriuntur nimbi. Varro, fo. 46.

Areas amurcâ conspergito, sic herbæ non nascuntur. Cato, fol. 14. Quatenus ad aream; huic autem nubilarium applicari debet, maximeque in Italia, propter inconstantiam cœli, quo collato semitrita frumenta protegantur, si subitaneus imber incesserit: nam in transmarinis quibusdam regionibus, ubi ætas pluviâ caret, supervacuum est. Columella, lib. 1. fo. 93.

Of the quantity of corn to be threshed in a day: §. 8. A good thresher assured me, that twelve bushels of oats were counted a good day's threshing, but he had lately for several days together threshed fourteen bushels, and winnowed them; but those oats yielded extraordinary well. He said likewise, that twelve bushels of barley was a good day's threshing, and in the country the common price was eight-pence per quarter; but five or six bushels of wheat was a very good day's threshing, and, in case the corn was clung, and yielded ill, sometimes three bushels was as much as could be threshed in a day.

It depends on the soil the corn grows on:

I have for some time been uneasy about the small quantity of wheat my threshers used to thresh in a day: my best thresher seldom in any year exceeded a sack in a day: I had this day (November 5th anno 1714.) a serious argument with him about it, another good thresher being present.—The first persisted, that it was well known to the threshers of the country that they could as easily thresh six bushels of wheat in a day at Netherton-farm, it being a warm gravelly bottom, as they could thresh four bushels in a day at Ashmonsworth, or Crux-Easton; for on such cold lands the corn threshed tough.—The other said, he had threshed at Netherton-farm for two or three years, and that they commonly reckoned the same difference in threshing, as abovesaid, between the wheat of that farm and the wheat of the cold hill-land of Faccomb, where the village stands.—So that the difference between the cold hill-lands, and the warm vale-lands, with regard to threshing, I now look on as a settled point.—And note, —in such a cold hill-country as our's at Crux-Easton is, men thresh harder to perform their day's work than in the vale, where the corn threshes easier, because the stroke of the flail must in such cold countries be forced down stronger, to beat out the corn, than in the vales, where a lighter stroke does more work.

It is to be considered, that Faccomb, and my neighbours wheat yields more in a day's threshing than in the clay-lands, because, their lands being lighter, the straw runs shorter, and consequently more sheaves are laid on the floor, and the more ears of corn must therefore be laid there; whereas on my clay-land the straw runs longer, and consequently the fewer sheaves and ears of corn are laid on the floor to fill it.

Wheat to be threshed in dry weather. §. 9. One week in particular our wheat yielded very little flour in grinding, and had abundance of bran, of which the miller also complained.—My thresher assured me, the reason was, because I had threshed that wheat whilst the weather was damp; for, said he, then the wheat will be cold, and will not grind well, notwithstanding the weather be ever so dry afterwards; but if threshed dry, and put into sacks, it will not afterwards grow heavy, and yet if threshed in open weather, and then put into sacks, it will be musty in less than three weeks time.

§. 10. The beards of the barley will come off much better in threshing for the swarth taking the dew. Of threshing barley.

§. 11. I had a mind to thresh out some vetches in the field ; they were ripe, but a little soft, on which, intending immediately to sow them, I asked the farmer (shewing him them) if they were not too soft to thresh ; he said, all the danger was that, if threshed on a floor, the flail and the man's feet would bruise and break them, but to thresh them on a hurdle, with a cloth, would do well. Of threshing vetches when soft with damp.

§. 12. I was asking a good farmer in my neighbourhood, whether it was best to carry rye-grass, or clover-hay for seed, to the barn, or the reek, and thresh it out afterwards, or to thresh it out in the field at hay-making ; the farmer said, they did it both ways, but, said he, I think the best way is to thresh it out in the field ; for, if the sun be hot, it will brit very much, and there will be great loss in carrying it home, especially if you go through narrow lanes, and then it will slack and give in the mow, so that it will thresh but ordinarily, whereas, if threshed in the field about noon, when the hay is dry, one man will thresh as much as three men can do the other way. Rye or clover-hay best threshed in the field.

§. 13. As my bailiff was winnowing peas for seed, I observed a vast quantity of charlock among them ; he said, it could not be helped ; for charlock was a seed that the fan would not separate from any sort of corn, but it might be done with the skreen. —So I ordered them to be skreened before they were sowed, and I advise the same to be done with all sorts of corn designed for seed. Cautioned to skreen corn.

§. 14. Farmer Biggs, and farmer Bristow were saying, that all sorts of corn yielded but few hulls this year (1702). (Note, it was a very dry summer and harvest). I asked them, what might be the reason of it ; they said, that wet harvests made the hulls come off the wheat-ears much more than dry ones, and likewise the oyls from the barley, but especially the small feathery hulls that are at the bottom of the barley-ears ; and in such years the straw threshes very brittle, and breaks into little pieces, which adds much to the heap of hulls : it is also possible the oyls may grow longer in wet summers. Most chaff produced by wet harvests.

§. 15. Allow, if you can, an empty space of barn-room in harvest-time, to receive the litter, and foddering-straw, that you thresh out before cattle may come to fodder ; otherwise such straw will be spoiled by throwing it into your back-side. Of a straw house.

R E E K S .

Mr. Duhamel tells us, it is a custom in that part of France he writes of—to half-thresh the sheaves without untying them, when there is a great deal of weed among the wheat. By this means, says he, they get the ripest and best grain, and few seeds of weeds ; for the weeds being shorter than the wheat, are generally at the bottom of the sheaves. Pag. 218.

R E E K S.

Houſing ſummer-corn preferred to reeking.

§. 1. **I** A M upon experience an enemy to reeking corn abroad that you have barn-room for, except it be wheat: if you propoſe to threſh out your corn within the compaſs of a year, the damage it may take by mice in ſo ſhort a ſpace is inconfiderable, eſpecially if by harveſt-time you have got the dominion over the mice by ſtore of cats, which a gentleman delighting in huſbandry ought to value as much as many do their hounds: the damage ſuſtained by mice will, I ſay, be inconfiderable in compariſon of the charge of reeking corn abroad. The computation of which laſt will run thus, viz. ſuppoſing it to be an oat, or a barley-reek of thirty-two load, ſuch a reek cannot well be ſuppoſed to be finiſhed in leſs than two days; in loading and pitching to reek muſt be employed,——

	l.	s.	d.
Seven men at harveſt-wages	1	8	0
Two teams of horſes, two days	0	14	0
Thatching	0	3	0
Two load of ſtraw	0	15	0
Elming	0	2	0
Stowing it in the barn afterwards ſeven men, a day	0	7	0
A team of horſes, a day	0	3	6
	<hr/>		
	3	12	6
	<hr/>		

Befides damages by birds devouring the ſides, and in hard weather pulling off the thatch, accidents by wet, charges and waſte in taking in, and hindrance from taking it in, it may be a month by hazy weather, or by not being able to ſpare people to do it, whereby many inconveniences may be ſuſtained, and the mice to be maintained are near the ſame.

Negligence of ſervants in not ſecuring reeks againſt wet weather.

§. 2. It is a common folly of the bailiff or other ſervants in huſbandry to act without apprehenſions of rain, when there is no appearance of it: if reeks are making in hay-time, or harveſt, tho' the maſter has provided ſtraw in abundance to ſecure them, yet, becauſe the day's-buſineſs begins early in a morning, the ſervant is loth to beſtow the time in carrying to much ſtraw to the reeks as would ſecure them in caſe of bad weather, and, becauſe the buſineſs of carting holds out late in an evening, the ſervants are loth to leave a half-made reek ſecure againſt all weather by pitching up ſtraw enough upon it.—It is the maſter's buſineſs therefore to conſider the temper of ſervants, and, if ſuch works may be termed works of ſupererogation, to gratify with good ale rather than to let them be undone.

§. 3.

§. 3. I laid abundance of barley-straw on the ridge of a long Barley-vetch-reek, and brought it up sharp; I believe when the reek straw not was cut the straw was three foot thick, and yet the wet had run equal to through this covering, and done considerable damage to the wheat for vetches:—the reasons of it were two; first, barley-straw is thatching reeks. more woolly and spungy than wheat-straw, which is close and hard; secondly, the reek sweated and heated pretty much, and it is observed in such a case the covering of straw is hollowed, and softened, and the reek thereby the apter to drink in the wet.

§. 4. I made my wheat-reeks on staffolds, and, when I came Of make- to thatch them, I made a question whether the perpendicular-side ing a to the weather should not be thatched as well as the eaves;—wheat- my thatcher said, it was needless;—I replied, that farmer Crapp reek. had told me, though he had housed wheat in a reek-house, yet for want of having the sides boarded, the wind had blown the rain against the sides of the reek, so that it had received great damage.—The thatcher replied, he knew of that very well;—for they had not minded to lay the ear-ends of the sheaves uppermost and upon a rise, all along as they made the reek, and to lay the straw-ends of the sheaves downwards; which if they had done, it had been impossible for the rain to have drove upwards to the ears; but on the contrary, in making the reek they laid the straw-ends of the sheaves higher than the ear-ends; consequently the rain that was blown into the straw-ends must necessarily run downwards to the ears.

Harry Miles of Wiltshire was saying, that people in our country have not the way of making a reek well; for, as they work it up, they should still keep the middle full, and then, when the reek sinks, that will throw the sinking of the reek to the outside, and so make the outside lie the closer;—whereas, if the middle be left hollow, the reek will fall-in in the middle, and the outside will be hollow.

It is proper in topping a wheat-reek to use a load or more of small sheaves, according to the size of the reek, because a reek cannot be so conveniently drawn-in and narrowed at top with great long sheaves as with slender short ones; therefore your husbandman ought to take care to order such to be provided, and out of the same ground from whence he makes his reek, in case he means to lay only the corn of a particular ground in the same reek.

Though a wheat-reek be well made, yet the bonds of the outer sheaves will be apt to grow, if long unthatched.

§. 5. We were setting up an oat-reek designed to contain twenty load, but by the foundation of faggots I rather judged it fit to hold forty load;—but the work-men said, the case was different and bar-between oats and barley; for barley-straw, being rougher in it's ley-reek. oyls,

oyle, would not slip and slide as oat-straw would, it being sleek and slippery; therefore barley might be over-laid the foundation on all sides as much as you pleased, but an oat-reek, which way soever it inclined, would be apt to slip away and tumble down; therefore an oat-reek must not be widened beyond the foundation, especially if the corn is carried in dry, as this was, and so the more likely to slip.

Of mice
in a reek.

§. 6. Farmer Wey of the Isle of Wight, observing sparrow-holes under the eaves of a reek, said, if the birds roosted in those holes o' nights, it was a certain sign there were neither mice nor rats in the reek, for, if there were, they would by their squeaking and running about at night so disquiet the birds, that they would not endure it: he had, he said, heard many ancient husbandmen make that observation.

Peas and
wheat set
damp in
reeks in
the hill-
country.

§. 7. I took-in a load of great partridge-peas out of a reek that was well thatched, and had stood a year and an half: to my great surprize the peas were as soft as when the reek was made, but they were sweet and sound; I kept the reek for my horses.—The reason of their softness doubtless was the damp winter-air, and Crux-Easton mists, which the strong winds had forced into the very middle of the reek:—I made the same observation a little before of a wheat-reek I kept over the year, and threshed the latter end of the second winter.

Of a hay-
reek.

§. 8. A great matter depends on the well reeking of hay, for hay will often swag and pitch in the reek after making, and must then be filled out with thatch to make it shoot off the rain as well as the rest of the reek.

Of the
form of a
reek, and
it's heat-
ing.

§. 9. If a reek of hay be not well brought in, it will be apt to heat, and in that case a long reek is best, because it may be made as long, and as narrow as you please, and therefore will not be so apt to heat;—but there is the most loss in such a reek, because more of it, in proportion to what it contains, lies exposed, to the weather;—therefore, if hay be well dried, and well brought in, a round reek is the most profitable; nevertheless, if it be water-meadow-hay, let it seem never so dry, I hold a long reek to be best, for such hay will, notwithstanding it's dryness, be apt to heat.—That indeed might be prevented by keeping the middle of the reek hollow from the bottom to the top;—but, when that is done, all the sides of that hollow will be finnowy, and a pretty deal of waste will be made that way too.

Of securing
hay
from heat-
ing.

§. 10. Farmer Biggs, as we were speaking of the diverse ways of securing a reek of ill-got hay from heating, said, after I had told him of other ways, that they had of late years (before anno 1700) found by experience, that to cut a side-hole through the middle of the reek, of about four foot, or four foot and an half diameter, and to secure it by under-propping it with wood, was the

the best way, and the same method was to be used to prevent corn from mow-burning, either in a barn, or in a reek.

I observed at farmer Pain's at Gauluks in the Isle of Wight, in a hay-reek cut into the middle some faggot-ends appear; I asked him the meaning of it; he said, it was an excellent way to preserve and secure a hay-reek from heating, which was done in this manner;—within about a yard of the bottom of the reek they fixt the first faggot end-wise, and then filled up the hay round it, and then placed another, and so on till within two or three foot of the top, and then they covered it, so that no wet could fall down to hurt the reek, and let it sweat for three weeks, during which time it would smoke like a chimney, and after that you might take out the uppermost faggot, and fill up the vacancy with hay, and then top-up the reek and thatch it for the winter.

§. 11. Last summer (anno 1701) I made a hay-reek, and a Not to hard rain came upon it before it was thatched; but the mishap thatch a was, I thatched too soon after the rain was over, that is, before hay-reek the outer-coat was well dry: in opening it for winter-spending I after rain found, that as deep as the wet and the damp of it had struck-in, till it is quite dry. so far the hay was finnowy, and dead, whereby I might lose a load of hay; but in case I had not thatched it till the outside had been fully dry, the hay had recovered it's old sweetness, and suffered no damage.

§. 12. Being informed that a vetch-reek I had set up had heat-Of heat- ed, I went to observe it, and, thrusting my hand into it, all along ing. the side against which the wind set I felt no heat, nor in that end that took the wind oblique, but at the further end from the wind, especially towards the further corner of that end, it was considerably hot within six inches of the out-side; so that it is the wind that drives the heat to and fro in a reek, and causes the pitching and yielding of it to that side it drives the heat to, and that vetch-reek, the wind being changeable, did for a week after it was made accordingly pitch from side to side.

G R A N A R I E S.

§. 1. *SOME, says Varro, have their granaries raised high ^{Of keep-} above the ground, and some make them under ground, ^{ing wheat.} but in either sort they take care to keep out air and moisture, for if they

* Aliqui ponunt triticum in granaria sublimia, &c.—Aliqui sub terris, &c.—Et curant ne humor aut aer tangere possit, quo enim spiritus non pervenit, ibi non oritur curculio; sic conditum triticum manet vel annos quinquagiata, &c. Varro, foli. 47.

they get in, they will breed the weevil. Wheat so laid up has kept good for fifty years.

§. 2. Brown quotes authorities, that in Ægypt wheat laid up in the ears in granaries has lasted one hundred and twenty years; and says, more strange it may seem, how after seven years the grains conserved should be fruitful for a new production; for Joseph delivered seed to the Ægyptians to sow their land for the eighth year; and Theophrastus says, seed of a year old is the best for sowing, that of two years old is not so good, but, when more than three years old, it is quite barren, but proper however for bread-corn.—Yet seeing corn may be made to last so long, the fructifying power well may be conceived to last in some good proportion, according to the reason and place of it's conservation. Theophrastus says in another place,—In a certain part of Cappadocia called Petræ wheat has preserved it's fructifying power even to forty years, and has been good for sowing^b.

§. 3.

^b Mr. Tull says, the most secure way he knows of preserving wheat is by drying it, and relates a story of a neighbour of his in Oxfordshire, who acquired a large fortune by this practice. His method was to dry it on a hair-cloth, in a malt-kiln, with no other fuel than clean wheat-straw; never suffering it to have any stronger heat than that of the sun. The longest time he ever let it remain in this heat was twelve hours, and the shortest time about four hours; the damper the wheat was, and the longer intended to be kept, the more drying it required; but how to distinguish the degree of dampness, and the number of hours proper for it's continuance on the kiln, he said, was an art impossible to be learnt by any other means than by practice. His speculation, that put him on this project, was, that it was only the superfluous moisture of the grain that caused it's corruption, and made it liable to be eaten by the weevil. When dried, the bakers allowed it worked better than new wheat, and every grain would grow after it had been kept seven years.

As the method proposed by Mr. Duhamel for the preservation of corn, by ventilation and kiln-drying, not only appears reasonable and practicable, but has, according to him, been confirmed by experiments, I have here given an extract from his book, as a hint to the reader, referring him, for farther satisfaction, to the original, where he will find draughts of the buildings and instruments made use of for this purpose.

Mr. DUHAMEL on the Preservation of Corn.

After having expatiated on the necessity and use of preserving corn in granaries, especially in France, where they are frequently in danger of famine, he proceeds as follows.

To preserve corn according to the common method requires immense granaries which must be very dry, and built very strong, and, in those who have the care of them, great assiduity, skill, and probity are requisite;

Consideration des grains
1753.
Page 12.

§. 3. In discourse with several notable farmers on country affairs, they seem'd to agree, that a brick granary, except lined with nary. within-

quisite; and we may conclude that the want of such edifices, and the difficulty of procuring proper persons to have the care of them, is the reason that magazines are not so much multiplied as could be wish'd.

I hope, says he, by the method I shall propose, to obviate all those inconveniencies. By these means a large quantity of corn will be preserved in a small compass, without danger of heating or fermenting; it will be secured from the depredations of animals and insects; and you need not fear even the incapacity or infidelity of those that are employ'd to take care of it; and all this without trouble and at a very small expence. But before I propose my method, I shall describe the common practice of the provinces about Paris. The inconveniencies will be easily perceived, and you will be better enabled to judge of the great advantages arising from the method I propose.

When corn is laid up in a granary with intent to be kept a great while, Page 141
the custom is to spread it only eighteen inches thick; 'tis true that, when it is old and very dry, the granary perfectly free from moisture, and the joists strong enough to support the weight, they may lay it somewhat thicker; but, as we must fix on some determinate height, I chose this as the most common in large granaries. That the corn may not lie against the wall, they generally have a passage of about two foot all round. By this means they prevent the corn from being lost by running down the chinks that necessarily happen at the edges of the floor; they remove it from the holes made by rats and mice; they take care to prevent the dirt, which falls chiefly from such places, from mixing with the corn; they remove it from all moisture that may come from the sweating of the walls, or from any defect in the roof: lastly, the grain is more expos'd to the air, and they contrive to leave a passage for it's reception. This is a custom generally observ'd, and probably has been found necessary.

The corn being thus removed from the walls, the sides of the heap Page 142
make a declivity, which, as far as it reaches, contains but half as much as if the sides of the heap were perpendicular, and this makes a loss of near a foot all round the granary; lastly, they leave a space, at one end, sufficient for turning the corn; all this greatly reduces the contents of the granary, and, to make it more clear, I shall give an example.

Suppose a granary eighty foot long and twenty-one broad, which makes one thousand six hundred and eighty foot superficies: you must take off for the passage and the sloping of the corn, at least three foot on each side, which makes six foot for the whole length, or four hundred and eighty square feet, which being taken from one thousand six hundred and eighty there remains but one thousand two hundred, from which you must take at least fifty foot for the space necessary for turning the corn and the passage at the other end: so that you can reckon only on one thousand one hundred and fifty foot square of room, which at eighteen inches deep will contain one thousand seven hundred and
Q twenty-

within-side with boards, would damp and moldy the corn that lay next the sides, especially on the weather-side, which they called the

twenty-five cubic feet of corn, which will weigh about ninety-two thousand pound.

Page 17.

It appears from the foregoing example what immense buildings are necessary for a large magazine, and the vast expence that must attend the building and maintaining them. The buildings at Lyons called les greniers de l'abondance, of which we shall speak hereafter, will furnish a further proof of it.

It follows then that it will be of great advantage to lay up a great quantity of corn in a smaller compass, and we shall make it appear in the following discourse that it may very easily be done.

Corn, tho' dry to appearance, contains a great deal of moisture. I have put new corn in glass bottles well stopped: the moisture that came out of it appeared on the inside of the bottle, and the grain grew moldy. At certain intervals, in the year 1745, I weighed a quantity of wheat of the last harvest, I exposed it for twelve hours to the heat of a stove or kiln, which raised Mr. Reaumur's thermometer to fifty degrees: it lost an eighth of it's weight, and yet was only dried; for being sowed it came up.

Page 18.

In 1744 I put some wheat, and other grain, of the harvest of 1742, into a stove heated so as to raise Reaumur's thermometer to 38° which is 8° higher than our hottest summers; both the sorts of corn, that were used for the experiment, in twenty-four hours were found to be diminished $\frac{1}{32}$; they were put again into the stove, which was heated to 51° , and in twenty-four hours after were diminished nearly $\frac{1}{16}$; besides that which was weighed, there were some separate parcels both of new and old corn set apart, to try what degree of heat it would bear without destroying it's vegetation. I sowed some that had suffered $12\frac{1}{2}^{\circ}$, some 38 , and some 51 : and in all these cases, the new came up, but the old did not.

It is remarkable that, be it never so hot during harvest, the sheafs that lie at top of the heap are harder to thresh than those that lie at bottom, which is the consequence of moist vapours that rise from the corn.

Page 20.

If you put a large heap of corn in a granary, and do not stir it for a considerable time, or if you only fill a barrel, after some time, upon running your hand into it, you will find a sensible heat in it and a small moisture; some time after it requires a vinous smell, then turns sour, and at last moldy; in a word it ferments, and is no longer fit to make bread, and sometimes even the fowls will not eat it.

It is to prevent fermentation that they lay it so thin, as eighteen inches, in the granaries, and turn it so often.

If it has been a wet season, and much rain fallen during harvest, they are obliged to turn the corn every three or four days; but when corn is well conditioned, and the first year is passed, it may be sufficient to turn it once a month; some turn but once a fortnight in the months of May, June, July, and August.

These

the south-west side ;—they gave instances of some farmers who had suffered by it ;—and a carpenter being there did attest it.—They said that mice would neither meddle with barley nor peas, if

These are the expences, and the care that attends it is not inconsiderable, especially in summer, when the farmer has so many calls and occupations in the field ; nevertheless the proprietor must keep a strict eye upon his workmen ; for, besides the frauds they will commit, especially when corn is dear, they frequently stir only the top of the heap, so that the bulk of the corn which you think has been turned, was never stirred at all.

Whoever can save these expences and cares, will render the preservation of grain much more easy ; and that is what we hope to shew in the following work. Page 22.

Wheat is not only the nourishment of men, but many other animals are particularly fond of it. Nobody can be ignorant of the great waste that is made in granaries by rats, mice, and birds: it seems possible to defend it from these depredations by carefully stopping all passages, laying snares, poison, &c. but all these precautions will not suffice to prevent the pillage of these animals, who, besides what they eat, waste a great deal by means of the holes they make, through which the corn runs down, and it is lost. If the farmer makes holes for cats to go in at, the birds will take the advantage of them, and the cats themselves contribute to the waste by their excrements, which form heaps of infected corn.

Our labour, therefore, will not be lost, if we can arrive at a method by which we may have nothing to fear from these animals, and that without the use of cats, snares, poison, &c.

One of the greatest obstacles to the keeping of wheat is the insects that breed in it: the chief are the weevil and moth. How often have the naturalist, the philosopher, the lovers of the publick good, endeavoured to search out means of exterminating these insects, which increase sometimes to such a number as to devour a great part of the grain ? All the methods that have been proposed have either proved ineffectual, or impracticable ; the only one used in our province is the passing all the corn over a wire skreen ; part of the weevils, and the corn they have damaged, falls through into a copper vessel, which they set under the screen ; but this tedious and expensive operation, only diminishes the evil without curing it ; instead of which we hope to propose a method, by means of which you will have nothing to fear from any sort of insects, and that without charge or trouble.

The business is, in order to render the preservation of corn easy, first, Page 25.
to keep a great quantity in a small compass ; secondly, to prevent it's fermenting, heating, or contracting any ill taste ; thirdly, to guard against the rapine of rats, mice, and birds, without exposing it to the damage occasioned by cats ; fourthly, to preserve it from mites, moths, weevils, or any other insect, and all this without charge or trouble. Let us see if all this may be brought about, and give an account of the experiments we have made on the subject.

Q 2

We

if they could get any thing else.—They said, it had been commonly asserted that mice would not touch wheat, where they could have oats; that many therefore would lay oats in one half of

We caused a case or little granary to be made, of oak plank two inches thick, forming a cube of five foot every way; at six inches from the bottom we made a flooring, or second bottom of lattice work, placed upon joists of five inches thick; covering it with a strong canvas; and this little granary was filled quite full of good wheat; it contained ninety-four cubic feet, weighing five thousand and forty pounds.

Before we proceed any farther, it is proper to observe, that such a granary of twelve foot cube will contain one thousand seven hundred and twenty-eight cubic feet of corn, whereas the granary we instanced in the beginning of this work, which had one thousand six hundred and eight square feet of superficies, could contain, in the common method, no more than one thousand seven hundred and twenty-five cubic feet of corn.

Page 27. This is an immense saving both of room and expence, since for about sixty pounds you may build such a granary of brick or stone fifteen foot square and twelve foot deep, which will contain two thousand seven hundred cubic feet of corn; whereas a granary, in the common form, to contain that quantity, would cost eight or nine hundred pounds,

The little granary, being filled quite full of corn, is to be covered with good oak planks, so closely joined, that neither rats, mice, or even the smallest insect can get in, leaving only some vent-holes, with trap-doors, or covers fitted very exactly to them, of which we shall speak hereafter.

Thus is our corn deposited in a small compass, and perfectly secured from rats, mice, birds, and even insects, provided there were none before in the granary, or among the corn; but if there should, we shall hereafter prescribe a method of destroying them.

Page 29. It is notorious in this climate, that corn laid up in great heaps will soon ferment and spoil, to prevent which it is necessary to force out the tainted air, and supply it's place, from time to time, with fresh, in short to establish a current of air, which shall pass through the corn, and carry off the dampness. For this purpose we proposed to make a false bottom of lattice work covered with coarse canvas (but if it were for a large granary, wire in the manner of a sieve might be better) thro' which the air might pass, and be forced out at the vent-holes at top.

Page 31. This purpose is answered by bellows, and the most proper for the purpose are those contrived by doctor Hales (as described in his book, called a Description of Ventilators) being constructed without leather, or any other matter that is liable to be destroyed by vermin.

Page 35. A large pair of these bellows being so fixed as to receive the air from without, and convey it between the bottom and false bottom of the granary, when you would ventilate the corn, open the vent-holes at top, and work the bellows, which will drive the air through the whole body of the corn with such force as to make the dust fly out of the vent-

of one side of their barn, and wheat in the other half of the same side, but they themselves never found but that the mice would eat heartily of both.

T H A T C H.

vent-holes, and when confined to one small opening will blow up some grains of corn a foot high.

Every stroke of the bellows conveys two foot cube of air into the granary, which, at the rate of four hundred and twenty strokes in five minutes, will supply eighty thousand six hundred and forty cubic feet in a day, that is to say in eight hours working. Page 36.

The proportion of air in a heap of corn is found by calculation to be about $\frac{1}{11}$, but supposing it even a third part, it will be changed two thousand six hundred times in a day, with one pair of bellows; but my granary has two pair.

The corn I chose for this experiment was of good quality: I ventilated it, not more than six days in a year, without the help of fire, which was sufficient to keep it so well that the best judges allowed it to be as good as could be. Page 39.

When the bellows had not been worked for several months, the corn was allowed, by good judges, to look and smell perfectly well, but they objected that it did not handle well, that is, that it had some little dampness in it. The bellows were worked for half a day, and that objection was entirely removed.

In hot countries corn may be preserved for a long time by being deposited in a vault or cistern, so closely stopped that the air can have no access; but experience shews, that this method will not succeed in our climate, the sun not having power to exhale moisture from the corn sufficient to prevent it's fermenting, when laid in a large heap; and this is further proved by several experiments of corn dried in a kiln, which, tho' it's weight was very considerably diminished, did not lose the vegetative quality, but grew very well. Page 49.

It follows from these observations that it is necessary to take away the superfluous moisture, and reduce our corn to the same degree of dryness as that of the hottest countries, in order to preserve it in great bodies. Page 51.

EXPERIMENT on ninety-four cubic feet of wheat (not dried) which was preserved by ventilation only, above six years. Page 55.

In the month of May, 1743, ninety-four foot of wheat was put in one of the little granaries beforementioned; it was of the harvest 1742 and of an excellent quality, perfectly clean, and so dry, that it lost only $\frac{1}{16}$ of it's weight by a small quantity of it for a trial being dried on a kiln with the heat at fifty degrees of Reaumur's thermometer. This wheat was well cleaned from dust, and deposited in the granary without being dried by fire.

The first three months it was ventilated for eight hours once a fortnight, the rest of the year 1743 and all 1744 it was ventilated once a month, all the year 1745 and part of 1746 but half a day once a month, and after that but once in two or three months.

T H A T C H I N G .

Of reek-
ing straw.

§. I. I Was telling a Dorsetshire farmer how useful it was to have wheat-straw saved against an unforeseen occasion, and for which it was often wanted.—He allowed, it was very good husbandry,

In the month of June 1750 the granary was emptied; and the wheat found to look and smell very well, but felt a little rough in the hand, because not having been moved for six years, the little hairs that are at the extremity of the grains, and the particles of the bran were roughed up; but after passing twice through the wind-screen that objection was entirely removed, and it was found by the bakers, pastry-cooks, &c. to be perfectly good.

This was corn of eight years old, seven of which it was preserved in the granary without any sensible diminution, and without any damage from rats or other animals; it cannot be said without expence, because there was a man employed from time to time in the ventilating, but it is very easy to reduce that expence almost to nothing, as will be shewn hereafter.

Page 62.

EXPERIMENT on seventy-five foot of new wheat extremely moist, grown, and that had already contracted a bad smell.

The harvest 1745 was very rainy, and all the corn grown in the ear; in the common granaries it was always in a state of fermentation, tho' laid but a foot deep, and turned every four or five days.

Seventy-five foot of this grown corn, which smelled very ill, and was so moist as to wet the floor of the granary where it lay a few days, was put, in this condition, and without being dried, into one of our little granaries with small hopes of success.

As the corn was very hot when put into the granary it was ventilated three or four times the first week, once in eight days during December and January, and, as it had then lost great part of its bad smell, from that time till June once a fortnight.

Then perceiving, by running one's hand into the top of the heap, that it heated, we concluded it was going to be intirely corrupted, which determined us to empty the granary; but, when we had taken out about a foot of the top, we were greatly surprized to find the rest fresh, having very little bad smell, and drier than that preserved in the common granaries. So that we regretted having emptied it.

The reason why the top was the worst was, the moist vapours being always forced upwards in ventilation; and we apprehend, if instead of emptying the granary it had, been ventilated oftener, the moisture that was at top might have been dried away.

This experiment teaches us one thing of importance, which is, that in this sort of granary the top of the heap is most subject to heat, so that if

husbandry, and added that he commonly used to reek his wheat-straw, which would take no damage for a year or two; and, if there

if the grain taken out of the vent-holes is in good condition, you may conclude the rest to be still better.

EXPERIMENT on five hundred and fifty-five foot of wheat of the year 1750 (which was very damp and difficult to preserve) put into one of our granaries without being dried on a kiln. Page 69.

It must be allowed that in this method it is very material to clean the corn well before it is put in the granary, because it is impossible to do any thing more to it till it is taken out for sale, but above all you must be careful to clear it from smut or blighted grains; for we find, by experience, that they will communicate a bad smell to the whole.

This five hundred and fifty-five feet of wheat was so well cleaned, that, tho' at first it had $\frac{1}{2}$ part of smut or blighted grains, there remained scarce any appearance of either when it was put into the granary, only a light dust that was impossible to get rid of, on account of the moisture of the grain, which made it adhere too fast to be removed by screening.

This wheat so well cleaned was put in one of our granaries, which had the bellows moved by a wind-will.

There was no want of wind during the years 1751 and 1752, and, as it required neither expence nor trouble, it was often ventilated, which preserved it very well, and not only dried it, but also cleaned it, in a great measure, of the bad smell it had when it was put in.

When it was taken out it was very full of a fine dust, which separated from the grain in proportion as it dried, but, after having pass the wind-screen, it was found to be very good, and was bought by the bakers at the top price of the market.

By this experiment it appears, that very moist corn, which has a Page 72. great disposition to ferment, may be preserved in these granaries by ventilation only; but he thinks it not safe to trust to this sole precaution; because, if a calm should happen about the month of June, so as to rob us of the use of our ventilating-mill, at a time when all nature is disposed for fermentation, the whole might be spoiled.

To prevent which, he proposes two methods.

The F I R S T M E T H O D.

Page 72.

Is to keep corn near a twelvemonth in a common granary, during which time you will have opportunity to use all means of cleaning it, by which operations it will lose so much of it's moisture, as to be perfectly fit for the granary of preservation.

This method will answer for such as desire to preserve the produce of their own lands only, and are already provided with a common granary:

Q 4

there was, no occasion for it, it would make litter and dung at last ; therefore, as wheat-straw in some years proves very short, or blighted,

ry : but those that would buy up a large quantity of corn, when the price is very low, for the chance of selling at a better market, must follow the

Page 75.

S E C O N D M E T H O D.

You must have a common granary sufficient for cleaning the corn before you put it in the granary of preservation ; but as soon as it is well cleaned you must dry it in a kiln (which is hereafter described) for by this operation, which is neither troublesome nor expensive, you will in a very little time dry it, more than if it had lain in a common granary for a year. After which operation you may put it in the granary of preservation without any fear, having only once passed it through the wind-screen to cool it, and clean it from dust ; as will appear by the following experiments.

Page 76. **EXPERIMENT** on ninety foot cube of fine wheat, which was preserved without ventilation, after having been dried in a kiln.

This wheat, tho' very full of smut and dust, was so well cleaned as to have no fault remaining but dampness ; it was dried in a kiln, by which it lost a little disagreeable smell which it had before ; when it was thought to be sufficiently dried, it was deposited in one of our granaries of preservation, which had bellows adapted to it, but there was no occasion to make use of them.

It appears by the foregoing experiment, that wheat well cleaned and dried need not be ventilated.

Page 78. **EXPERIMENT** on seventy-five foot cube of small wheat, mixed with smut, which had been dried in a kiln.

Our different screens cleaned the large wheat perfectly, but with all our care we could not free this small wheat from smut, dust, &c. of which much remained, and the kiln did not clear it from the bad smell it had contracted.

Frequent ventilation would undoubtedly have taken away that bad smell, but this experiment being to try the effect of the kiln only, we determined not to ventilate, unless there was great danger of its corrupting, which did not happen ; but yet the bad smell increased so much that we were obliged to kiln-dry it again after it was taken out of the granary, and to screen it several times, by which means it made tolerable good bread.

This experiment shews, first, how necessary it is to clean the corn well before you put it in the granary of preservation, and that, in some cases, both ventilation and kiln-drying are necessary ; secondly, that
corn,

blighted, in neither of which cases it will be fit for thatching, so it is prudent to save and reek what one can spare, when it proves long and good.

§. 2

corn, which has contracted a bad smell, may be cleared of it by the kiln and wind-screen.

Having found by the foregoing experiments that good corn, well cleaned, and properly kiln-dried, may be preserved without ventilation, and that good corn tolerably dry may be preserved by ventilation only, we conclude it must be most advantageous to join both methods, especially for large magazines. Page 80.

EXPERIMENT on eight hundred twenty-five foot. cube of fine wheat lightly kiln-dried and ventilated. Page 80.

This wheat was of the year 1750, and consequently but of a middling quality : after being well cleaned, and lightly kiln-dried, it was put in the granary of preservation about seven foot deep, which granary had bellows worked by a wind-mill.

This corn had a bad smell, which was not entirely dissipated by the kiln, but was entirely cleared of it by ventilation ; it was not only well preserved, but so meliorated, and became of so good a quality, that the bakers preferred it to all other, and bought it two-pence per sack dearer than the same wheat preserved in the common method.

It is certainly most advantageous to unite both methods, not only because it is the most effectual in preserving the corn, but it is also the least trouble and expence : for to kiln-dry it sufficiently to keep without ventilation requires a large fire and long attendance, and to preserve it without kiln-drying will require very frequent ventilation, whereas by joining the two methods you render both very easy, less expensive, and the success more certain. Page 82.

In all these experiments we have never suffered any thing by moth, or weevil, tho' the common granaries were greatly infested with them at the same time ; this is a good prognostic, but we must not conclude from hence that this method will absolutely prevent the mischief : it may be supposed, that the care we had taken, in these experiments, to clean the corn, had entirely freed it from them, and may be objected that this great care cannot be taken in large provisions, and that, should any get into the heap, they would be more dangerous, inasmuch as they would not be disturbed for so long a time ; these reflections determined us to make the following experiment.

Of the M O T H or W O R M.

The moth lays it's eggs on the corn, the eggs produce a worm or caterpillar, which feeds on the corn, and spins a silky web all over the surface, so as to make a crust sometimes of three or four inches thick, which is entirely spoiled, beside the bad smell it communicates to the whole. Page 84.

In

Oat-straw of no great use. §. 2. It is of great use to have a good reserve of barley-straw, or wheat-straw, to sling some loads of either on the peas, and barley-recks, to secure them when they are obliged to lie a long time unthatched; as for oat-straw, it is of no great use, unless to cover an oat-reck, or peas for fattening hogs, or corn for fowls.

Of helming for thatching. §. 3. When straw is heaped up together in order to be helmed, it is fit at the time of wetting straw for helming that there should be two persons to keep the heap close together by beating it, whilst one slings water on it; otherwise, if the straw lies hollow, the water will run so fast through it that it will not take wet.

Of binding on the thatch. §. 4. It is found by experience, that in thatching barns, &c. it is more profitable to bind on the thatch with pithed ship-cordage untwisted (which is sold at market-towns) than to bind it on with withs, not only because the cords bind faster, which is much to be regarded in places exposed to the wind, but because they also endure longer: this method likewise saves the time of twisting the withs, as well as prevents the damage done to the young coppices in cutting them, and often unseasonably too: if you please, the same person who thatches may also bind on the cords,

Page 87. In winter 1746 we collected all the wormy crust (from our ordinary granaries) which was very thick, the moths having been very numerous the preceding summer: these crusts were broke, and screened, and what grain could be got from it (which undoubtedly was impregnated with the eggs of the moth) was put in one of our granaries which contained seventy-five foot cube, and ventilated from time to time all winter.

About the end of May if you opened the vent-holes at top, a vast number of moths flew out, which shewed they did not like their situation.

In the month of June 1747, the granary was emptied; the moths and worms were all perished, and there was found only a thick crust on the top, of about $\frac{3}{8}$ of an inch thick, and the corn had lost part of the bad smell it had when it put into the granary, insomuch that it sold for the current market price.

Of the W E E V I L:

Page 89. The weevil is of the beetle kind, it devours a great quantity of corn, old as well as new, but does not communicate any bad smell to it, as the moth does; it will endure the heat necessary for kiln-drying, and is numbed but not destroyed by intense cold: they are generally found collected in heaps, which feel very warm, which warmth probably is necessary for hatching their eggs, and if so, they will not be in a condition to propagate their species in our granaries. No smoke will destroy them but that of sulphur, and that gives a bad smell to the corn.

Page 95. In the month of May 1751, we put some weevils into our granaries, and when it was emptied in August 1752, we found none.

cords, which saves one labourer's hire, but it is thought to be better that a labourer should be within-side to bind, because he can do it stronger, which of great consequence.

§. 5. I told Mr. Hillman near Andover that the mice got into my wheat-staffold, tho' it was impossible for them to come up by the staffold.—He asked me whether I did not make up the helm some time before I thatched with it, for, if I did, the mice might very likely be carried into the reek. Of helming long before thatching.

§. 6. It is very good husbandry to top hay or corn-reeks with well wetted helms, that they may be well sparred down, and the spars will then stick well in them; whereas, if you top with dry straw, the top will be liable to be blown off, because it lies loose and hollow, nor will the spars stick fast in dry straw. Of wetting the helm to top reeks.

§. 7. I was thatching my cart-house with oat-straw, it was March the 14th (anno 1703)—my oats not having lain long enough in sward did not thresh clean: the thresher told me, he feared abundance of them would grow in the thatch, and would damage it by rotting after they had grown, and stop the rain from running off, especially if a wet season, which would make the oats grow, should ensue, but, if it should prove a dry spring, they might be malted; said he, had this straw been laid on in winter, the cold would have killed the oats in chitting, and so the damage had been prevented. Of thatching with oat-straw.

M A L T and M A L T I N G.

§. 1. **F** A R M E R Sartain and others skilled in malting do allow, that barley, as soon as it is housed, will work very well, and make very good malt, provided it took no wet in the field, after it was cut, but if it did, they say, it will not work well. Barley as soon as housed will malt well.

§. 2. Mr. Slocock of Newbury, a maltster of long experience, informs me (it having been a dry season for a good while) that the forward barley, which was already cut, and carried into the barn, was dried up with the drought, and would not therefore make so good a malt as that which should be housed after rain: it is true, said he, such dry barley will raise an increase and smell well, and will put forth a beard, i. e. a root, but it will not put forth a spear to run half the length of the barley-corn, and so cannot make good malt, because the hardness of the rind binds up the spear from shooting.—So, it seems, a rain on dry shrunk-barley not only thins the rind, but loosens it also from the flour, that the spear may the better shoot up between. Mixt barley, that is, such, of which some was brought in drier than the other, will

will never make good malt ; it will not come all together ; it is the same with old and new corn.

When sweating in the mow it will not malt. Of the malt-kiln and of changing the water.

§. 3. Barley, when first cut, before it has sweated in the mow, will come as well as afterwards, but whilst it is in it's sweating it will not come at all.

§. 4. Discoursing with Sampson Crefs of Holt in Wiltshire, an observing malster, about the art of making malt, I told him among other things, that I found the lighter the kiln was loaded in drying off a kiln of malt the sweeter the malt would be ; for should the kiln be loaded some six inches deep, neither the flame nor the smoke would pass off well, but the malt would be suffocated with smoke.—He replied, that he believed, if my kiln was choaked with such a thickness, it could not have a good draught, but must be a faulty kiln ; for, said he, a good kiln ought to have such a draught as to roar like waves on a river, or like a furnace under a brewing copper.—Again,—I told him the opinion of several judicious malsters about changing the water in the cistern while the barley is wetting, especially if it be coarse or cold, because a slimy water would run from it.—He agreed, that in the fore-end of the year, before the barley had taken it's due sweating, be the barley never so good, it must be very proper, because the water such barley is steeped in will be foul, and the giving it a second wetting or running of water must needs cleanse it, and tend to the making sweet malt.—In the same manner, said he, it is likewise proper to do by barley wetted at the latter end of the year, towards spring, because, when the weather grows warm, water soaking barley forty-eight hours will grow sour, and begin to corrupt.—The next day I talked with William Sartain of Broughton, and Mr. Whatly of Bradford, Wilts, who are both of them malsters ; they admitted it to be advantageous for the corn in the cistern to change the water at any time, except in the middle of winter, when the weather was too cold.—As to the quick draught of the kiln, and it's roaring (as above hinted) that, they said, in many malt-houses depended on the corner the wind sat in, and on the opening of doors or windows ; that though such fierce fires were best for high-dried malt, yet a gentler fire was best for the pale-dried malt.

Of drying the malt on the floor.

Hill-country preferable to the vale for malt.

§. 5. The two malsters mentioned in the last observation agreed, that you cannot keep barley too backward on the floor, nor give it too much time, in case it neither harles at root nor spear, and that, receiving it's drying on the floor, it would require the less fire and wood.

§. 6. The hill-country barley has a much finer coat, and consequently more flour than the barley of the vale : the hill-country barley will be watered or wetted in four tides, whereas the vale barley

barley requires five, and the hill barley, when it is watered, will in it's coat look as clear as the horn of a lanthorn.—Note, every day is a tide, and every night is a tide.

§. 7. On observing that the straw-dried malt I made at Crux-Easton wanted the fine elegant flavour that was common to such the malt made at Holt, &c.—I discoursed Sampson Crews about it, and he suspected two errors in my method of wetting; first, that the water I both wetted my barley and brewed my malt with was not agreeable, for, if that was wanting in either case, though I might brew very sound drink, yet it would want that fine flavour I complained to be deficient: though, said he, I have a well, yet I fetch my water both for wetting my barley, and brewing my malt from Staverton-river; for pond, or well-water, that is either foul or unpleasant tasted, will want the spirit when made drink of, and he wished me to use chalky water out of my well for both uses, for that is the water, said he, I would use if I had it.—Secondly, it is possible you do not change your water often enough at wetting; for it is common for the first water to come away slimy, like ox-drivel, as you may find by taking up some of the barley out of the cistern, and the water will taint and grow sour, if not changed during the five tides; which will give an odd taste to the malt, or at least rob it of it's flavour; you should at least change the water once, especially in the two warm seasons of making malt, viz. in the spring, and at autumn, for then the weather is warmer than in winter, and will sooner taint; but if you should change the water three times in warm weather, you will find it the better, and you will do well to have a hoghead of water ready to run into the cistern as soon as the former water is let out, because the barley by lying close may be apt to heat.—He said, he finds with him a hoghead of water will wet a quarter of malt.

In the spring, and at autumn, when the weather is warm, he thinks four tides enough, because the water being then warmer than in winter, four tides will penetrate more than five tides in winter.

He said, in case barley would not work well, because it was coarse and cold, he gave it six tides, and changed the water after the third tide; otherwise it would be slimy before it could be flung on the floor, nor would it without so many tides take water enough to come * suant;—therefore, it is a great error in my malster in such case to give barley only four tides, as I have found he does.

§. 8. I proposed to my malster, to wet but three quarters of the barley at a time, that it might have longer time on the floor, lest by wetting more, which would require more room, one heap should press too fast on the other;—but he was against it, said

Of changing the water, and of the choice of it.

Of the quantity to be wetted in proportion to your floor.

said it was best to wet as much as the floor would carry, which was four quarters at a wetting; for, said he, the more outsidés you make the worse the barley will work; [as it stands to reason it should] for the outsidés which lie to the air, never work so well as the inside, and the more heaps you divide your quantity of barley into the more outsidés you make.

Not to heap up the malt, that it may heat before drying.

§. 9. I asked Willam Sartain, whether he approved of the custom of flinging up the malt from the floor into an heap before the kiln, and letting it heat before they dry it; he said by no means; but, said he, it is an old way, and they did it because it's being heated by so doing would forward it in the drying, and save fuel, but it makes it high coloured. Whatly says, it will both give it a higher colour, and make it bite freer, i. e. shorter, but he does not, he says, use it. Sampson Cress says the same, but condemns the practice. It was an old way among maltsters, but they have found it to be wrong. Whatly says,—some used to let it take heat till one might almost roast an egg in it, but surely, says he, that must make the drink apt to turn sour.

Of turning the malt often at spring and autumn.

§. 10. In the spring, and at autumn, the barley will be apt to come rugged, i. e. put forth a single root at a time, instead of pushing forth all it's roots, in a manner at once: this is a fault;—in such case the forwardest root will be apt to draw all the substance of the flour away, and rob the rest, and prevent them from shooting forth, and so you can never have good malt.—To prevent, this inconveniency, you must turn the heap often, and give it air, and spread it thinner, in order to keep it cool; which will check the tap-root from running out so hastily, and give the other roots time to come on; without which you cannot make good malt.

Rules for managing malt in order for brewing.

§. 11. If you are desirous of having your drink in the greatest perfection, I would recommend it to you to have regard to the following observations;—First, to take great care that your malt be well screened, that being never thoroughly done by the maltster; and therefore ought to be done over again by you; for if you keep it, not being exceeding clean from dust, and all manner of foulness, it will in a little time decay and corrupt, and will give an ill taste to your drink, nor will that fine well, but be muddy,—Secondly, to let your malt settle five or six days in the sack after you have ground it; for it will then much better fall to flour, and grow dry, whereas otherwise it will be clammy, and the water will not dilute it.—Thirdly, the older your malt (but exceeding twelve months at least) the better; the time therefore for buying of malt is before any new barley can be threshed out; for after new barley comes to market the maltster will

* This rule contradicted § 19—at least in pale-dried malt.

will be mixing the new malt with the old, but old malt will go much farther than new.—Fourthly and lastly, let your malt be well dried; for slack-dried malt will not keep; for keeping it ought to be well dried.

§. 12. October the 4th (anno 1712) Mr. Hillman, maltster, of Andover visiting me, we discoursed about making malt: Mr. Hillman said, the act of parliament that laid the duty on malt was a general prejudice to it's being well made; for before the act the maltsters used to fling the barley out of the cistern or stone into the floor, and then cast it forward again, that the four water might run off, and then fling it back into an heap, or a couch of only ten or twelve inches thick, that it might lie easy;—but now the maltsters, out of lucre of having the couch measure the less, thereby to lessen the duty, fling the corn out of the cistern as wet as possibly they can, that the weight of it may press it the closer together, and to that end they lay it in a heap or a couch of twenty-four inches high, without flinging it off for the water to drain away, whereby the undermost corn is pressed so dry that it is killed, and never works into malt, but * finnows; and by this means the four water not running off gives the malt a sour and churkish taste, which never wears off.—The damage the undermost barley receives (as above described) from the close pressure of it puts me in mind of the common expression of the countryman, who says, that when barley is first sowed it ought to lie easy, the reason of which he knows not, but observation and experience confirms him in it.—From hence it may not be improper to borrow a hint how to account for the reason of it:—it seems to me, as some creatures, for example amongst the fishes, the eel, or the miller's-thumb, will live with less air than other fishes, so also it is with corn, amongst which some sorts of grain are easily suffocated and choaked, and the vegetable p^{un}-ctum saliens (or heart) stifled for want of a sufficient pabulum of air in it's tender infancy, when oppressed with heavy wet clay; whereas in more porous earth, which lies light, and whereby there comes a freer access of air to the seed, the vegetable progression is supported and carried on in the seed.—I think it may well be made a quære whether barley sowed in a pot of mold, and put into an air-pump, where the air is drawn out, would not rot and finnow, instead of growing,—and whether, if the same experiment was to be made on barley and wheat put into an air-pump, the wheat would not spear out with the help of a less quantity of air than the barley, because we see wheat will grow under a closer, heavier, wetter, and colder earth, from whence the air is more excluded, than barley will do.—Thomas Beckley of Bourn, maltster, says much to the same purpose with Mr. Hillman, and that sometimes the keeping the barley longer in couch

couch than ordinary for the exciseman's coming contributes to the fouring the malt; and the close pressing it in the cistern, by the deepness of it, whereby it lies the harder, hinders it also from coming.

To know when barley is fully malted. §. 13. An old and an experienced honest maltster did assure me,——that if the germen, or the spire-end of the barley, which runs between the flour and the rind, was not as high ascended between the rind as the root-end was put forth, such barley-corn was not fully malted, and that no more of the grain would be converted to flour than as far upwards as the point of the germen ran, and that by biting the grain one might find the difference; for that part of the grain not malted would be hard and tough, and being ground would be fat, dauby, and clammy in the liquor, and would not drink it up.

My maltster sent me malt, which my butler was not pleased with; he said, there were many grains in every handful of it, which were not malted at all, and many grains that were but half malted, of which I might be satisfied, if I made trial in water; for the corn which was not malted at all, would sink to the bottom, and the half-malted grains would swim an-end, like a fishing-quill.——I called for a bason of water to make the experiment, and found it to be true.

Of the increase in malting. §. 14. The maltsters have frequently a bushel and an half increase in the quarter, when they do not screen the coomb well, but in the London-trade there is not above a bushel increase to be had, because for that market the malt must be made very * fine, * knot: if malt be sent to London, and be not made knot, it will heat, and the coomb fall off in sifting, and tumbling it out at the wharf, and then it will not hold out the measure it was sent for, which will occasion dissatisfaction between the factor and the maltster.

Of pale-dried malt. §. 15. I find they agree, that pale-dried malt, if care be taken to give it its gentle heat with a soft fire, may be dried as hard as the highest-dried malt, though generally speaking the pale-dried malt is slacker dried; but in case time be taken in drying it well, they know not why it should not make as strong drink as the high-dried malt, and both the malt and the drink keep as long.

Of wheat and oat-malt. §. 16. Mr. Edwards says, that he has used, and brewed with a bushel of wheat-malt, and twelve bushels of barley-malt to the hoghead to his very good satisfaction.——He also says, that Sir Robert Sawyer used always to put wheat, beans, and oats to his malt.——He likewise says, that a bushel or two of oat-malt to twelve bushels of barley-malt will ripen the drink much sooner; ——and further, that oat-malt and barley-malt equally mixed, as many of the country people here use it, makes very pretty, pert,

pert, smooth drink, and many in this country (in Hants) sow half barley, half oats for that purpose, and call it Dredge.

§. 17. 1696. Fern-dried malt is not of late years looked on to be so good as malt dried with other fuel, though some years ago dried malt it was in vogue, but people soon found their error: it used formerly to yield 2d. in the bushel extraordinary, but now it yields 2d. in the bushel less.—It makes the ale taste maukish.

§. 18. If malt be burnt, the longer it lies by the better it will recover itself, lose it's heat, and look paler: I had some made of malt, that being rashed would have been quite spoiled, had it been used directly, but by keeping it a year and an half by me it was so well recovered, that there was no loss in it.—Pale malt is best to be brewed as soon as it is ground, but the high-coloured malt is better for being kept a while after it is ground before it be brewed, because it is too hard to break to pieces, and molder in it's flour, till the air by being imbibed has loosened it's parts.

§. 19. I find by my own, and the experience of other maltsters, that for brewing drink malt is in perfection about three weeks or a month after it is made; for by that time the fire will be out of it, and it will then be fullest of spirit; whereas the more it slackens afterwards the more the spirits go off, and with them the strength of the smell abates, as may easily be perceived.—Therefore, though malt takes least damage kept in a great heap, yet I find they all agree, that one had better make October drink with new malt than with old, because, if both years barley be equally good, the new malt will brew stronger drink than the old, but this more especially holds in pale-dried malt, because it may so happen that high-dried malt may be so scorched as not to be mollified, or have the fire enough out of it for brewing till many months after it's being made, and by long keeping that suffers least.

They hold that it is more profitable for the maltster to sell old malt than new, because, before it is slacked, and while but newly come from the kiln, much more goes to the bushel.

H O P S.

§. 1. **M**R. Perdue, the greatest hop-merchant in Winchester, says, he sets his hop-hillocks at double the distance others generally do, and that he is sure he is a gainer by it; for others set a distance.

* Our author having but few remarks on hops, they, who desire information in this particular, may consult Mr. Miller's Dictionary, under the article Lupulus, where they will find a full account of this plant, with several curious experiments made by the Reverend Doctor Hales.

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thereby

thereby in poles, and otherwise, he is but at half charges, and has as good a burden of hops as other people; for the sun having power to shine through the poles, and to strike it's heat to the bottom, brings blossoms from the very bottom, the sap being checked and dried up by the sun, whereas, when the poles are set thick, the hops carry blossoms only at the top.—*Quære* whether the same reason holds not, for setting beans thinner.

Ofchoofeing hops. §. 2. Hops that feel clammy are the best; therefore may be chose in the dark.

Of the hop-feed. §. 3. The true virtue of the hop lies chiefly in the seed, and not in the leaf, which but few understand; they choose the hop by the colour of the leaf, whereas the brightest leaved hops are the worst sort, because they are not full ripe, and consequently were gathered when the seed was in the milk, whereby it shrinks to nothing; but the hop in perfection has a nut-brown leaf, and it's seed being full ripe has a good pith; which is what gives the grateful bitter, though the generality of people are ignorant of this.

Of hop-poles. §. 4. Hop-poles for the second year ought to be sixteen foot long, the first year wanting none; the third year they ought to be twenty foot long; after that twenty-five foot, and never longer.—If the girt of a twenty-five foot pole be eight inches at the butt-end, it is reckoned a compleat pole: ash is better for poles than withy by five shillings in the hundred, in the twenty-five foot poles.

G R A Z I N G.

Jews skill- ed in the manage- ment of cattle. §. 1. **I**T seems to me (as before hinted) that the Grecians, Romans, Phœnicians, &c. derived their husbandry from the Jews; for it is not to be supposed but that Abraham, Isaac, and Jacob, and his sons, who were such wise persons as they are recorded to have been, and so conversant in cattle, must be excellently skilled in that branch of husbandry. See Gen. xxxiv. 5.—And that Jacob's sons were wise persons may be seen by their conduct before Joseph their brother.—That Moses, who was so excellently skilled in all the learning of the Ægyptians, and afterwards kept his father Jethro's flock forty years, must by means of his advantages in education have made vast discoveries in the nature of cattle is most certain, and what converse the patriarchs had with all the eastern nations, whereby those nations might be informed, is well known.

Antiquity of this branch of husband- ry. §. 2. Doctor Patrick in his comment on Gen. xxix. observes that Rachel's name in Hebrew signifies a sheep.—And Varro derives many antient families from the names of cattle. Lib. 2. c. 1.

c. 1. De re rustica.—And lib. 1. fo. 29. he says, the pastoral care was the first employment in the world, and that agriculture came in of later years.—It seems indeed that those names, that honourable families antiently assumed to themselves, were borrowed from the names of cattle, as thinking the pasturage of them more profitable than tilling the ground;—and we find of Jacob, notwithstanding his flocks were so large, that yet his provision of corn was but from year to year; for in the second year of the famine in Ægypt he wanted corn, so that it seems he thought it more profitable to trade in cattle, and their fleeces, than to go to markets with corn.—It is to be observed that Rachel kept the sheep, as being an honourable employment, not but she had others under her as assistants and servants.—GOD himself is named the shepherd of Israel: sheep-shearing, not reaping of corn, was their greatest festival. See Patrick, fo. 506.—In the hot countries it appears, that their custom was to bring their flocks to wells, and into shades, to drink in the heat of the day, and, when that was abated, to drive them to feed again, as appears from Genesis xxix. 7.—It is yet high day, &c. See Doctor Patrick's Comment; and Cant. i. 7.—and Palladius in his Calendar says, that the cattle used to be drove out to feed in the summer evenings, when the dew first began to fall, so that then they used to tend their cattle late, and the morning dew was also taken by them, which, and Virgil's saying, *Et ros in tenerâ pecori gratissimus herbâ*, is contrary to our practice, and see Varro, l. 2. c. 15.—Notwithstanding however what may have been conjectured by various writers, and the preference given by them to the pastoral charge, in regard to it's antiquity, it is plain from Genesis iv. 2. that and agriculture were near of the same date, for Abel was a keeper of sheep, and Cain, the elder brother, a tiller of the ground.

§ 3. Mr. Brown, in his *Vulgar errors*, fo. 41. observes, that, Of the colour if sheep have any black, or deep russet in their faces, they want lours of not the same about their legs and feet;—that black hounds have cattle-mealy mouths and feet;—that black cows, which have any white in their tails, do not miss of some in their bellies, and if all white in their bodies, yet, if black mouthed, their ears and feet maintain the same colour.

§ 4. That Jacob's sheep brought forth speckled lambs, on Of party viewing the rods at the time of conception, is imputed by Patrick coloured to the divine will rather than to the force of imagination; yet he cattle owns, that St. Austin, and some others, imputed it to the operation of natural causes, and alledges the like thing done in Spain between horses and mares.—Lord Pembroke told me, it was common in Spain to cover a mare with a Turkish carpet, and to lay another before her, when they brought the stallion to cover her.

her.—I have also observed, that it is a common expression, on seeing a party-coloured horse, to say, “He was begot on a common :” it being supposed, that there the mare might, at the time of conception, have several different coloured horses in view.—But no wonder that these arts are not mentioned in the *Rei rusticæ* scriptores, they not being practised by the Romans; for their endeavours were to avoid party-coloured breed, either in sheep, horses, or horned cattle; for which reason they would not keep such cattle of any sort, of either sex; and it seems to me, that Jacob proposed to Laban the ring-streaked, spotted, and speckled cattle for his hire, not only as unlikely to proceed from the white cattle, but also as the cattle of less value than the white cattle; for in these countries, as has been before remarked, they did not affect cattle of medley colours, and, as it is likely, because they thought those cattle of the worse natures, as not having been created so from the beginning; all cattle at first being of one colour in the same individual, as black, white, red, &c. and the mixture of colours whereby their natures are weakened, arising from the copulation of males and females of different colours.

Cattle in low case not to be put into rich land.

§. 5. The stronger and richer the land is, the more must cattle be kept up to a good pitch; for, if on such land cattle are in the winter suffered to run to poverty, or are brought into it poor, they'll be liable to the yellows, and the blain, and most sort of distempers; for it is the same as if you should offer strong meats to weak stomachs, or to persons in a low estate of health.—It was agreed by farmer Chivars, farmer Harding, farmer Earle, and farmer Stevens of Pomeroy (notable Wiltshire dairy-men) that cattle in good case, and in heart, would for a little while feed on the coarsest fodder, be it straw, or hay, which cattle low in case would starve before they would touch, and therefore such cattle have the weaker stomachs.

Observation on Virgil—
Et ros in tenerâ, &c.

§. 6. Great cattle choose to feed with their heads from the sun both morning and afternoon, feeding a different way in the afternoon from what they did in the morning.—Our cattle in England seem not to care to feed among the dew in the morning before sun-rise; but like to stay till the sun has began to warm it; so that it seems, the saying of Virgil,—“*Et ros in tenerâ pecori gratissimus herbâ*”—should be understood in England of the dew after sun-rise; perhaps in Italy, where the days are so hot, and the grass in the day-time roasted with the sun, the cattle may like to lick up the dew early in the morning, and doubtless in England our cattle vary much in their hours of feeding between summer and winter.

Cattle choose the highest ground in hot weather.

§. 7. I observe in the hill-country, that in summer-time cattle covet to pasture on the highest part of the field, for sake of air, and go not down to the low part of the ground to feed, it lying

lying close from the air, till towards the evening, when the bottom of the field is also cool; the oxen likewise, which come from the plough, and are hungry, will go up to the height till towards sun-set, though that part be very bare of grass.—My shepherd said, on a certain day, that he would drive my sheep into the road on the waste to feed, because the day was cool and airy; for, said he, if I drive them thither in a hot sultry day, they will not feed, but will lie in the rutts.—The reason for their doing so, as I conceive, is, because they find great relief by the stream of air which runs along the rutts, as in a channel, when perhaps no motion of air is sensibly to be perceived elsewhere.

§. 8. When cattle in summer-time go late to shade, and come out from shade earlier than ordinary, to go to feed, it is a shrewd sign from their commons grow short. Sign from their going to feed.

§. 9. Large cattle will taint poor ground with pasturing on it, and will make mamocks, that they will leave and not eat; when at the same time in rich land, and a good pasture, they would eat up all the grass clean; and that this should be so stands to reason, because, at best the poor ground not being very toothsome, a little addition to it of unfavouriness, by pissing or dunging, will occasion the cattle to forsake that part, especially about June, when poor ground begins to fall off from growing; whereas in good sweet ground the taint does not near so much overcome the sweetness of the grass, and for variety's sake it may be pleasant and grateful to the cattle, there being still a considerable degree of natural sweetness left to recommend it.—In poor grounds, such as hill-country-downs, the sheep will feed them down close, notwithstanding the ill favour of their tails: the reason for the sheep feeding them so bare and close is apparent; for, where-ever they lay their tails, there is time for such part to out-grow the taint, the grass being always kept young, and tender, and in a springing and growing condition, which is not the case in poor hill-country ground set apart for pasture for great cattle, which must therefore be hained, so as to be raised to a good bite; for the grass that may be tainted in such pastures is of a good length, and the greatest part that is above ground is tainted; when great cattle therefore are forced to eat it, they may be observed to walk along biting the tops of it, that is, such part as has grown up since the taint.

§. 10. In case you design the feed of the second year's broad-clover for your cows and horses, as not having provided new broad-clover for them, of one year's growth; such second year's broad-clover, designed for the support of your cows and horses, ought not, in our hill-country, to have been fed the first year, but with cows, and a few horses; for if such ground be fed

with sheep the first summer, it will much damage the produce of the second year; because they will wound and bite into the roots of the clover.

Cattle fed in broad clover need little or no water. §. 11. It had been a very dry and burning hot season for six weeks, during the latter part of April, and all May, (anno 1702) and I had an hundred sheep and three beasts fattening in broad-clover: I often thought my servants had neglected to drive them to water; for they had no water in the pasture: so, not trusting to my servants, I drove my fattening cows myself, in the evening, to water, but could not persuade them to taste it, neither that day, nor the next; I also drove my sheep to water, and waited patiently on them half an hour, but could not persuade them to touch it.—I observed the dung of the sheep to be very moist, and fat, and pappy like cow's dung; whereas, when sheep feed in other grass, they are naturally very dry, and costive; from whence I infer, that the leaves and stalks of the broad-clover being so juicy, no cattle need so much water with it as with other grass, if they may not even do without any at all.

Of cattle swelling in broad clover. §. 12. Farmer Miles of Holt assured me, that about them, in Wilts, oxen and cows were in great danger of being swelled by being put into broad-clover, whenever any rain came, though it was dry when they were put in: they had also, he said, in those parts, lost sheep by putting them into broad-clover, and into green wheat likewise, in the spring.—I said, I had this spring (anno 1720) fed my wheat down with my flock, by putting them in for two hours in a morning, after they came from fold; and I had found no hurt by it.—He replied, he supposed that would do them no harm, but what harmed them was keeping them in longer, and letting them lie down.

Of letting out the wind from a beast swelled with broad clover. §. 13. A farmer in my neighbourhood had like to have lost several oxen this year, (1720) by putting them into broad-clover, though he watched them: one of them being so much blown, that he thought he could not be saved, the farmer ignorantly struck the bullock with his pen-knife into the hollow place under the free-bone, under the loin, which was wrong, and the bullock died; whereas, he should have taken a pair of strong pinchers, and in that hollow place have taken hold with them on the bullock's hide, and have pulled it from the flesh with all his strength, and then have struck his pen-knife into the hide only that he had loosened, and not into the bullock's flesh, whereby his guts were hurt, but, instead of that, should have run it in between the hide and the flesh, and a wind would have issued out strong enough to have put out a candle.—In case a bullock, not thus blasted, has a blain, do the same thing, by lifting up the hide in the same place, and then make but a small orifice, so as to thrust

thrust in a pen-knife only, and a great deal of wind will issue out.

I was speaking afterwards to an old experienced farmer on this subject, and he said, he had not in thirty years time lost a cow by broad-clover, nor did he think it more dangerous than other grass, unless cattle came hungry to it out of the straw-barton, or were very poor in case; for then they would know it unreasonably, and it was very gross and windy; but cows, that had the same spring been first in other grass, would not be very greedy of-it, nor would, in that case, over-fill themselves; for they will eat any grass of the field before broad-clover.

I believe broad-clover is not so apt to hurt cattle on our dry hills as on the deep lands.—I also believe, the thicker it is sowed, it is the less apt to hurt, because it runs the finer.

The reason, as I conceive, why broad-clover is apter to blow a cow than a horse, is, because a cow licks it in with her tongue at a greater length, and swallows it larger than a horse does; for he chews it more, as not chewing it over again as the cow does in the cud, and so it goes first down into the cow's stomach more gross, and with less of the salival juice to correct it than that which the horse swallows down has.

Another farmer of my acquaintance in Wiltshire had two beasts died with the rise of grass, by putting them into the after-mass of his mead, which was very luscious, it having had a mighty quick growth, occasioned by warm rain; and his cattle having for some time fared hard, they eat so greedily on their being first put into the aftermass, that they quite choaked up their first stomach, called the fardingbag; for, upon opening the cows, that stomach was found full of raw indigested grass.

Mr. Bachelour of Ashmonsworth, and farmer Crapp, and farmer Biggs discoursing upon broad-clover, farmer Biggs said, by mixing it with hop-clover, he had never lost a cow in his life; and so said farmer Crapp.

§. 14. The summer, anno 1717, being showery, the hop-clover came up thicker than ever I knew it, and grew to that height among the barley, as, at harvest, to flower; and we were forced to turn the barley-swarths, on account of the great quantity of hop-clover that we unavoidably cut off by the scythe with the barley.—I hoped therefore that so great a bite of hop-clover, as my fattening oxen might have after harvest, would bring them forward, they being well advanced in flesh before; and the hop-clover being sweet, I had great expectations from it; but for a fortnight I could only keep my oxen to hold their flesh, and then for another fortnight I found they lost flesh, though the bite of the clover did not so abate, but that it seemed thick enough to support them: my working oxen also filled themselves very well

for near a fortnight; but when the head of the hop-clover was taken off, they fell off their flesh.—My ox-hind said, the cattle were forced to pull up so much of the barley-stubble with the grass, that it greatly abated the goodness of it. From hence for the future I may learn experience, and know how far I may depend on such hop-clover for fattening my working oxen.

Cows, sheep, and all sorts of cattle, will choose rather to feed on broad-clover, if it be kept down pretty close, than on hop-clover, when it has once run into flower; for of the two hop-clover is the bitterer.

What
grafs best
to fat cat-
tle in Sep-
tember
and Octo-
ber.
Of win-
ter-rowet,
&c.

§. 15. My ground will almost fat cattle in spring, when the saps are flush; but it must be the aftermaths of good ground only, when September and October comes, that will support a bullock, and carry him on when near fat: the poverty of grass at that time may be seen by its dying away, or losing its colour: then such grass is lost on a bullock.

§. 16. Mr. Biffy (my tenant in Wilts) a very experienced grazier, was telling me, how much a beast would thrive with his winter-straw, in case he had the liberty of going abroad, and, besides his straw, picking up some winter-rowet, which would give him a better stomach to his straw.—I replied,—I found that by experience; but our hill-country-meads contained so few acres, they would not afford much winter-rowet; but, said I, though rowet, which is of a deadish nature, and afforded the cattle little better than a change only, made the straw more grateful, yet I observed, by giving them with their fodder a taste of the first spring-grass, which was luscious and gnash, nothing would sooner wean them from, and take them more off their stomachs, not only to straw, but to the best hay also; and therefore I carefully kept them from such grass.—He replied, it was, generally speaking, very true; but yet that their spring-grass beasts would (before the quantity of grass was sufficient for a maintenance wholly thereon) eat heartily of straw or hay, early in the morning, and whilst the dew was on the grass; for in the spring the cattle do not care for such grass early in the morning, nor till it has been warmed by the sun, and the dew taken off it; because such grass is very cold by the wet lying on it, and the juices are then as yet unconcocted, and you may see the bullocks, at such time, stand under the hedges, forbearing to feed till the dew is off.—All this seems very reasonable, whereas on the contrary, in the summer-time, when the crudities of the grass are taken off, all cattle are more desirous of feeding in the mornings and evenings, while the dew is on the grass; in which sense only Virgil is to be understood, when he says,—“*Et ros in tenerâ pecori gratissimus herbâ.*”

§. 17.

§. 17. I lopt several pollard-oaks this-spring (anno 1705) whilst Oak buds in bud, and let the loppings lie, in order to be faggotted: the poison to beasts of the common came and browsed on them, and the oak-cows. buds killed five of the udder-cattle; see therefore and prevent such evil for the future.

§. 18. I was telling my ox-hind, I doubted some weanling-Calves calves I had wanted water.—He said, that was easy to be seen; will not for, if they suffered for want of water, they would not fill them- eat if they selves, though there was never so much grass, but would look want wa- mighty hollow and thin, and go about bleating. ter.

* Varro advises to water cattle twice a day in the summer and once in the winter.

This winter (anno 1718) I was fully convinced of the great advantage it was to cattle to have water at command in their foddering-yards, so as to have recourse to it when they pleased; for the cattle in my cow-yard, where they have no water, (but when they are drove to it, and that but once, or at most twice a day, and sometimes are neglected, or drove unseasonably) were in general much more out of countenance, and leaner than four or five cows that the parson joisted for me, and which fed on the same straw, it being the tythe of my farm.—The difference lay only in this, that his cows went when they would to the pond in his yard.—Gentlemen-farmers, having so many irons in the fire, ought to depend as little as may be on servants, but should provide such conveniencies as may, as much as possible, answer the same ends, without the care and trouble of servants.

I wintered this year (1719) twenty two-years yearlings in the French-grass, where they had also the running in the woods, and were foddered in the straw-house, and thus they lived very lusty till March, when, the rowet being gone in the field, and the bud beginning to swell in the coppice, I was forced to remove them, and bring them wholly to straw; I was afraid they would have been much pinched, their rowet being gone, and losing their range, and being confined to the backside; and for three or four days they seemed to look hollow; but then they filled again, and did very well, and I do not a little impute their doing so well to their having plenty of water at command, and to the warmth of the yard: I note this, that I may not fear the consequence in such another year.

§. 19. Stalled-oxen, if tied up to the house, which is close, Stalled have been found of late years (since 1705) not to hold to their oxen not stomachs so well as when one side of the house is open, like a too be kept penthouse; because, when an ox grows fat, he is naturally very too close. hot; therefore it is best to have the sides of the fatting-houses open.

* Boves æstate ad aquam appellendos bis, hyeme semel. Var. fol. 56.

open.—In yoking-time, whilst they plough them, if they slip a cord, they never fight, but when fattening, it is likely they may.

Of house-
ing cattle. §. 20. Farmer Elford of Dorsetshire says, that cattle, which are used to be housed on nights in winter, will be tender, and expect it, and will in winter fall away in their flesh if they have it not: therefore he, not having the conveniency of housing them, takes care not to buy a cow, if he perceives she has been used to be housed.—I asked him how he could perceive that by a cow in a fair; he said, very easily; for such a cow would have the hair of her sides towards her tail clung with dung; which they, who bring her to market, cannot get off without great difficulty; the hair will sooner come away than they can separate the dung from it.

Cattle in
proof
require
strong
bounds. §. 21. Poor cattle may be kept to their good behaviour by slight inclosures; but by experience I find, that cattle well kept, and high in proof, must have very strong bounds, else, when they rise in case, they will soon break through, especially if they want water, or take a dislike to their pasture.

A clog for
cattle. §. 22. The annexed figure represents a clog to hang at the bottom of a yoke or shackle, to prevent a beast from leaping; it may be increased according to the bigness of the beast.



c, the hole through which the shackle comes.—b, eighteen inches.
—a a, three foot long.

Of bells
to hang
on cattle
when
turned
into the
woods. §. 23. Being to send five yearlings to the coppices, that I might hear whereabouts they were, I was to put on bells; so I bid my wood-man get withs for the bells. He said, by no means; for a with would be apt to gall their necks, and the flies would blow the sore places; and, besides that, withs would be apt to hang in the bushes; but a good strong whitelather collar would do very well; but, said he, an iron collar, made of a smooth plate, is better, and will not gall, and the bell will sound much better than either with a with, or a whitelather collar; because the iron collar holds the bell off from resting on their breasts; whereas, with the other collars, the bell lies on their breasts, whereby the sound will be deadened.

F O D D E R I N G.

§. 1. **I**N the foddering-yards of back-sides, or other out-houses, Of convenient partitions in a foddering-yard. constantly used, has great conveniencies in it; one of which is, that in them you may dispose of a two-yearling cow, or another cow, at the time of bulling; not only to keep them from a bull, but from the other beasts also, that would be leaping such a cow, whereby they may hurt each other, &c.—Especially cows forward with calf will be apt to warp by leaping a bulling-cow.

§. 2. The open winters make hay the dearest, if a hard frost and snow come at the forehand of them; for if cattle once to fodder, they must be held to it, or they will receive great damage.—In washy weather all the hay one can give to cattle will not make them thrive, but in dry frosty weather they'll thrive with their meat.

§. 3. I am assured by a farmer of Woodhay, in my neighbourhood, in the vale that there is abundance of hay there so four and rushy, that it is not so good for cattle as straw in a good year, and he has known cattle grow lousy on such hay.

I was telling this to another farmer, and he said, it was true, and that such fodder ought to be given to cattle but a little at a time, so as not to cloy them; for, if they should be once cloyed with it, they would starve rather than feed on it.

§. 4. Anno 1704, I let my cows go at large from their foddering-yard, during the winter, and so on till April, when they picked up some grass; and those that had calved I baited with hay: the consequence of which was plainly this, that by April my cows would not stand to eat any straw at all, but were, during the months of March and April, so weaned from straw, by baits of grass and hay, that they fell off from their straw quite, and grew much leaner, and worse in flesh than they had been, and apparently worse than the farmer's cows, which were, after the winter months, wholly pent up to their straw, and to the pond.

§. 5. All sorts of cattle that chew the cud, as sheep, cows, &c. care not to graze after each other, nor to eat one another'savings in the foddering-yards; but cattle that do not chew the cud will eat after those that do, and vice versa.

§. 6. * Pliny tells us, where hay was scarce, it was usual to feed their cattle with chaff and barley-straw. Of chaff, says he, that

* Ubi fœni inopia est, stramento paleam quærunt, hordei stipulam bubus gratissimam servant:—Paleâ (chaff) plures gentium pro fœno utantur;

is the best sort, which is the thinnest and smallest, and nearest to dust; the best therefore is from millet, the next from barley, and the worst from wheat, except it be for hard labouring beasts.

Cattle must not be sent from the foddering-yard, in the hill-country, till the middle of May.

§. 7. On sound experience I am convinced, that in our hill-country we ought not to have any dependance on sending our cattle out of the foddering-yard to grafs before the middle of May, and therefore we ought to be provided with winter-fodder for cows accordingly; for this year (1720) there was a very wet spring, and it continued so throughout March, April, and May, and yet the natural pasture-grounds did not afford a bite for the great cattle till the middle of May; indeed the hop-clover might be fit to support them a fortnight sooner; but it is a hard matter, tho' one should have a good stock of that grafs, to get the shepherd's leave to hayn it from the sheep for that end, he stands so much in need of the hop-clover grafs for his sheep, from the middle of March to the beginning of May.

To fodder early in winter mornings.

§. 8. At the beginning of winter, suppose the latter end of October, and a good part of November, while cattle still continue out in the field at grafs, it is very necessary to fodder them early in the morning, while the hoar-frost hangs on the grafs, which they will not eat kindly of till the sun has warmed it.

Of racks.

§. 9. The stradling racks are best for foddering, if made strong enough, i. e. so as not to be overturned; for these racks may be lifted up as the dung mixen rises, which those fixed in the ground cannot be.

Cribs better than racks in the hill-country.

§. 10. It is a practice in many places, especially in the vale, to tie their cow-beasts up to a rack to fodder; but if one rightly reflects on the places where it is done, we shall find it only used where the fodder is good, being either hay, or very good straw; but in the hill-country of Hampshire, where the cattle have straw-fodder only, and that not so good as the straw in the vale, the custom is to fodder their cows in racks, or cribs, in the open yard, which they think better than tying their cattle up to racks in houses; for tho' in cold and rainy weather the houses may keep their loins dry, yet in countries where the fodder is coarse, especially after wet and backward harvests, when the spirit of the straw is washed out by the rain, the giving cattle straw from racks, from whence they cannot pick and choose, as from cribs they may, is judged to tend to the impoverishing the cattle, whereas in cribs they can pick the sweet from the coarse.

Asking a great grazier in Somersethire, in what method he fed his fattening beasts, he told me, he thought it was best for them to reach up to a rack.—I said, I thought not, because reaching
and

utuntur; melior ea quæ tenuior, minutiorque et pulveri proprior, ideo optima e milio, proxima ex hordeo, pessima ex tritico, præterquam juventis opere laborantibus. Plin. lib. 18. c. 30.

and hawling might give frequent qualms to the stomach of a fattening-beast, especially when near fat.—He replied, he did not know but it might; yet if you give them their meat from under them, they will blow upon it, and spoil half of it; so that, if their meat be given them from under them, it ought to be given to them so little at a time, that their breath may not taint it.

§. 11. My shepherd assures me, that my sheep and other cattle will not eat my spring-vetches made into winter-fodder so well as they will the winter-vetches, the halm of the latter having, he says, more strength and spirit in it than that of the former, the halm of which is loose and woolly.—This seems very reasonable to me, for the halm of spring-vetches, and the straw of rath-ripe corn of all kinds run in a parallel, as white, and black oat-straw, rath-ripe, and late-ripe barley-straw, and I believe the same may be said of rath-ripe peas-straw, and great partridge peas-straw.

Rath-ripe
straw not
so good
fodder as
late-ripe.

Several farmers in my neighbourhood have affirmed to me, that the straw of the Patney barley, otherwise the rath-ripe barley, was hollower, and not so good fodder as the other; but farmer Farthing of the Isle of Wight assures me, that his cattle eat his white oat-straw better than his black; and Mr. Smith of Bishop-Canons tells me, that his cattle eat rath-ripe barley-straw better than late-ripe; so that it seems, the straw of those countries runs finer than ours, their land better agreeing with the grain.

§. 12. There is a manifest difference in cattle's eating their fodder, when fresh threshed, and when it has been threshed too or three days, especially if the straw be but indifferent, and coarse fodder.—I have been often sensible of this, but more particularly this year (1719) in foddering with peas-halm, when the cattle eat it very well all the week days, while it was given to them as fast as it was threshed, but some, that had lain all Sunday on the floor, they eat but indifferently on Monday; and the more so, because a dry cold wind had blown on it through the crevices of the barn-door.—This also the man, who threshed the peas and gave the straw to the cattle, said was manifest to him.

Cattle pre-
ferred to
fer straw
that is just
threshed.

§. 13. It is said, the longer the halm of the corn is the worse it is for fodder; the shortest straw makes always the best fodder.

Short
straw pre-
ferred to

§. 14. I asked farmer William Sartain, of Broughton, Wilts, his opinion of oat-straw to fodder cattle with. His opinion was, that it ought not to be given frequently to cattle for fodder, but only a little now and then, by way of change; for, he apprehended, there was a roughness or harshness in that straw, which made the gums of beasts, or the roofs of their mouths sore, and said it was the opinion of many that it set their teeth on edge.—But whatever was the cause, or howsoever they were affected, certain

ferred to
long.
Oat-straw
bad fod-
der, and
why.

certain it was, that after cattle had been held to oat-straw a while they went off their stomachs, nor would they heartily fall to other straw, nor even to hay after it.—Another farmer afterwards in discourse affirmed it was disagreeable to cattle, and ought not to be given to them too often, nor too much at a time, and he thought that it's toughness might loosen their teeth by the strength they were forced to use to chew it, and so it made them unfit to masticate other meat for some time afterwards.

Barley-
straw of
seed sowed
on one
earth bad
fodder.

§ 15. Farmer Biggs and farmer Crapp visiting me, the former said, he doubted his fodder would fall short, because he had sowed so much of his barley on one earth, and his straw was much the worse for it.—Neither farmer Crapp nor I could well apprehend that: but, said he, the man who threshed for me told me, that he had observed it to be so.—I afterwards asked several farmers and threshers concerning it, each apart: they seemed to be at a loss how it should be;—but at last I found one, who readily replied, he had often heard it accounted so, and that the straw of such barley was much deader than that of barley sowed on two earths, and that it would starve cattle, if held long to it.—I can conceive no reason for it, except it is because barley sowed on one earth is generally sowed on poor, light; or white land,—and so the straw cannot be fed with so much sap and juice as otherwise it might be, and therefore may be drier at harvest than the straw of corn sown on richer land, and which in it's own nature may require two earths.—An old labourer of mine agreed with Biggs's thresher, and said, he could tell one-earth barley from that sowed on two earths by mowing it;—but I could not learn how.

Peas-halm
for fodder.

§ 16. Mr. Smith of Wilts assures me, that, amongst them, they give not barley-straw to their horses, but peas-straw, if it be anywise well housed, and that they always look on the great partridge peas-straw to be better fodder (*cæteris paribus*) than the small partridge peas-straw. This I mention here, because I have above noted, that rath-ripe straw of all kinds is worse fodder than late-ripe straw is.—Mr. Smith also says, if their beans are well housed, they give their horses bean-straw, and they eat it very well.

When peas-halm has fallen all along on the ground, and laid for some time, as it may sometimes do, till the grass shall grow thro' it, such peas-halm is not fit for fodder, the leaves being in a manner rotted off, and the halm is only fit for dung.

Thistles
used for
fodder.

§ 17. If thistles are cut young, when they are withered the cattle will lick them up, though, whilst they are green and growing, they will not touch them.

Elm-
leaves
good fod-
der.

§ 18. Elm-leaves gathered green, and suffered to dry in the sun upon the branches, the spray being stripped off in August, will prove a great relief to cattle in winter, or in scorching summers, when

when hay and fodder is dear; the cattle will eat it before oats, and thrive exceedingly with it; but you ought to lay these boughs in some dry place, to prevent their mustling.—In some parts of Herefordshire they gather elm-leaves in sacks for their swine and other cattle: but some say, they are ill for bees, in that they surfeit of the blooming seeds, which make them obnoxious to the lark, and that therefore they do not thrive in elm-countries. J. Mortimer, Esq; F. R. S. fo. 333.

§. 19. In winter an ox will pay better for his hay, and thrive faster than a heifer, tho' her calf should be young within her;— therefore 'tis more profitable to winter oxen than heifers.

More profitable to winter oxen than heifers.

FATTING of CATTLE.

§. 1. **T**HOUGH grafs of a middling goodness may raise a beast to be half fat, yet such grafs, tho' the bite be never so deep, may not be able thoroughly to fatten him, but he will stick there, or mend but very little; for tho' a lean beast will feed greedily till he is half fat, yet afterwards he will grow nice, and require to be tempted with sweeter meats; otherwise he will not feed beyond hunger: therefore persons ought to consider their land, and have a care how they resolve on fattening of cattle, because they think they have plenty of grafs and a good bite.—Nor does it follow, because French-grafs, hop-clover, or rye-grafs will fat, that therefore such grasses when they grow on poor ground will do the same, though the cattle may have a full bite; therefore such ground ought to be applied to the breeding of cattle.

Grafs, tho' plenty of it, from poor land, not good to fat oxen,

§. 2. Dr. Sloan says, fol. 84.—The true way of fattening cattle, as I was informed by the graziers of Jamaica, is by bleeding them in the jugular vein, (which will stop of itself) and then purging them with aloes, or sempervive-leaves cleared of their outward skins.—Much the same method is often used by some graziers in the north, especially if their grounds raise a bullock very fast, as I suppose the land in Jamaica may do.—Dr. Sloan says, the less nourishment the grafs affords, the bigger the paunches of the beasts that feed on it; so that the bellies of cattle, in dry times, in hot countries, are as big as if they were with young.—It would be the same with all sorts of cattle in England also, if you starved them.

Of fattening cattle in Jamaica.

§. 3. I was saying to Mr. Bachelour of Ashmonsworth, that I approved of cutting a young bull before his being put to fattening; he seemed to wonder at it, and said, that he, and all the neighbourhood used to fat a young bull without gelding him, and they supposed, except he was not fatted till the next year, he would fat the better for it, and he was sure it was so of a ram, and to keep him till the year after would not pay charges.

Of fattening a young bull.

§ 4. In

Of fattening a bullock. §. 4. In fattening a bullock in Hampshire in the winter, they use, by the latter end of October, when the goodness of the grass is gone, whereby he became half fat, to give him hay, and then to finish him with corn and hulls; but they ought to be wheat-hulls; those are much the best; and it is much better to give him threshed corn than oats in the straw; for of them he will make great waste.

There is nothing cheaper to raise a fattening bullock with, than ground-barley mixed with chaff.

Of fattening a heifer with a new-made ox. §. 5. A Wiltshire grazier shewed me a three-year-old bull in January 1698, which he had gelled a fortnight before Michaelmas, and had then in fattening, along with a heifer, for, he said, they would fat more kindly together, and it would very much improve their meat. His way was, to drive the new-made ox and the heifer to house on nights, and there give them their supper, and in the morning their breakfast, and then let them out to fodder with the milch-cattle; for keeping them warm in the cold nights did much favour their fattening.

Time of buying in lean beasts. §. 6. About the beginning of November, when it may be supposed the graziers have disposed of many of their high-fat oxen, and the plough-man has sowed his crop of wheat, and casts off oxen, then will the markets be open for lean oxen, which the graziers buy to eat up the *oughts, and rowety grass the high-fat oxen had left; and then with straw or hay they keep them in a thriving condition till spring, when they begin to fat them; but from the beginning of November to the middle of December is the chief time of selling them.

Quantity of hay a stalled ox will eat. §. 7. A stalled ox in the winter, if he be kept to hay only, will eat at least a load every two months.

How long an ox is in fattening. §. 8. I asked Mr. Biffy how long an ox would take to be fat; he said, a good ox must be in good case at May-day, when he is put to grass to be fattened, if he is designed to be got fat by All-hallow-tide, which is about six weeks before Christmas; nor will he be fat then without some hay: but, if any grazier should order his grazing so, as not to get his oxen fat by that time, but must be haying all the winter, — unless beef be at three-pence half-penny or four-pence per pound, he can get nothing by it. — I asked him how then it came to pass that we had any ox-beef in the markets at the latter end of winter; he said, some people were no wiser; but there were often beasts put to fattening, that would not be fat so soon as others, and some people over-stand their markets by setting themselves a price, under which they will not sell, hoping beef will be dearer, and at last are forced to sell; then there are cows that come in with-calf unseasonably, and they must be fattened, be it when it will.

§. 9. Farmer Lavington of Wiltshire says, that a heifer, that has never been bulled, will not take fattening so well as if she had; but if she has had a calf, or has warped, she will fat very well, though not bulled, when she was turned to fattening.—But Mr. Clerk of Leicestershire says, it is not safe to trust to her fattening without having her bulled.

Of fattening a heifer that has not been bulled.

How soon

§. 10. I asked Mr. Clerk how soon a calf would make beef; he said, a cow-calf would make very pretty beef at three years old, but, if killed sooner, they called it bevifs; nor would an heifer prove in fat till that time, not being past growing; for which reason steers will not be beef till four or five year old, because they will be so long growing; therefore it is only profitable for those countries to fat steers that plough them.

a calf will make beef.

§. 11. I had an old black cow brought a calf in the beginning of July, the cow being high in case: the question was, whether I should keep her over the winter, for sake of her winter's-milk, she having calved late in summer, or should make the best could of fattening her, she being well in case. So I asked the farmer's wife, if such a cow, being old, would give milk all the winter; she replied, according as she should take bull; the sooner she took bull so much the sooner her milk would dry up.—Now she, being high in case, would soon take bull; so I looked on myself as answered.

The sooner a cow goes to the bull the sooner her milk dries—therefore to be fattened.

§. 12. An old cow, or an old sheep, will not fat near so well with hay as with grass.

Mr. Clerk of Leicestershire said, he commonly gave a bull, or an old beast, when they were got pretty well in flesh, (if corn was cheap) ground-oats and ground-barley; he said, it would improve them much; he gave it them dry, and it would make them drink abundantly.

Ground-oats or barley to fat an old beast.

Mr. Putchin and Mr. Oldershaw of the same county assured me, they knew of nothing so good to plim a horse, or an old cow, as the tails of the malt, or the larger malt-dust; the proportion was, to-boil two quarts of malt tails in six or eight quarts of water, and to give it two or three times a day:—it would, they said, fat an old cow in six weeks time, so that she would feel very well to the butcher, but then, said they, she would deceive him; for it cannot be expected that flesh blown up so soon should carry any quantity of tallow withinside.

Malt-tails or dust.

§. 13. Falling into company with an ancient butcher, I asked him, what ground he judged best for giving tallow to a beast. He said, old grass-ground, if fat, though lying high and dry, would do very well till towards Midsummer, but it would then fall off, at which time the lower and moister pastures would tallow much better: he said, such pastures were good for tallowing all the year round.

I What a ground best to make a beast tallow.

Turnips not good to fat cattle after Christmas. Broad-clover not fit to fat cattle after October best.

§. 14. It has been found by experience, that turnips do not fat cattle well after Christmas; they grow hollow and sticky; but they will do very well for folding sheep.

§. 15. A butcher came to buy an old cow of me; she was near fat: it was October the 13th, anno 1702; he said, if he bought her, he would keep her till Christmas in aftermas-grass, for my broad-clover would raise her no higher.—I said, I thought so too; for the broad-clover leaf, being so very broad, held a dew on it, at this time of the year, all day long, whereby the cattle fed half on water; besides, the juice of that grass was too watery at this season; but the meadow-aftermas is soon rid of the dew, within three hours of the morning, and does not hold it like broad-clover.—This I learned by having occasion to carry some aftermas broad-clover hay to dry, and to spread it abroad, which I found was to no purpose on a broad-clover ground; and yet I did it with good success on the rye-grass, though of a deeper bite than the broad-clover.—A farmer of my neighbourhood, coming afterwards, asked the above butcher's father, whether it was best to fat a cow in broad-clover or meadow-erthe at this time of the year. The old man said, the meadow-aftermas was abundantly the better, and gave my reason for it, without knowing what had passed between his son and me.

Hop and broad-clover hay not good to fat large cattle. See Grasses, §. 16.

§. 16. Farmer Sartain said, he had experienced, that hop-clover and broad-clover hay would not prove a bullock in fatting;—But quære, whether this may not only hold good in the great oxen of Wiltshire.—Surely small beasts, such as are in our hill-country, may do very well with those sorts of hay.

§. 17. I asked Mr. Biffy what aftermas would raise a beast in autumn so as to finish him; he said, in the spring almost any ground will raise a bullock, the sap being then flush; but it must be the aftermas of good ground only, when September and October come, that will hold a bullock, and carry him on when near fat; for though, by haying up a ground early, after mowing or summer-feeding, there may seem to be a great bite of grass in it, yet, if such ground, by reason of it's poverty, should fall off of it's strength in September and October, which may be seen by the dying away, or the fading colour of the grass, it is lost on such a bullock.

If one has natural aftermas-grass able to keep up a bullock from September to Christmas, it will pay for keeping an almost fat bullock or cow, if she be not too forward with calf; and the reason is, because there is but a small part of England that have natural aftermas at that time of the year, fit to fat with, in proportion to the summer-clover every one has fit for that purpose; besides ox-beef is not then come in, and cows are generally too forward with calf.

§. 18.

§. 18. I asked Mr. Bissy if French-grafs hay was fit to fat a Of bullock with ; he said, the Somersetshire graziers going to Lon- French- don had often assured him, that, if French-grafs was cut early grafs hay in flower, it would fat cattle very well till towards spring, but to fat a bullock. then it grew too dry.

§. 19. By discoursing with Mr. Bissy about winter-fattening I What find by his experience, and the neighbourhood's, who have kept quantity the account, and weighed the hay, that a good heifer put up of hay will to winter-fattening on hay would eat at least two hundred weight fat an hei- of hay per week, which at thirty shillings per ton, or eighteen- fer. pence per hundred weight, will come to three shillings per week, and at that rate her fattening for twenty weeks will cost three pounds, and in less time a heifer, that is not very forward when put up to hay, cannot be fattened ; yet at this rate, if beef sells well in the spring, some advantage may be had, but gain cannot be depended on by such practice.—How comes it then, said I, to pass, that heifer-beef is so frequently to be had in the spring ? Because, said he, we graziers have sometimes the mischance to have a heifer warp, that would otherwise have been beef at Christmases, but casting her calf put her at least ten weeks backward, and, to make the best of her, we must keep her on to fattening. Sometimes we are disappointed by a heifer's or a cow's calving sooner than we expected, perhaps in December or January, and thence she would go dry ; such we must therefore fat, and, being fed with hay, she makes early beef in the spring.

§. 20. Fourteen pound weight of hay is the constant allow- Allow- ance on the road, to every fat beast that is drove to London ; ance of hay to a fat beast on the road. they that entertain fat cattle sling fourteen pound of hay for each beast into the rack in the evening, when they come into the inn, which is to serve also next morning for their breakfast ; so that half a tod, i. e. seven pound of hay, is supposed sufficient for a fat ox's bait at night, and the same in the morning.

§. 21. The cattle, that in hot weather come to London in Of beasts droves, are many of them heart-broken, and so heated, and that are tired off their spirits, that, if they were not killed, they would over- die ; and those whose feet bear not the journey well, do so waste drove. their juices through the fatigue, that, when they are killed, they will not stiffen.—The reason is, because they have so emptied themselves of their juices that their joints will remain loose and flabby ;—and thus we may observe, the plimming of meat in boiling argues the youth of it, i. e. it's fulness of juice, and it's shrinking argues the contrary.

§. 22. Mr. Clerk, Sir Ambrose Phillipps's tenant, says, when Cattle he drives cattle to Smithfield, if he has a chapman that is eager, handle as soon as his cattle take up their stand, if he can, he will deal best when with him ; for cattle handle to the best advantage when warm, warm, &c.

and their fat when heated is mellow, and softer than after they have stood to cool.

One may be more deceived in the condition of a fat beast in good quick-springing grafs than in a coarse pasture, because the fine grafs may plim him faster than it can make good sound meat of his flesh.

Of old cow-beef. §. 23. An experienced butcher observed to me, that a young beast would eat well when half fat, but an old cow, and but half fat, was not eatable; for the whole body of such a cow ought to be filled with new juices.

Old cow-beef generally comes in about St. Simon and Jude, which is the latter end of October, or later; for old cows are not apt to take bull so soon as young ones, and so do not make the earliest cow-beef.

Old cows tallow best on the inside. §. 24. The butcher killed a fat cow for me, of four years old; I saw her opened, and she proved very fat withinside, and very fat on the back.—He said it was common for a young cow to be fat on the back, but very rarely to tallow well in the inside; but old cows generally tallowed best withinside, but not so well on the back.

Sign of a cow's tallowing well. §. 25. If a cow seeming high in case should bring forth a small calf, it argues, the cow thrives in tallow: and if a good cow, middling in case, produces a great calf, there cannot at that time be any foundation for tallow.

Old cows tallow best. §. 26. I was at Gausuns in Wiltshire with farmer Pain and Mr. Biffy: they agreed that an old cow, though she would not weigh so well in the quarters as a young one, yet she would tallow better.—But farmer Pain said, to his certain knowledge, an old ewe would not do so; what tallow an old weather might yield he knew not.—However he was sure, that the best mutton, and that for which the butcher would give me most, was a sheep of two year or two year and a half old; such mutton would spend and weigh best. I objected, that such sheep, not having done growing, would not be fat. He said, he never found it so: he bade me look at the ewes with their lambs, that he then had with him; the ewes are but two year old, and I hope, said he, to have them all with the butcher in a little time.

Marks of a good bullock for fattening. §. 27. In discourse with farmer William Sartain of Wiltshire about the choice of a bullock for fattening, and when his bones lay well, he said, an understanding butcher might get more money by an ugly mishapen bullock than one whose bones lay well, because those bones that lie ill carry more fat than they seem to do; therefore, if a bullock handles well in the places they make trial of, that is only to be regarded.

Sign of a cow's tallowing well. §. 28. If a cow carries a deep navel, or her navel springs or struts forth when she is fat, it is a very good and almost a certain sign that she will die well, that is, that she is full of tallow. If

If an ox be full at the cod, when bought lean, or springs and Id. of an fruts forth full in the cod, when fat, it is a good sign that he ox will tallow well.

§. 29. * Varro, Columella, and Palladius are, in the main, Marks of pretty well agreed in the characters they have given us of a fine a good ox ox, which are as follow—Symmetry of parts; stout sound limbs;—among a body large and somewhat long (close and short, says Columella) the an- and well ribbed; horns bending a little inward like a crescent, tients. flatly, strong, and in colour inclining to black; a broad curled forehead; large black eyes; great hairy ears (or, as Markham translates it, rough within): flat cheeks; spreading nostrils; snub nose; blackish lips; neck thick, long, and muscular, with vast dewlaps, swagging down almost to the knees; deep brisket; buttocks round and full; sides and paunch strutting and capacious; a strait flat back, or a little swayed; a tail brushing his heels, the lower part of it thick with hair, and a little frizzled; nervous and well set his legs, and rather short than long; his knees strait, somewhat knotted, or embossed, and standing wide from each other; a foot not very broad, the claws large and of an equal size, not stradling apart, nor liable to accidents by inclining inward; his hide smooth and sleek to the touch, it's colour black, as the most eligible, because it denotes the beast to be of the hardiest kind, next to that red, then flesh-colour, and lastly white, which is the tenderest of the four. The colours Columella and Palladius most approve of are red and brown.

A beast should have a large hoof or foot, and large long legs: Id. for this is a sign, that, when he is fat, he will weigh well. A spiny legged beast never pays the grazier so well as the former.

facing among the moderns.

* Hæ pecudes sint hæc compositæ, integris membris (grandibus, Colum.) oblongæ, amplæ, (corpore denso brevisque, Colum.) nigrantibus cornibus (proceris et robustis, Colum. sine curvaturæ pravitate lunatis, Pallad.) latis frontibus (et crispis, Colum.) oculis magnis et nigris, pilosis auribus (hirtis, Colum. magnis, Pallad.) compressis malis, subsimilive, apertis naribus, labris subnigris, cervicibus crassis, et longis, (et torosis, Colum.) a collo palearibus demissis (amplis, et pene ad genua, Colum.) latis humeris (vastis, pectore magno, Colum.) bonis clunibus (rotundis, Colum.) (capaci et tanquam implente utero, lateribus porrectis, dorso recto planoque, vel etiam subsidente, Colum.) caudam ut habeant profusam usque ad calces, inferiorem partem frequentibus pilis subscissam, cruribus (nervosis, Pallad. brevioribus potius quam longis, Colum.) rectis genibus, eminulis. distantibus inter se, pedibus non latis (ungulis magnis, Colum. et Pallad.) neque ingredientibus qui displodantur, nec cujus unguis divaricent, et cujus unguis sint pares,—et leves, says Varro, but that term must rather refer to the cow than the ox.—Corium tactu non asperum et durum, colore potissimum nigro, dein rubeo, tertio helvo, quarto albo; mollissimus enim hic, ut durissimus primus.

A beast should not be leather-throated, that is, have his skin hang down deep under his throat; but should have a thin neck: the former is observed never to prove so well.

A beast should be deep in his gascoigns, which mounts him high in the hinder parts, and makes him weigh well.

A beast should be wide between both huckle bones, which gives room for his filling: such a beast, when fat, will be sure to weigh well.

A beast should be deep in the brisket, that is, from the upper part of the shoulder to the lower part of the neck; for then he will fill well with fat.

A beast should be short ribbed, that is, the rib and the flank should meet close: some beasts either want a rib, or have a false rib, which is so called, because it is very little, or lies deep within; this is a great disfigurement, by which means the flank will pitch and fall in.

When a beast is fat, he will shew himself to the eye to be so by a roll of fat as big as one's fist, which, when he walks, moves itself forwards before his shoulder, such a roll of fat may likewise be seen in his flank. *Luxuriat toris*, says Virgil.

Sign of a
good cow.
See Bulls
and Cows.
§. 1, &c.

§. 30. A cow has a good udder, when her teats are at equal distance, and pretty wide asunder; when the teats are near together, there is danger of losing one of them; as her teats ought not to be very small, so neither ought they to be too big; for such are called windy teats.—When a cow's udder hangs full in leather, and in wrinkles behind, it is an argument the vessel is large to receive milk, whereas some cows, tho' they might give ever so much milk, have no vessel for it.

Signs of a
good
beast,

Mr. Clerk of Leicestershire says, after all that has been said, if he can buy a cow cheap, he will buy her against the rules of shape above described, and she may sometimes pay as well as any.

§. 31. Being at Holt in Wilts, I fell into discourse with Mr. Biffy, and having a mind to be more particularly informed in this branch of the grazier's business, I asked him what were the signs and tokens of a good beast; those by which he chose them when he went to fairs; for he had just been saying, that there were many beasts in a fair, which were in show twenty shillings better than some others, and yet not so valuable as those that seemed to be so much less worth: nay, he said, there were many fat beasts in Smithfield-market, twenty shillings more in weight than some others, and of the same age too, and the lighter beast the more preferable at the same price.—He therefore said, that in an ox the experienced graziers had a particular regard not to buy one that had a long and heavy dewlap, or merry-thought, which hung down under his throat, nor one that had a thick jaw, nor heavy small eyes, nor that was thin in the buttocks: they commonly

commonly observed, he said, that those beasts, which had most of these properties, paid least for their fattening, nor did they take it kindly; for they were apt not to take fat in all parts proportionably alike.—We love to choose those beasts which have not too thick a hide, but of a middling thickness; for the grain of the beef of a thick-hided ox is apt to be coarse, and yet we do not covet a very thin hide neither.—The north-country oxen, said he, are generally thick-hided, nor will they in Smithfield sell so dear as North-Wiltshire oxen will do: the sweetness of our beef is esteemed greater than their's, and we can out-sell them one hundred weight in seven.—We choose an ox with a light head, thin and close jaws, full and lively eyes, not thin on the rump, but that has a thin and short dewlap, and as little under the throat as may be; such an ox is likely to thrive much faster than one of the contrary shape, and to carry fat in all pieces equally, which is a great advantage to the butcher; for then, the coarse pieces will sell well. A light bony head in a sheep is also a good sign, but in a cow a long and heavy dewlap is not so much regarded.—Then I went with him down to his grounds, and was shewed two oxen which answered the above differences and characters.—Taking notice of a particular ox, he said, that he was half fat, and began to gather flesh, which might be as soon perceived in the cod as any where; for there they soon begin to shew their thriving, and so does a weather-sheep.—I observed myself the cod to be truss, and extended round as big as my fist; whereas, in the lean oxen in the field, the cod was lank, and made little shew.—He says, all fat beasts are apt to be too hot; therefore a fattening bullock, if he be kept out of the wet, cannot be kept too cool, and for that reason it does very well for one side of the fattening-houses to be open; for, if a fattening-bullock be too hot, he will be apt to * peal; but for lean beasts, * the hair they could not be kept too warm. will come off.

§. 32. I find by Mr. Alyff of Oxenleaze, Wilts, that the largeness of the cod of a fat ox is a great beauty, and the bigger it is, proportionably a sign of his fattening the better; and he is very positive in it, that oxen that work make the best beef, and die unkindlier, and are inwardly fatter than those that never worked, and says, (it being a phrase he often used) that they divide better in the joints, and piece better under the cleaver, when quartered-out by the butcher; whereas the unworked-beef does not so easily divide, (as he terms it) eats coarse and livery.—I told him, I had often heard the graziers affirm as much, but it did not seem reasonable to me, because, as country-farmers and labourers had much greater strength than gentlemen of the same bulk, by means of the exercise of all the ligatures and cords of their bodies, which became thereby stronger and tougher, so I thought that

that must be the case of the ploughed-ox ; and seeing their flesh and ours is but a bundle of pipes, tubes, or fistular parts faggotted together, full of heterogeneous juices, I could not consequently suppose, but the flesh of a worked-ox must be tougher than the flesh of an unworked ox.

Marks of a beast when fat, or for fattening.

§. 33. Markham, lib. 1. fol. 62.—for an ox to feed, advises; that he should, as much as might be, be ever lusty and young of years, or, if old, yet healthful and unbruised, which you may know by a good tail, and a good pissel; for, if the hair of one or both be lost, he is then a waster, and will be long in feeding. If you would choose a fat beast, handle his hindmost rib, and, if it be loose, and soft, like down, then it shews the ox to be outwardly well fed; so do soft huckle-bones and a big notch round and knotty; if his cod be big and full, it shews he is well tallow-ed, and so doth the crop behind the shoulders.

Mr. Serjeant Webb's bailiff came to me in the beginning of November, 1713, to buy my lean oxen, that I wanted to cast off to the grazier. He found fault with some that their bones did not lie right in two respects, viz. that they were thin in their buttocks behind, i. e. that their buttock, or britch-bone did not spread, and stand out wide; from whence, he said, they would not prove, nor fill up in their buttocks behind, so as to look well to the grazier.

Again, there were two of them that had a rib wanting on each side, or a rib less in the flank than they should have, viz. the first rib next to the buttock: note, though this defect commonly goes; and is known by the expression of a rib wanting, yet a juster expression is, that such a beast has a short rib, which sinks or falls inward, and does not bear outward, as the rest do, so that in the handling one cannot get to feel all of it, but the lower part seems lost, and therefore it vulgarly carries the name of a lost rib.

There was another bullock he excepted against, because the bottom bushy part of his tail was lost, having but little hair on it, which was to him a token that he had been over-worked.

In two or three he disliked their hair's staring, or standing on-end, on the ridge of their back, another argument of their hard labour.

I asked Mr. Dark, a great grazier in Wiltshire, what marks he looked on as promising in beasts to be bought for fattening; he said, a beast with thick horns was by no means liked by graziers; and a thick head was an ill mark amongst them; a beast with large ribs weighed well; a close-ribbed beast, with quarters that lay well, they liked to buy, and not a thin flat-ribbed beast.

A thick hide a bad sign.

§. 34. A butcher bought a heifer half fat of me to kill: he said, she would not pay for keeping, for she was thick-hided, and such beasts would not prove.—I observed the hide seemed to sit loose, and

and the hair to stare more than ordinary, or look like beggars-plush.

Upon the best inquiry I could make of Mr. Biffy, farmer William Sartain, and others in Wiltshire, they do not think the Welch-cattle of North-Wales and the cattle of Shropshire fat kindly; for they are thick-hided, especially the burs, i. e. the oxen;—and it is to be noted, that the thicker hided the cattle are the longer they are in fatting.—And it is generally to be observed, that the cattle of North-Wales are black cattle.—But Mr. Biffy says, that in South-Wales, as in Glamorganshire, they have thin-hided cattle, which are much on the red and brown colour, and that they get their breed from Gloucestershire; they will fat very kindly.—Mr. Biffy tells me, the more northerly the cattle are bred, by means of the cold, the thicker are their hides; for in Leicestershire, Derbyshire, and Yorkshire, the hide of a large ox may sell for thirty shillings, because of its thickness, and being fit to make ben-leather for the soles of shoes; whereas the hide of an ox in North-Wiltshire, &c. though as big as the other, will not fetch above fifteen shillings; but such an ox will notwithstanding sell for more than a north-country ox will do, because the meat is finer, and the beast will yield more tallow; for the finer the hide the finer always the meat.—I put the question to farmer William Sartain, young John Sartain, &c.—what difference there might be in Smithfield-market between the price of a north-country ox, and a North-Wiltshire ox of the same weight; they said two pounds in ten pounds, but the hide of the north-country ox would yield a third penny more in value.

§. 35. If a farmer intends to graze cattle in a hill-country farm, such as mine in Hampshire may be, these three things are especially to be regarded; First, to raise a good quantity of French-grass for hay and aftermas. Secondly, to turn a good quantity of hill-country meadow into rich pasture, by feeding it, dunging it, or other manure; to make it fit for raising the bullock or heifer in the spring, when he comes first from hay into grass-lease, and to receive him with a vigorous aftermas, when other grasses, as clovers, and French-grass aftermas goes off.—Thirdly, to have hovels in your bartons, inclosed with close court walls, to shelter your cattle in the winter from wind and rain. All these three things are necessary and uniform, and do correspond one with another; without them grazing must be carried on very defectively, and to little profit by the hill-country farmer.

By the methods here prescribed, in order to the fatting of cattle, plenty of French-grass hay will enable the grazier to buy in barren beasts before the spring-grass comes, when it is most likely they will be cheap, and may be bought to the best advantage, allowing

allowing the value of the hay they may eat in consideration with the purchase ; and if by winter-haying some meadow-ground, (after it has been fed close, but has been kept high in heart, by feeding it, and soiling it) you can early in the spring, by April or sooner, have a bite to take off such grazing beasts from hay to grafs, it will be very advantageous before the clovers can be ready, which are seldom so in the hill-country till a week or fortnight within May ;—and by haying-up such meads for an after-mass, which towards the end of the summer are in very good heart, you'll support your bullock, and carry him on when the spirit of the other grasses fail.—Then such cattle as are unfinished being brought to French-grass hay, and tied up under hovels, or coverings, and within court walls, will proceed in thriving by being secured from the wind and rain, and the tedious hill-country rimes, that often continue whole winter-days, all which makes fattening-cattle brought from grafs to pitch, and washes them out.—Besides, if you have not plenty of French-grass hay, you cannot in winter make the best of a milch-cow that warps, or of a cow that towards the latter end of winter you may perceive proves barren, or of a fat cow that casts her calf before you kill her.—I mention here the necessity of French-grass hay only, and not of clover hay, because I suppose the hill-country farmer, who provides store of French-grass hay, will be wise enough not to mow the clovers, but to feed them, to improve his lands, for the hill-country farmers have generally so much land for their money, that all they can do is little enough to keep their arable land in such heart, as for their profit it ought to be in.

If the foregoing cautions are not observed, the ill consequences that will follow must be such as these ;—if the first of the three foregoing cautions is disregarded, your cattle cannot at any time of the year be fat as they ought to be, and then you must be under necessity of selling them half fat, of which necessity the buyer never fails to take the advantage ; and sell them you must, notwithstanding the prospect of prices rising in a month or two never so much ; and you'll commonly find, that you shall have nothing for the meat they have eat whilst they have been fattening.—In the second place, we will suppose that very few will be so unwise, as to begin to fat a beast in October with hay, and so to hay him throughout the winter ; but we may reasonably suppose, that warping beasts and barren heifers, &c. may, and commonly are begun to be fattened with hay from Christmases, in which case, though hay be plenty, yet if an early spring-grass be wanting, such cattle must be hayed at least till the middle of May ; for till then, in the hill-country, the clovers will not give a beast a bite, and then commonly, where the master is at a loss and disappointed,

ed, the goods suffer before his eyes before he can make the best of them, and in this case he shall find a beast visibly pitch before he can find a purchaser for him.—Again, if early spring-grafs be wanting, you cannot begin summer-fattening of cattle, nor can buy a barren heifer till towards the middle of May, and then they are commonly very dear; and in the hill-country from so late a beginning the summer-grafs will hardly fat a beast, the ground falling early off its strength, being generally poor;—and then, if you have not a quick-growing aftermas treasured up, by keeping such ground as was formerly meadow in good heart for that purpose, it is plain you must again run into the first evil;—and if you have such an aftermas, you will again often be wanting hay in November, and December, to finish summer-fatted beasts; so that plenty of hay is always necessary, &c.—And lastly, though you have both hay and grafs, if you want winter shelter the cattle must suffer.

PROPOSALS for FATTING CATTLE in the hill-country, and first of the BARREN HEIFER.

§. 36. It is proposed (1.) That the meadows of the farm, which generally in a farm of an hundred pounds per annum hold to no greater proportion than from twelve to twenty acres, be laid to pasture for the fattening purpose.

(2.) That from seven to ten acres, be yearly sowed to hop-clover, for the first spring-grafs for the fattening of beasts.

(3.) That the good pasture you have made of ground best inclined to natural grafs, by chalking and dunging, &c. may receive the barren heifers, (for I fear it will not be good enough, nor deep enough fed for the oxen) and this made pasture, having been hayned from the latter end of January, or the middle of February, I suppose may by the end of April have got a good head of grafs.

(4.) Your barren heifers must, from the time they may have been supposed to have eaten up this made pasture, be kept in your meadows till they come to the slaughter.

All fattening-cattle, whether lambs, sheep, barren cows, or oxen, do require a regular and proportionable progression from coarser to better food, as they grow more and more into good flesh; otherwise, when half fat, they will go back, and you will not without great difficulty raise them again, which will be a great loss, nor will such beef spend kindly.

Against the time he buys in his heifers, a gentleman, who would make a good hill-country grazier, (for I do not suppose it to answer but to such who kill their own beef in their family) ought to take

take care to be provided with an over-plus stock of middling good hay, or of winter-vetches, or of barley-straw and autumn-grass mixed together, layer and layer of each, be it whatever it will ; it ought properly to be better than barley-straw ; for he is to suppose he has bought barren heifers which have been kept all winter to straw ;—if they have been kept better, i. e. to straw and rowet, there is still the greater reason for him to mend their keeping ;—and he is from the time of buying to consider, that he ought to begin to raise them in flesh ; for the better case they are in against they are turned to spring-grass, they will take to fattening the kindlier, and bear their first scouring the better.—If he could turn them into a field, for an hour or two in the day, where there is a little rowet, it would do well, and to have change of the above-said dry meats would keep them the better to their stomachs.

PROPOSALS for FATTING OXEN, in the hill-country.

§. 37. The times of turning off oxen to fattening are two in the year, which in several respects answer the publick conveniency, viz.

(1.) The first is about May-day, when the labour of the ox is pretty well over for the spring-season, the spring-corn being then generally all sown.

(2.) The second time for turning oxen to fattening is the beginning of winter, i. e. from the first of October to the middle of November, which falls out again very luckily ; for then the winter-corn, i. e. wheat, and winter-vetches are generally all sowed throughout England, and the plough-man's hurry relaxes.

At both these times the grazing gentleman, who designs to kill for his table all the year round, must turn oxen to fattening.—We will first begin to discourse of the spring-fattening, which is the most chargeable to the husbandman, and therefore he ought to expect a better price, and a suitable return ; for oxen turned out at May-day will hardly get fat till Christmas, and, if not turned out till June, will not be fat till March, April, or May, which again falls out very opportunely ; because from Christmas till the latter end of May cow-beef is very scarce, and is generally supplied by ox-beef ; but then it is obvious, that when an ox gets half, or three quarters fat by or be for winter, he must be supported and carried on by a great quantity of hay, and that very good ; for the beast will then grow nice.

The other time of entering an ox into fattening is, as before-said, in October and November, when he is also turned off from the plough ; and the gentleman, my young husbandman, must be informed, that it is waste to lay very good, much more the best
of

of hay before such an ox; for coming hungry and poor to it, he will devour abundance, and will eat up the fattest hay without paying for the cost and charges of it.—The most you can propose by this method is to get him fat by July, instead of September, or October; during all which interval of time heifer-beef will be plenty, and will sink the price of ox-beef; therefore so chargeable a method will not quit costs.

What the grazier therefore in this case ought to do, is as follows: he should bring his ox easily and gently into good flesh by a rowet, that he ought to have hayned his grounds up to for that purpose, and of which rowet he ought to give him the worst first, except it be of so sour a kind as to want the correction of the winter-frosts before he will eat it, of which kind stubble-rowet commonly is, and in such case that must be reserved till then, or rather for young beasts and milch-cow cattle.—He ought to give him variety of dry meat along with his rowet, in which he ought to consult his tooth by flinging before him, by changes, each sort of good straw, giving now and then a lock of winter-vetches, or coarser hay, but of every thing good in it's kind, i. e. sweet, and well made, and thus the ox ought to be carried on throughout the winter.—Against March comes he ought to have better hay; not only because the rowet may be supposed to be all gone, but also because the ox mending in flesh grows nicer, and will be weary of dry meat, through the tediousness of being foddered so much with it during the winter; therefore his hay must be mended; for not proceeding is going back.—Against April, if possible, a short head of grass should be got for him in your pasture-ground for cow-cattle, by hayning the pasture in February, that he may have grass along with his hay, as before said in the fattening of barren heifers;—and against May a head of hop-clover must be in readiness, in the hill-country, to receive him into his first full grazing, as is also said of fattening the barren heifer; for it is not to be supposed the meadows of the hill-country, which according to this scheme are to be converted to pasture, can be fit before the first of June to entertain a grazing-ox; and it is also to be noted, that in the hill-country, in the month of May, hop-clover will not afford a good bite for an ox, or a cow, unless the autumn-bud be hayned, and preserved from being fed by sheep: in the month of May, if it should prove a cold and dry spring, the fattening oxen and cows must also with their hop-clover, if it be short, have good hay given them, if they will eat it.—Note, fattening in the hill-country, if you hay in the winter, is more chargeable than in the vale, not only because hay is dearer there, but also because the winter-season begins a month sooner, and holds a month later in the hill-country than in the vale.

Thus

Thus you see what disadvantages the hill-country gentleman lies under; who would kill a bullock once a month, or three weeks, more than a grazier of the vale does; for the first must, in a manner, by forcing nature provide rowet and several sorts of grasses in their due order, exactly accommodated to the season of the year, besides winter-meat, &c.—Whereas, for the latter all may be procured in a natural course, with but a very little care and trouble.

Now I doubt not but by this time the reader is provided with a fatal objection, and will tell me, I have forgot the taking care to provide one of the most material, and difficult ingredients to be had in the hill-country for fattening of cattle, viz. proper grass, in a sufficient plenty, and yet on all occasions I have before prescribed it.—I do acknowledge I should make a very great, and ridiculous blunder, without an ample provision in this case; I must therefore lay it down as a principle, that a hill-country grazier goes to work without his tools, who does not lay down from fifty to an hundred acres of land proper for it to French-grass, not only on the account of making up the deficiency of the meadows, not laid down to pasture, being converted to other uses, but also to answer many other demands, for instructions in which matter, I refer to the chapter on French-grasses, &c. ^b

T U R N I P S.

Liming
good for
turnips.

§. 1. ^c **O**bserving that the turnips, which one of my tenants was cutting, were wormy, I told him, they would have been less so, in case he had limed his ground.—He said, that last year (1702) he limed one part of his ground, and those turnips were much freer from worms than these;—and, said I, much sweeter too, I believed,—He answered, he never had sweeter turnips, nor carrots than from that ground, and he did believe that liming was the occasion of it.

Dunging
turnips in
Norfolk.

§. 2. ^d Mr. Heron of Norfolk assures me, that they dung their turnip-land as much as may be, even to that degree, that their dry land-meadows are quite impoverished by it.

§. 3.

^b See the articles—Bulls and Oxen—Cows and Calves.

^c To destroy the caterpillar, Mr. Miller says the surest method is, to turn a large parcel of poultry into the field; which should be kept hungry, and turned early in the morning into the field: these fowls will soon devour the insects, and clear the field.

^d Dung and tillage together, says Mr. Tull, will attain the necessary degree of pulverization in less time than ploughing can do alone; therefore dung is more useful to turnips, because they have commonly less time to grow than other plants.

§. 3. I had discourse with Mr. Pawlet of Leicestershire, who deals in great quantities of turnips; it was August the 7th, 1699—he says, when turnips are sowed after Midsummer they are generally counted out of danger of the fly:—This fly is like to a weevil breeding in malt, with hard wings; there is no danger of it after the turnip-leaf begins to grow rough, which will be in a fortnight's time after sowed, if they come up well. He sows a pound and an half of seed on an acre, and so, as I find, do all the gardeners in those parts; for the more are sown on an acre the more chance they have to escape the flies.— There are, he says, four sorts of turnips; the red or blue turnips, the yellow turnips, and the long turnips; for sale the gardeners deal only in the first two sorts;—that the fly lays more severely on the leaves of the red or blue sort than on the white; that turnips should be sowed in dry weather, or else they cannot be raked or harrowed-in well; that they must have a shower of rain to come up in; that though it is true the rain beats down and destroys the fly that would devour them, yet it makes those flies that out-live it cruelly hungry; so that it is after such rain that the turnip-leaves are most eaten. He says, there is so much moisture in the ground before Michaelmas, that you never need to doubt the seed sown in August or after.

§. 4. Mr. Scamwell assures me, if I strew tobacco-dust over the land where any greens, as lettuce, &c. are set (suppose a pound to an acre) the fly will not come to those greens. Quære, if not a good way to sow turnip-feed with tobacco-dust.—I am told if you mix powder-brimstone with your turnip-feed it will preserve them from the fly.—Mr. Worlidge in his treatise, called Two treatises, says, that the greatest enemies to turnips are the flies, which, about the sowing-time, by the sun's influence, are generated in the stubble that remained in the field, where you now sow your seed; for it is observed, that an easy ploughing and sudden sowing these seeds makes the turnips more apt to be thus destroyed, than a well dressing, and more leisurely sowing; for this deprives these vermin of their shelter and sustenance, so that they generally die before the seeds come up. The seed being soaked in foot-water, and sowed, the bitterness they have attracted from the foot is said to be a security against birds, flies, and insects.—New burn-beaked ground sowed with turnips has been observed to escape the fly more than other land, and some strew ashes on their turnips in gardens to preserve them from this insect.

§. 5. Mr. Bachelour told me, that I might depend on it, this was so cold a country, that, if I sowed turnips the latter end of August, Turnips to be sowed early in a cold country.

• Mr. Miller adds two other sorts, viz.—the rusty-black, and the greca turnip.

August, I should not so much as have leaves, and therefore I ought to sow them by Midsummer: he said, he had known it tried.

Why turnips sowed, when the wind is northerly, or in a hot gloom, may not come up.

§. 6. I told a famous gardener, that I had heard it said, if turnips were sowed when the wind was in the north, or north-east, that no turnips would come up.—The cause of that, he said, must chiefly be, because such wind, which naturally parched the ground and dried up all moisture, was at that time accompanied with drought; but he doubted not, though turnips were sowed in such wind, if rain came afterwards, they would come up well.—I have also heard, said I, that if turnips were sowed in rain, and a hot gloom came afterwards, that no turnips would come up.—He said, the reason of that, he thought, must be, because the ground, by such a sudden heat after wet, was made starky, so that the turnips could not get through; and may not, said he, charlock and other weeds be destroyed by the same accident?—And indeed I cannot but agree with him; for if it be observed, you will find the turnip does not come up with it's seed-leaves upright, picked, and sharp, as many seeds do, but with broad indented seed-leaves, and the stem that carries it's head being but tender, no wonder if it cannot pierce through the crust of earth, when it is hardened.—Here the wisdom of God is to be admired, who, having ordered seed-leaves not sharp-pointed or spiked, but broad, or many, and indented, and so not fit to force upwards, has caused them to bend their heads downwards, and so to get through the earth by their bended stalk.

Caution—
to preserve
the best
seed.

§. 7. I am of opinion the way to have large turnips is to preserve some of the largest turnips for seed; for from such seed do the largest turnips proceed; whereas the seed bought of gardeners comes of their scattered seed, which, running up thick, does not head, nor produce a seed that will carry a large turnip.—It is the same of asparagus, says Quinteny.

Quantity
of seed on
an acre.

§. 8. Mr. Chessin of Leicestershire having been very successful in turnips, I asked him, whether he did not sow about a pound and an half on an acre; he said, his was cold land, for which reason he sowed rather more.

Of turnip-
seed burst-
ing with
too much
rain.

§. 9. As the less solid the rinds of all seeds are the larger the fibres, and as the less spirit and oil is contained in them they do the less resist vegetation, and consequently putrefaction, and the sooner begin growing, or are malted in the ground, so such seeds may be expected, if they come not up in a few days, (as turnip-seed in four or five days) to be either bursten with too much rain, or malted for want of moisture, and conveniency to set them on growing; for such seeds, of the nature above described, are susceptible of a great deal of moisture, and therefore, when sown in the driest time, though they meet not with moisture enough to set

set them on gowing, seldom fail of being malted, because the very relaxing quality which is in all earth, together with the dew of the night, are sufficient for that purpose. Yet, as to the bursting the vessels of the turnip-feed by plethory caused by too much rain, it may be noted, that some have observed a glut of rain to have fallen on the turnip-feed, soon after they have sown it, without any such ill effect, and others have found that such speedy rains have burst the vessels, and turned the flour of the seed into a mucilage.—In these two different cases, as I judge, the following distinctions should be made, viz. in case the turnip-feed be sown for the sake of roots in June or July, while the ground is hot with the sun, and has at the time of such heat been glutted with rain, or that a glut of rain immediately falls on such sowing the turnip-feed, i. e. the same day, or the night after it was sown; in such case I easily conceive, the turnip-feed being very susceptible of moisture, the seed-vessels may imbibe the rain to so great a degree as to be distended thereby, and be bursten with the heat that rarifies such moisture;—but in case the seed be not sown till about the middle or latter end of August, when it is sown chiefly for the herbage, the ground being generally cooler, and not heated like a hot-bed to force up the seed so quickly, yet moist enough, when driest at that time of the year, to set the turnip-feed on growing without rain, in such case, especially if rain does not fall under two days after the turnips are sown, it is probable the seed may have had so much time to swell gradually in the ground before the rain comes, that it may be past such danger; and this the best account I can give of the aforesaid diversity.

As for the above reasons turnip-feed is subject either to be malted, or to corrupt, it may not be improper to add here, that the same reasons may hold for the same effect in many other seeds, as the medic-grass, the vetch, &c.—which the *Rei rusticæ* scriptores order to be soon covered, because they are soon corrupted; for whether a hasty rain may come suddenly on them, as they lie above ground, before they can be harrowed-in, or they lie on the ground exposed to the scorching sun before they are covered, it seems in both cases, for the same reason, they may either be malted by the scorching heat of the day, and the giving damps of the night, or, being first scalded by the sun, and a sudden rain coming on them whilst above ground, they may imbibe the moisture the faster, and so burst with a plethory, and this more likely than if they were first covered, or than after they have lain wet in the ground, because, in the first case, the too much wet they receive as they lie above ground carrying not so much of the spirit, or vegetable juices, or volatile salts of the earth along with the water, the nib, or germen is not so much impregnated therewith,

Id. and of
other
seeds.

T

therewith,

therewith, as to be pushed forward into the act of vegetation, but the nib or plant of the seed is swelled, and drowned, and bursts in the vessels by receiving too much water without a spirit sufficient to aëquate and protrude the vegetable parts, &c.—In the second case, the seed lying on the ground, if the scorching sun lies on it, it's vessels, being thereby shrunk, do, on a hasty rain following, imbibe the moisture to a greater degree than otherwise, and to a bursting;—and I must now acquaint the reader, it has not a little exercised my thoughts in the reflection what should be the reason why hop-clover and broad-clover seed should often come up so partially in the same field, where the nature of the earth has been the same, the season the same, and the tillage the same; yet I have had some lands in the same field, and that more than once, where the clover has not come up at all, or but very sparingly, when at the same time it has come up in another part of the ground very prosperously. I am not able to account for it otherwise than that I suspect we have sometimes sowed some of the clover-feed, as is usual, after the day's work of harrowing has been over, in order to cut out work for the horses the next day, and then rain has fallen in the night, or the next day, so as to hinder the harrowing the seed in for a day or two, or sun-shiny, or windy weather has come, so as to dry the seed, and we have neglected to heal it with the harrows next day, other business intervening, and so the seed has perished. I must confess I cannot advance this beyond a probable hypothesis for want of having kept a diary of the fact, therefore leave the reader to make the best he can of the hint I give.—^f Pliny says, caution must be used in sowing the medic-clover, which ought to be covered in as soon as sowed, lest it should be burnt up.

Of sow-
ing turnips
on a peas-
erth

§. 10. Farmer Miles says, he has often known, where peas have proved rank, so as to have made the ground mellow, that turnips have been sown thereon, as soon as the peas were removed, and harrowed-in without ploughing, and it has had very good success.

Of turnip-
seed lying
a year in
the
ground.

§. 11. My gardener affirms, if turnip-feed be dropped, and in digging covered over with earth, he has the next year found such seed fresh and good, and, when the earth was turned back again, it has grown, and produced good turnips.—I asked him how that could be, since it is said, if turnips be sown, and no rain falls in some short time, the seed will die and never come up.—He said, that was true; for when it lies on the top of the earth, and but just harrowed-in, if nine or ten days hot weather come upon

^f De medica cavendum, ne aduratur, terræque protinus integri debet. Plin. lib. 18. fo. 283.

upon it, it will never come up, but in this it was turned a spade deep under ground.

§. 12. The Newtown-men, who houghed my turnips this year (1707) having made it their business for many years to hough of hough-turnips, assure me, that it is best to hough turnips as soon as they have four leaves, that is, as they explain it, the two seed-leaves, and the two succeeding leaves, provided they are grown big enough to be out of danger of being buried in houghing.

§. 13. In houghing turnips I suppose care ought to be taken to hough those up that are deepest rooted in the earth, and to leave houghing those that grow upon, and most out of the earth, without much turnips. regarding their bigness, inasmuch as they that lie on the ground, and have room to grow, will quickly be the biggest turnips.

§. 14. A dry season is the best for houghing turnips, because neither the weeds nor the turnips houghed up will be so apt to grow again.

§. 15. I am apt to think the best way to manage turnips (the seed of which is impatient of growth, and apt to burst in too much wet, as also to corrupt, if the ground be so dry as only to give it a damp, but not wet enough to set it on growing) is, first to harrow the ground fine, then to roll it with a roller big enough to break the little and clods, so to let it lie till the next rain; then, the ground being mellow, to sow the seed, and harrow it in with shortened harrows, which may not open the ground too deep, nor bury the seed; then to roll it again with an one-horse roller, in order to keep the moisture in the ground as deep as the seed may lie; for the surface of the ground must not be dried before the seed can strike root, which may be in two days and two nights, and yet the surface of the earth must be fine, and so lightly compressed, that the seed may spear through.—The mystery of the success or miscarriage of a crop of turnips consists in these four things, viz. first in the seed's not lying too deep; secondly, in it's not lying too wet, which it cannot easily do if harrowed-in shallow, for the surface of the earth is soon dry; thirdly, in it's not lying too dry; and, fourthly, in it's lying in a fine bed.

Turnips ought, in clay-land, to be but just harrowed-in with a bush, as light as may be, that the turnip-root may grow upon the ground; for it will not be able to grow to it's dimensions within the clay-ground, nor can it, if it be checked in it's growth by a stiff ground, be sweet, because, for want of room, the exuberancy of it's juice will make it knotty and sticky.

I have often considered the nature of turnips, particularly with relation to the soil of our hill-country, and do think we are like to be deprived of that benefit others have from turnips, because our ground is so cold and backward in it's productions, that we can never expect to sow a crop of turnips after a crop of hot-

spur-peas; for in the first place hotspur-peas will be late ripe with us, and, if we could rid that crop by the middle of June, yet that is too late to sow turnips with us, on account of the drought that reigns over us at that time, nor would turnips have time enough, in so cold a country as our's is, to grow to perfection.— If we sow in the beginning of May, the turnip will not feed with us the same summer; so that it is plain we cannot have two crops the same summer, but the crop of turnips, which is hazardous must stand in the room of a crop of corn.—The best way I can propose for a crop of turnips in our country is, to winter-fallow the second or third year's clover-ground, which will be rather too poor to bear a crop of barley without the foil of folding, and then to sow turnips the beginning of May, and, if they succeed, you will have all the May-showers to forward them, and time enough, if the first sowing fails, to try again, and, if you should not succeed at last, the ground will be very sufficiently, and excellently husbanded to plough again, and sow winter-vetches in August; all things considered here is the least lost every way, as I could demonstrate.

White land better than clay for turnips, in regard to their sweetness.

§. 16. With us at Crux Easton, turnips will be sweeter in white than in our clay-ground, as I have observed in a garden-plot with one part of it clay-land, and the other white down-land: always from the white-land there comes a very sweet turnip, but from the clay-land a rank turnip that the people cannot eat;—I suppose, if a ground consisted of these two sorts of land, the sheep would lie on the turnips of the white land.

White land bad for turnips. Also of rape-roots.

But notwithstanding this, January 10th. (anno 1698) going to Holt by Burbage, I asked a farmer whether white lightish land might not bear turnips, and he said, by no means, it was the worst sort of land of all for them; the blackish sandy earth, or reddish sandy earth were the best.—Another farmer I met with afterwards said the same, and they agreed the best time for sowing them was about St. James's tide. [Note, if they are sowed earlier in the summer, the sun will ripen them, and bring them on so fast that they will be apt to run to seed] Charlock, rape, and turnip-feed, are not easily distinguishable, and sheep will eat of the rape-roots as well as of the turnip-roots, and it is of the same nature, and the same sort of land agrees with it; only the rape-root does not grow so large as the true turnip-root does; yet many farmers about Burbage buy of it to sow.

Turnips, if not clean eaten, may take root again after ploughing.

§. 17. Mr. Cooper of Berkshire sowed four acres to turnips last summer (anno 1699) and ploughed them up at spring, and sowed the ground to peas; and the little dwarfish turnips that were left behind uneaten, notwithstanding his ploughing them up, took root again, and were then in great quantities run to feed, and had much damaged

damaged his crop of peas; but the seed being dropped he intended, after the peas were off, to harrow them in.

§. 18. Being in company with Mr. Gouch, a Norfolk gentleman, we discoursed about the turnip-husbandry of Norfolk: I hanbery, a could not find that they so much valued the harm the fly did to distemper, their turnips, while they were young and tender in the leaf, as among they did a distemper or disease that fell on the roots of their turnips. turnips. which they called the hanbery, alluding it seems, as he said, to the like distemper in a horse's heel, which was a watry excrescence, that would sometimes grow to the bigness of one's fist, and that some years this distemper would take whole fields, and, after it began to grow in the turnips; they would never thrive.— No one, he said, could ever out the cause of this disease.— I told him, I thought it must proceed from the egg of a worm or fly that was laid in the turnip, in the place were it had been bit, and the little maggot lay in the hollow place, which, with it's tail continually working circularly, formed the juice of the turnip into a round excrescence about itself, in which it continued growing, like that of the oak-apple.*

G R A S S E S.

* After blaming the practice of putting a flock of sheep into a large ground of turnips without dividing it, by which they will destroy as many in a fortnight as would keep them a whole winter, Mr. Tull proceeds to give an account of the three manners of spending turnips with sheep, which are common to those drilled, and to those sown in the random way.

The first manner now in use is, to divide the ground of turnips by hurdles, giving them leave to come upon no more at a time than they can eat in one day, and so advance the hurdles farther into the ground daily, until all be spent; but we must observe, that they never eat them clean this way, but leave the bottoms and outsides of the turnips they have scooped for the ground. These bottoms people pull up with iron crooks made for that purpose; but their cavities being tainted with urine, dung, and dirt from their feet, tho' the sheep do eat some of the pieces, they waste more, and many the crooks leave behind in the earth, and even what they do eat of this tainted food cannot nourish them so well as that which is fresh and cleanly.

The second manner is to move the hurdles every day, as in the first; but, that the sheep may not tread upon the turnips, they pull them up first, and then advance the hurdles as far daily as the turnips are pulled up, and no farther: by this means there is not that waste made as in the other way; the food is eaten fresh and clean, and the turnips are pulled up with less labour than their pieces can be.

The third manner is to pull them up, and to carry them into some other ground in a cart or waggon, and there spread them every day on a new place, where the sheep will eat them up clean, both leaf and root. This is done, when there is land not far off, which has more need of

G R A S S E S.

Grasses indicate the nature and goodness of the soil.

§. 1. **B**Y my own observation I am sensible, that, as the sort of grass every ground bears (which is best discovered by its ear or panicle) is a certain indication of the nature of the soil, so by the thinness of the culm, which carries the ear or panicle, and the shortness of the ear or panicle compared to what you may observe it to be in other grounds, you may make a right estimate of the goodness or poverty of any ground carrying such or such a sort of grass; for the reason holds as well in this case as it does in corn; therefore it is very necessary for our husbandman to understand the English pasture, and meadow-grasses.

The cow-quake grass.

§. 2. The cow-quake grass, or *gramen tremulum*, though a very poor and slender grass, is no indication of poor land where it grows; for Mr. Ray says, it is the most common grass of any in all the pasture grounds throughout England, Hoc genus in pascuis per totam Angliam vulgatissimum est; in omnibus quas unquam lustravit Clusius regionibus prata multis locis vestit. Fo. 1274.

Small creeping-grass and smooth crested-grass.

§. 3. The *gramen parvum repens purpureâ spicâ*, or small creeping grass, is no indication of bad ground, though a very slender grass: Ray says, vol. 2. fo. 1286. it is very common in pastures.—It seems to have a great sweetness in it.—The same may be said of the *gramen cristatum*, for that also abounds every where in our meadows and pastures.—It is in English called smooth-crested grass.

Perennial grasses may endure the winter.

§. 4. As I conceive, it may be laid down for a general rule, that all such plants as are perennial will bear sowing as well at autumn, i. e. before winter, as at spring, provided they are sowed early enough to take good root before winter, the difficulty lying here; for they are plants that will endure many winters; thus may you sow rye-grass, broad-clover, hop-clover, French-grass, &c.

I happen-

—dung than that where the turnips grow, which perhaps is also too wet for sheep in the winter, and then the turnips will, by the too great moisture and dirt of the soil, spoil the sheep, and, in some soils, give them the rot: yet such ground will bring forth more and larger turnips than dry land, and when they are carried off and eaten on ploughed ground in dry weather, and on green-sward in wet weather, the sheep will thrive much better; and that moist soil, not being trodden by the sheep, will be in much the better order for a crop of corn; and generally, the expence of hurdles and removing them being saved, will more than countervail the labour of carrying off the turnips.—They must always be carried off the ground for cows and oxen, which will be fattened by them, and some hay in the winter.

I happened to carry out in my dung some winnowings of clover-seed, and laid them on two ridges of land where I had sowed wheat: the clover came up very thick at harvest; but was not so rank as the barley-clover, it being kept down by the wheat.— It was a very wet, but not a hard frosty winter; but from hence I do infer, that clover-seed will endure the winter, nor will it seed the next summer, nor damage the wheat.

§. 5. This day, being the 30th of May (anno 1707) walking Of the in the fields at Mr. Raymond's I observed that the seed-vessels, or gaping of cups of all the several sorts of grasses in the meadows, gape in the feed- their flowering-time, so that the little mistress or plume (from vessels. whence the flower arises, which is the first principle of the seed, and no bigger than the point of a needle) may easily be conceived to be hurt by bad weather, such as blights, mildews, rain, &c. I also observed the seed-vessels of the barley to gape.

I impute the great quantity of grasses this summer, 1705, to the advantage of the great drought the grass-flowers had in flowering-time, the farinaceous or flowering seeds on the stamina not having been washed off by rain.

§. 6. Hop-clover and broad-clover grasses seem to my eye, by Of the their deeper colour the second year than the first, not to be so nature of sweet a food then as in the first year, when they are brighter co- hop and loured. broad-clo-

§. 7. As broad-clover falls off of it's sweetness after Midsum- ver. mer (as elsewhere hinted) and will not then fat ewes and lambs, as Grasses natural grass in a good pasture will do, so I doubt not but all abate of their sweetness do abate of their sweetness and spirit at that time of the year. after Mid-

§. 8. Varro says the medic seed ought to be sowed in the summer. Of the morning after the dew is off; and no more ought to be sowed Of the than can be covered-in by the harrows the same day; for, if not medic covered, the least wet may destroy it. feed.

Post secundam diem horam vel tertiam spargendum est, cum jam omnis humor sole ventove deterfus est, neque amplius projici debet quam quod eodem die possit operiri, nam, si non incessit, quantuloconque humore prius quam obruatur corrumpitur.— I believe this seed, as well as vetches, and other grain that come up in the shorter time, takes in moisture very fast, and is apt therefore, if not sowed dry, to burst and corrupt. ^a

§. 9.

^a The medic or Luserne so much extolled by antient writers had not been long introduced into England, and was very little known in the time of our author. Mr. Tull's description of it is as follows. "It's leaves resemble those of trefoil: it bears a blue blossom very like to
" double

Hop and broad-clover
ver not natives of
England.

§. 9. I have often suspected, that the hop-clover and broad-clover we sow was not of English extraction, because it will not last above two years with us, if mowed, and but three years if we feed it as sparingly as possible, and sow it in the best land we have; therefore I thought these seeds might have been brought from Flanders, where, as natives, they might last many years;—but I am now (anno 1707) convinced from Mr. Ray, and from the nature of those plants: Mr. Ray, in his History of Plants, vol. 1. fol. 944, calls the broad-clover we sow—the larger purple meadow trefoil;—and shews the manifest differences between it and our red honeysuckle, and says,—it grows in pastures, but less frequent than the common purple trefoil, and is also sown in fields as food for cattle, and by some called common clover-grass: and the same author, in his Synopsis Stirpium Britannicarum, fol. 194, carries on the comparison farther, and says, it is not so durable as the lesser purple meadow trefoil, nor does it like that sow itself.—And of the hop-trefoil, vol. 1. fol. 949, he makes but two sorts, and says, the bigger, which is that we sow, grows in the fields among the hedges, especially in gravelly or sandy soils.—I do indeed conceive, that none of these trefoils are long-lived, not only because they have tap-roots poorly maintained by fibres (of which those we sow have fewer, and are less nourished by the capillary roots than the others, they being pretty well matted) but also because I find the white honeysuckle, the purple, and the lesser hop-clover to increase and decrease yearly in a manifest manner, according as you improve or impoverish your ground; if you improve it with manure or ashes, you may raise great quantities of it, I judge, from the seed, but if you mow it, and withhold your dung, it will die away in two or three years time.—The * Dutch clover, white honeysuckle, I think, ought chiefly to be managed by ma-
nures,

“ double violets, leaving a pod like a screw, which contains the seeds
“ about the bigness of broad-clover, tho’ longer and more of the kid-
“ ney shape. It’s tap-root penetrates deeper into the earth than any
“ other vegetable it produceth.”—He is of opinion however, from
some reasons he there mentions, that there is no hope of making any
improvement by planting it in England, in any manner practised by
the antients or moderns, and relates the great expence and pains the
Romans were at to raise it; but to those, who are desirous of making
the experiment, he recommends his new Horse-hoeing Husbandry as
the only method to obtain it. Mr. Miller calls it an extreme hardy
plant, and is positive, it will succeed well in England, but seems to
agree with Mr. Tull, that it cannot be cultivated here to any good pur-
pose by the old method of husbandry; for the rules he lays down for
it’s culture are all according to Mr. Tull’s manner, by the drill, and the
hoe-plough. See his directions at large under the article—Medica.

nures, where it likes a ground, because it is sweet food, and by it's trayling stalks takes root at the joints, and matts extremely, and soon over-runs a ground, and is therefore, I believe, the longest liver.

§. 10. The more stony your ground is the more reason to sow clover, because thereby the barley may be the better raked up; inasmuch as either hop or broad-clover will bear up the barley from the stones, but rye-grass, it seems, is not serviceable on that account. To sow clover on stony land

§. 11. I find that broad-clover, sowed on strong clay-land, which is apt to run to sward, is not so apt to run to grass, if mowed, as when fed; for when it is mowed, the clover-grass runs so rank, that it shades and depresses the natural grass, it cannot do when fed; besides, the feeding of cattle brings a soil to it, which encourages the natural grass, but kills the broad-clover; for, where the cow-dung lies, the broad-clover will turn white and rot underneath it, and dunging of sown-grasses, such as saint-foin, instead of enriching them, brings on the natural grass. Broad-clover runs sooner to grass when fed than when mowed.

§. 12. It seems to me a very great difficulty how to account for the growing or not growing of broad-clover, whether sowed in the spring, or at autumn with a wheat-crop; for I have often observed some lands in the same ground to fail, where the nature of the soil had been the same.—On the utmost reflection I can make, I do conclude, that sometimes, where fields are sown with wheat and broad-clover, the clover has failed on account of the coldness and wetness of the ground, and I make the same judgment of broad or hop-clover sowed with oats, especially if sown early in the spring, when, though the land may not be too cold, neither in it's own nature, nor through rain, &c. for oats, yet it may be so for clover-feed.—And though white-ground in it's own nature be dry and warm, yet it is hollow and light, and, being also poor, the cold of the spring often pierces it, and so in such grounds the hop-clover as often dies as in cold clay-ground.—And it often happens, that three or four acres in a large ground may fail by being sowed wetter than the rest, by the falling of rain, which might put a stop to the sowing of the oats for two or three days, and then you may be obliged to sow again before the ground may be dry enough for the clover-feed, though it may do well enough for the oats.—Note therefore for the future to observe more critically whether this diversity does not hold.—From hence seems to arise the cause, why broad-clover seldom succeeds so well with black oats as with white, because they are sowed early, and while the ground is cold, and therefore the more care ought to be taken. Inquiry into the cause why broad-clover often fails.

§. 13.

Of feeding broad-clover.

§. 13. The autumn-clover, which shoots up at the beginning of September, arising from a young bud, and being full of sap as well as of but a short length, is easily fed and maintained throughout the winter, and therefore to be saved by being hayned; but the first year's clover, which comes up among the corn, or the growth of aftermoss-clover, being before autumn grown to a good length, requires too much nourishment (when nature is withdrawing it's strength in order to form and nourish the buds of the next spring) to be maintained during the winter, and therefore ought to be fed down, because otherwise it would die on the ground.

Caution to favour grafs after britting. See § 22.

§. 14. I left a patch of French-grafs for seed, and it britted much; I soon eat down the aftermoss, and hayned it from the middle of August, or the beginning of September, for the next summer's crop; the 2d of October (anno 1704) I went to see whether the brittings came up, or not; I found they came up very thick on the ground, with their seed-leaves, and established trefoil-leaves, and with farther soboles prepared at the roots for next year, and I believed they would do well, not having been fed otherwise than as above; for this feeding of the aftermoss, to eat down the rowet, that the brittings might grow, did them good. A day or two after I observed broad-clover and hop-clover in their seed-leaves, and their trefoil-leaves, very plentiful from brittings; therefore the favouring such grounds a month after britting, and in rains, adviseable.

First year's clover makes the best early grafs for horses.

§. 15. Broad clover of the first year, i. e. after the stubble, is forwarder in it's growth, and springs faster than the second year's growth will do; therefore, if you would have early grafs for your horses, a clove of the first year's growth is fittest for them. — The fibres of the roots of the young clover are more spongy than those of the second year's growth; the glands also of the former are tenderer, and more easily admit of the philtration of the juices through them than the latter do, and therefore the young bud sprouts faster than that of the next year's growth.

Of broad-clover of the second year's growth for fattening cattle in the spring. Vid. Fattening of cattle, §. 17.

§. 16. Having said nothing of the great service of twenty or thirty acres of broad-clover to support great cattle in a dry season, in July and August, when there is more especially a stop to vegetation for a month or five weeks, I have this spring (anno 1719) found such twenty or thirty acres of broad-clover, of the second year's growth, of equal service to what it had been in July and August; for this year my broad-clover supported my great cattle from the middle of April to the middle of May. — As I found the broad-clover of the said grounds beneficial the former year in July and August, so without the same relief this spring.

spring my great cattle must have starved; for my fodder-straw was gone by the middle of April, and no rain had fallen for five weeks before, and the wind had been north and easterly for six weeks, so that no grass of any other kind did wag, and yet the twenty acres of broad-clover did from Mid-April to Mid-May maintain twenty-three yearlings, and eight steers of four years growth, besides a great many hogs, and yet the pasture grew on them, and run more and more to a head every day, though early in the spring the sheep had fed it down bare, so that the ground was not hayned, till the beginning of April, and the wind, as well as drought, opposed the growth of the grass.

§. 17. Amongst the many advantages of sowing broad-clover one is, that it will grow during the fore-part of the winter, and will support a few fatting-sheep, giving them a little hay with it, and without the grass being injured by them, provided you keep only a few in a large extent of ground; that they may not be forced to bite too close; whereas hop-clover will make no such advances in the winter months as to serve such an end or purpose: this is a good conveniency to a country gentleman, who would fat his own mutton in the winter. Of broad-clover, it's use.

§. 18. As I remember, Ray says, that the true broad-clover grows wild in moist fat meadows; therefore it is no wonder that it should succeed well when sowed in moist, spewy, and springy, cold arable.—At Holt there is so cold and springy a clay, the farmers used not to sow it, either to barley, oats, or peas, and would but now and then clap in a few beans; but farmer Isles (before, or about the year 1716) sowed it to broad-clover, and it got a very thick sward, and carried a deep green colour, and yet the ground was not laid round, but was laid down flat. Broad-clover loves moist ground.

Farmer Lavington of Wiltshire was of opinion, that a black, sandy, mellow land was the best ground for broad-clover, that the old broad-clover hay was as good as old meadow hay, only in foddering the leaves of the clover were apt to fall off, so it made more waste than the other.—Mr. Raymond said, the broad-clover hay was so luscious, that neither sheep nor cows liked it so well as common meadow hay;—but farmer Lavington replied, he found not but that with change they liked it as well as the best hay. Id. black, sandy, mellow land.

§. 19. It often happens, that, when dry springs and summers follow after the sowing of clover-grasses, they will come up in a blade, and die away again without any sign of a blade appearing at harvest, and yet about that time on the following summer a thick blade shall appear above ground, and produce a good crop: this happens when the blade only was killed by the drought; but the root had escaped, and so sprung up again when rain. Of clover in dry springs.

rain came.—When the blade appears in the spring, tho' it dies away again, you may have hopes of it's reviving, but, if it never appeared, there can be no hopes at all.

Sickly clover should be fed, healthy mowed.

§. 20. A Gloucestershire gentleman shewed me his broad-clover, and said, some part of it had been dunged, and was the better for it;—but, when I had examined it, I found the land to be of a wet, cold nature, and I suspected that most part of that which was not dunged was killed by the wet, and I believed much of the other was killed by the dung; but it is true, so much of it as escaped grew the thicker and ranker for it, being supported by the dung, as by a cordial, against the wet. This broad-clover turned yellow; therefore, if it did not recover it's colour, especially if it put forth fresh buds at the root, I thought he should feed it down, though if it recovered of it's sickly look, it ought to be mowed.

Cows dunging kills broad-clover.

§. 21. I have heard say, that broad-clover would not come again where the cows had dunged, and I do believe it, especially where it falls broad on the grass; for I have turned up such cow-dung, and found the broad-clover under it perfectly whitened, and rotted by the dung, which roots I suppose were forced by the dung in such a manner as thereby to be killed, as it fares with kitchen-plants.

Off-favouring broad-clover and French-grass in November, &c. See §. 14.

§. 22. November the 5th (anno 1703) I cut up several roots of broad-clover, and found the top of the root divide itself into many tufts, as the French-grass root does, through the center of which tufts the new soboles are formed, and issue out; I found at this time of the year most of the soboles formed for the next year grown enough to be bit off by the sheep, which I conclude must put nature very backward, and cause her to form another central bud within the foldings of that bit off; therefore great favour ought to be shown to such grasses at this time of the year;—but as for rye-grass, and other such-like grasses, though their roots divide themselves into tufts, from the center of which also, as through a sheath, the new spires of grass spring up, yet it is but of one continued spring of grass, not made up of dissimilar parts, and so it has no leafy head to be taken off, to so great damage as the French-grass has; but being bit off, it has similar succedaneous parts, which carry on it's growth, and so winter-feeding does not hurt it.

Of the roots of clover, &c. and inferences

§. 23. My men were fallowing up a field that had been two years sowed to broad-clover: I wondered to see such abundance of slender carrotty-roots turned up by the plough, and staring an end; I plucked at them, and drew some of them up, and found they were the broad-clover-roots; I measured them, and found most of them to be eleven inches long in the tap-root: It is evident

dent from hence of what consequence the depth and strength of the soil is as well to broad-clover-roots as to carrots and parsnips, and to hop-clover too ; for quickly after I dug up a hop-clover-root of two years growth ; it was in pretty good strong ground, and I found it to be in length about six inches, and very thick, when compared with a root or two of the same year's growth ; I pulled another root of hop-clover, in a piece of white-land, in the same ground, but it was very slender and weak compared with the other, and not so long.—From hence it is plain, as has been before observed, that in good land the clover is neither hurt by the sun, nor tore up by the cattle, as it is in poor land : it is also apparent, from the deep penetrating of it's tap-roots, how necessary it is their mold should be made fine and easy to them when they are sown.—I also examined the rye-grafs, and I found it consisted of an innumerable number of short hairy capillary roots, and consequently feeds on the fat surface of the ground, and therefore at Midsummer, when ground is burning, it soonest burns, and is best and chiefest in the spring, and at autumn ; nor need ground be so fine, nor so deep, nor so rich for it, as for either French-grafs or cloyer. Rye-grafs improves for a year or two, or three years ; whereas the clover dies away, and disimproves the surface of the land, tho' indeed it improves yearly by pasturing of cattle, by the heat of the sun, and by the moisture of both rain and dew.

§. 24. The flourishing condition of plants is no argument for the agreement of the ground with them, in case the seed of such plants be the fruit for sake of which they were sown ; for, as before observed, the plant is the hardiest part, and will often flourish in a soil much too cold to bring the seed of it to perfection ; thus I can have rank barley-straw, and rank broad-clover-grafs on my clay-grounds, where the seed of each will be cold and thin, nor will they come to due perfection.

It is plain from the reasons aforesaid, that the seed-part of the seed is the tenderest part of it ; and that the plant, or herbaceous part of the seed, is the hardiest part of it ; so that one need not be so very curious in changing the seed of any grain, tho' somewhat degenerated, when you sow not to produce seed, but only to raise the grassy or herbaceous part of the plant.—Therefore what gore or winter-vetches, tills, or clover-grafs you may sow only for fodder for cattle will do very well from seed of your own growth, taking this caution, that every year you buy new seed for what you intend to let run to seed, and wherewithal to sow your crops the succeeding year ; except indeed you raise seed of winter-vetches of your own saving, it is impossible, if you sow a great quantity of them, to procure seed time enough to sow so early

early as that grain requires to be sown ; so remis are farmers in threshing out their winter-vetches for the market.

Aftermas of broad-clover had hay in the hill-country. §. 25. Our Hampshire hill-country is so cold, that the broad-clover aftermas ripens very indifferently, and the juices of it are very cold and sour ; so that, if the hay made of it sods a little in the wet, tho' housed afterwards never so dry, it becomes tasteless : this I had experience of in the year 1711 ; when I had such hay that had taken wet, but was reeked very dry, and came out in good order ; yet the cow-beasts would not eat it for change so well as straw, but made waste of it ; and the calves would not touch it ; yet I could see nothing more than ordinary in it, but that it had lost it's colour and smell, but was neither wet nor finnowy.

Hop-clover, if the summer proves dry, lasts but one year. §. 26. I have observed, that, if a summer proves dry, hop-clover will not hold above one year ; either the sheep, feeding it close, pull it up by the roots, or else the root not striking deep has no shade, and so is burnt up by the sun.—But I have a great presumption, that that evil would be remedied, if we laid our grounds down in good heart to hop-clover ; for then the root would strike deep, and would neither be injured by feeding at stubble-time, nor by the heat of the sun in summer.

Management of broad-clover in Wilts. §. 27. Mr. Townsend of Caln, in Wilts, tells me, that thereabouts they make great advantage of ploughing the aftermas of broad-clover into the ground the second year, and then sowing wheat on it :—they roll it down, he says, and some, who have sheep, tread it down before they plough it in.

The younger the root the sweeter the grafs. §. 28. The extraordinary fineness of the wool, about All-cannons in Wiltshire, is imputed to the richness of their arable land, which bearing continual ploughing, the grafs that springs up in the fallows is thereby always young and tender, as proceeding from annual seeds, not from old roots : it holds as a general rule in grasses of all sorts, that the younger the root the sweeter the grafs. So broad-clover, and hop-clover, and rye-grafs too, are much sweeter the first year than the second ; it seems therefore to be good husbandry in the hill-country of Hampshire to plough-in the second year's broad and hop-clover, because, as it is coarser the second year than the first, so it must be very coarse seed in the hill-country, where it is often four the first year.

Of ploughing-in clover in the vale and hill-country. §. 29. It seems to me, that in the vale, where the land is good, and lies warm, and brings the broad-clover forward, and where they sow wheat late (the latter end of October, or after) they may plough-in the broad-clover pretty early in the spring, viz. by the middle of May, it having been hayned up early for that purpose ; for by that time there may be a good burden, being ploughed-in, to improve the ground with, and there will be time enough

enough to sow it, either on the second, or on the third earth; for the clover will have time to rot by Michaelmas; but in the hill-country, where both the land and the air are cold, and consequently cannot bring the broad-clover forward to a good head early enough in the spring, and where we sow wheat very early (in August, or the beginning of September) I do not see how we can have a burden of broad-clover on the ground early enough in the spring to have time, when ploughed in, to rot, and to give the ground any more than one earth before seed-time.—Therefore, in the hill-country, I rather advise to feed the broad-clover early in the spring, and then hayn it up, so that a good burden may be ploughed-in by the latter end of July, taking a dry time for doing it, in order to sow wheat on the back of it, i. e. on one earth, in August, or by the middle of September at farthest.

§. 30. Amongst other advantages of sowing broad-clover beyond hop-clover one is, that, as I have observed, few thistles, age of docks, or other trumpery of weeds come up in my broad-clover grounds, in comparison of what come up in the grounds sown with hop-clover; for the broad-clover spreading, and covering the ground so much more than the hop-clover does, it kills the weeds; it also grows taller than hop-clover, and runs up to a good height the second year's growth, which hop-clover does not, and is a great means to suppress weeds. The growth of weeds in my hop-clover cannot be imputed to the foulness of the feed, because I use milled-feed.

§. 31. Mr. Herrick assured me from experience, that, if, on their rich land in Leicestershire, broad-clover was sown, when the ground was intended to be laid down for a long time to natural grass, the broad-clover would, when it decayed, prevent the ground from swarding to natural grass.—This may very well be in such grounds as naturally run to grass, as the rich lands of Leicestershire do, inasmuch as the broad-clover may destroy the very roots of the natural grass, and kill the seedlings that may lie in the ground, and would come up, were they not checked.

§. 32. The poorer the ground is the closer you ought to feed down the sown-grasses: broad-clover and hop-clover ought to be fed down almost close to the root; for, if either broad-clover, or hop-clover grass be sown on white-land, or be cut out of proof by the poverty of the ground, and you let them run but to a full-grown leaf, it will be of a foliomort colour, and speckled with black specks, which is a blight occasioned by the weakness of the ground, and such grasses, especially hop-clover, will eat bitter, and therefore the grass of such ground should be always kept fed down close with sheep; for, if you let it run up high enough for a bite for a cow, no cattle will eat it; so the rule holds, as well

well in sown as natural grasses, the poorer the ground is the closer to feed them down.

If clover be thin and sickly when broke up, sow vetches. §. 33. If broad-clover, or hop-clover has a small, thin, unsappy leaf, or looks of a foliomort colour, and is out of proof, whatever the nature of the ground be, and tho' generally kind for corn, yet trust not such a ground at it's first breaking up, neither to wheat, peas, nor barley, for it will disappoint you: rather choose to sow it to vetches, and, if they prove well, you may then promise yourself a good crop of barley: this I have found by experience to be true.

Hop-clover after-mass comes to nothing, if sown with broad-clover. §. 34. If hop-clover, and broad-clover be sowed together, and mowed, the hop-clover afterwards will come to nothing; consequently the afterwards of the broad-clover must be the thinner.

Hop-clover short-lived. §. 35. I conclude that the hop-clover commonly sowed is not long-lived where it grows wild, as Mr. Ray says, in arenosis & sabulosis (which I have often observed) not above two or three years, because in all sorts of soils that I have known it to be sowed in, as well sandy as gravelly, I never heard that it lived above two or three years.

Hop-clover preferred to broad-clover. §. 36. Notwithstanding what I have said of the advantages of broad-clover beyond hop-clover, yet I know many farmers are of opinion that hop-clover is much sweeter feed than broad-clover; and particularly one assures me, if a ground be sowed half and half of each, the cattle will never touch broad-clover till the hop-clover is eat quite bare.—He judged the broad-clover to be a four feed; for, said he, if cattle were put into a field of it, they would pare away the four grasses round the edges quite to the earth before they would begin on the broad-clover; but he said, the broad-clover hay was much better for either great cattle or sheep than hop-clover hay, which nevertheless was good feed for sheep, if well housed, but the broad-clover hay was full as good as any other hill-country hay.

Caution to sow twenty or thirty acres of broad clover for fattening-beasts in the hill-country. §. 37. Though I think it answers my purpose, as well as others in the hill-country, to sow hop-clover rather than broad-clover, yet it is very necessary for me every year to sow from twenty to thirty acres of broad-clover, to supply me for a short time with grass for my great cattle, when other grasses are either not so forward in the spring as to pasture them, or have been burnt up in a hot summer, and so have expired till they revive in afterwards; for instance, broad-clover may be very useful to usher in the other spring grasses for a fortnight before hop-clover will be high enough to afford a bite for great cattle, and, if you mow the broad-clover, the afterwards will be of great use, when the vigour of the hop-clover is spent, as also that of the natural grasses, which

V. Fattening of cattle, §. 17.

which will come in turn after the hop-clover, and will hold till after the hop-clover is gone ; the aftermas of the broad-clover will then fall in turn to support that great stock of cattle maintained hitherto by hop-clover and natural grafs, which you could not otherwise have maintained, had you not had such a quantity of broad-clover aftermas, or French-grafs aftermas, to receive them till the aftermas of the hill-country meadows, or the natural grafs pastures, could be of growth enough for that purpose.

§. 38. The farmers are very apt to say, that broad-clover impoverishes land, but hop-clover does not.—This, as it seems to me, must be understood, if they are both mowed ; for then, broad-clover being double the burden, no wonder if thereby the ground be doubly exhausted ; on the other hand, both being fed, it should seem, broad-clover maintaining twice the cattle that hop-clover will, acre for acre, it should doubly improve the ground ; but to abate of that it may be objected, that hop-clover being undeniably the sweeter feed consequently makes the richer dung, and therefore, being but half the quantity in burden, yet being fed may improve ground as much as broad-clover.—Cold clays are not fit however for hop-clover, and it appears to me, that the best barley ground is the best hop-clover ground.

§. 39. I have observed, according to the forwardness or backwardness of the spring, that about the beginning of May the hop-clover will have run it's length to it's first flowering, and then it begins to be pasture for cows and young beasts, and from thence it continues on flowering, joint by joint, as the nest of bud-blossoms proceed on in growth, still leaving a blossom behind on the last joint on a stalk below, and thus it will continue to do till about the eighth, or, as it did this year (1718) till the ninth of June, about which time it will have completed it's height, and the topmost blossoms will then wither and run to feed ; all which time, being about six weeks, the hop-clover grafs is very hearty for all great cattle, and they will eat it freely till about the 8th or 9th of June, tho' the blossoms of the lowest joint are seeded ; so long as the seeds continue soft and green, and do not turn blackish, so long the stalk also will retain good sap ; so until this time the hop-clover grafs may be depended on for pasture for all sorts of great cattle ; sheep also will eat of it thus long very well, and will bite deep of the stalk.

§. 40. ¹ It may be known, whether the hop-clover out of husk yer feed

¹ Mr. Miller says, in the choice of broad-clover seed that which is of a bright yellowish colour, a little inclining to brown, should be preferred, but the black rejected as good for little.

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husk is too much kiln-dried or not, as well by it's strong fragrant-smell as by it's colour and taste ; for it has a strong rich smell, if not over-heated.

Hop-clover roots torn out of the ground by winter-feeding with sheep, and inference. §. 41. Walking in the hop-clover ground of the second winter's growth on the 26th of January (anno 1702) I observed more particularly than I had done before, that not only many hop-clover roots had been drawn out of the ground by the sheep, and lay without any hold at all, but half the hop-clover tufts also were more or less drawn out of the ground, some for instance half out, others not so much, but in general they were all of them jogged or loosened, which was occasioned by the sheep's being kept hard on them, and often biting in last summer's and this winter's feeding, but more especially in this last winter, which proving very wet, the roots were the more easily loosened or drawn out ; besides by the great vacancies among the tufts of the clover, compared with the first thickness they appeared in after harvest, it was visible vast quantities had perished in the afore-said manner before the second winter ; nor can it but stand to reason, that by their roots being thus shaken, and half drawn out of the ground, they must be much weakened in their growth, and kept backward, no less than trees are that suffer by such loosening at their roots.—This is therefore a strong inducement to me to think summer-fattening of sheep more profitable than a winter-breeding stock, whereby the winter-charges of the latter is altogether avoided, and the clover, being winter-hayned for the summer-fattening, four times the quantity may be expected to be well-grown and deep-rooted, and, such fattening-sheep being to be well kept, there will be no danger of their much injuring the clover in the summer.

Of wild white and red broad-clover or honey-fuckle. See §. 45. Of the melilot—nonfuch. §. 42. Mr. Webb of Mountain-farley sowed the wild white and red broad-clover, or honeyfuckle, and it holds the ground and decays not : he says, it is practised in Suffex, and that he had his seed from thence.

§. 43. ^k The melilot-leaves are generally nicked in the edges by some insect that knaws them : Mr. Bobart and myself were looking on a plant of it in his garden, that was so bit ;—he said, he never saw a plant of it but what had it's leaves bit in that manner.—This cannot always be done by a worm in the same manner the peas are, for there were many collateral branches of it at Mr. Bobart's, which stood a foot and an half high, and had shot after it was out of the reach of the worm : quære

^k They, who are desirous of being acquainted with the culture of the melilot-trefoil, or nonfuch, may consult Mr. Miller's Dictionary, under the article—Melilot. I believe there was very little of it sown in the fields in our author's time, nor is it yet grown common.

quære therefore what insect this must be.—It has also the name of trifolium caballinum in Italy, because horses are particularly fond of it—it seems it is an annual plant.

§. 44. Some will have the rattle-grafs to be called louse-wort, Of louse- because it makes the cattle lousy. Ray. vol. 1. fol. 769. and Sy- wort. nopsis, fol. 162. In pratis sterilioribus.

§. 45. The broad-clover-grafs, which of late years (anno Of the 1707) had obtained some credit, as a longer living grafs than the honey- common broad-clover, and is sown under the name of cow-grafs, fuckle- I find to be the common purple trefoil, or honeysuckle-trefoil, trefoil. as described by Mr. Ray, vol. 1. fol. 944. distinguished from the great purple meadow-trefoil, which has always hitherto been sowed by the country farmers, and I doubt not but always will; for by experience I find the other not to yield half the burden, nor indeed, in poor ground, such as in our hill-country we commonly lay down to grafs, to be a longer liver than the common sort; —but both sorts being natural to some lands, I doubt not but they will continue more years therein than when sown in poor land, or in a soil not so agreeable to the genius of the plant.

§. 46. Mr. Holyday, a considerable clothier in Wiltshire, was Of the giving me an account, in the year 1707, that the Spanish wool lesser me- was always troubled with a burr, and that, in cleansing some of dic-tre- the foulest of it, there came off more coarse foul wool than or- foil, yel- dinary, so that he was tempted to lay it on his meadow-ground, low blou- to improve it, which brought forth a strange sort of grafs, that fomed. had lasted ever since, it being many years ago. It was, he said, a three-leaved grafs, and brought forth yellow flowers, and abundance of burrs with seeds in them.—I found this to be one of the annual medics I had in my garden, with burrs for the seed- vessels, and by it's seeding every year, I suppose, it maintained itself in his ground; but what I take notice of it for, is this; he assured me, in picking the Spanish fleeces there were none but what had more or less of the burrs in them, which is an argument to me, that the Spaniards sow much of this trefoil, it not being a native of their country, but brought from Persia.—Quære if it may not be a very sweet feed to breed fine wool.—It seems to me in the leaf to taste sweeter than hop-clover: I went to see this trefoil, and found it to be the lesser medic-trefoil that had small burrs;—but I since find by the clothiers, that the Spanish wool has been coarser for thirty years last past than formerly, which may be occasioned by their sowing these grasses.

§. 47. Notwithstanding the great character the Rei rusticæ Of the scriptores give of the cytibus, or shrub-trefoil, for food for all cytibus, or sorts of cattle and fowls, and Pliny says,—it is not in danger of shrub-tre- being hurt by heat, or hail, or snow, non æstuum, non grandinum, foil.— non nivis injuriam expavescit, yet the use of this trefoil is not to Medicago, Miller. be

be transferred into our climate; for Mr. Bobart assured me, that the plant will not bear our winters, unless housed in a green-house.

Columella commending the cytifus for its great use for cattle and fowl, says, there is no climate in which this shrub will not grow plentifully even in the poorest soil, neque est ulla regio, in qua non possit hujus arbusculæ copia esse vel maxima, etiam macerrimo solo fol. 187.—It will not, as above noted, endure our winters in England.

Rye-grafs. §. 48. One of my tenants told me, rye-grafs was what they coveted in the Isle of Wight beyond hop-clover; for, said he, the rye-grafs will bear the winter, and keep to a good head, which the clover will not do: I have had, added he, an acre and an half of rye-grafs upon tolerable good ground, which I have hayned up from Michaelmas until within a week of Candlemas, and from thence to the middle of April it has kept fifteen ewes and fifteen lambs.

Though I disapprove of dunging French-grafs and clover, for reasons noted before, yet it is proper to dung rye-grafs; for it makes the roots of that tillow, and mat on the ground, to the utter destruction and suppression of the couch-grafs.

Mr. Ray says of the gramen foliaceum, or rye-grafs; it is a perennial plant, with jointed roots, and propagates itself by sending forth fibres from its joints, fol. 1263.—And because its roots do farther propagate, I doubt not but it may be kept alive, by dunging it, many years longer than we usually do, or by refreshing it with soil, when after two or three years it begins to decay.

As rye-grafs does not improve land as other grasses do, so it may be presumed, if Dr. Woodward's doctrine be true, the rye-grafs roots, being very like the roots of oats, barley, and wheat, may feed on the same salts of the earth that the roots of those grains do, and that the orifices of the rye-grafs roots consist of the same angles with those of the said grains.

Rye-grafs generally lasts but three years: Mr. Lawrence, near Upcern, Dorset, told me, that he had as much rye-grafs seed on eighteen acres of land as was worth twenty pound, and, after the seed was threshed out, the hay was better than oat-straw fodder.—I saw a reek of it in his back-side, and an oat-straw reek, which were both laid open to the cattle, and they would not touch the straw, but had made such an hole into the rye-grafs hay-reek, that it was ready to fall.—He said, if it was mowed green, and not for the lucre of the seed, it was excellent good for cattle.—He sells the seed for twenty-two pence, and two shillings per bushel; and sows three bushels on an acre.

Mr.

Mr. Oxenbridge shewed me some of his rye-grafs hay, and I thought it was very fine hay; he looked on it, he said, as his choicest fodder for his sheep:—he mowed it when in the flower.

Farmer Ryalls of Dorsetshire affirmed, he had known experienced farmers say, that the very hee-grafs, after mowing the rye-grafs the same year it was sowed, being ploughed-in, was as good as dunging, and would pay for the seed.

I find all farmers from experience do agree, that notwithstanding rye-grafs will maintain as many cattle on an acre as hop-clover will do, yet it does not improve land for corn like hop-clover. —This must proceed from one of the following two reasons, or partly from them both: viz. First, the rye-grafs consisting of a multitude of matty fibres, which run on the surface of the ground, they gird and hold it so together, that, when ploughed, they cannot be disentangled from it's earth, which cannot therefore be made to work fine.—Secondly, the fibrous thready roots of rye-grafs having great likeness to those of wheat and barley, as also the spiry grafs-leaf being much like the blade of those grains, it may well be suspected, that the rye-grafs roots suck similar juices from the earth with the roots of those grains, and so they may rob each other of their specific nourishment proper to them; whereas, the roots of hop and broad-clover being like a carrot, and their leaves different from the blade of corn, they neither gird the earth together, nor feed on the same juices the aforefaid grains are believed to do; for in all respects otherwise rye-grafs should more improve the ground than hop-clover, not only as it feeds more cattle, but also as it keeps down all weeds, which hop-clover does not.

A farther reason why rye-grafs is not so natural to produce a good crop of corn as clover is, may be, because rye-grafs and darnel are by many herbalists ranged, as bastard sorts of corn, amongst the classes of corn: the roots of rye-grafs are sweet and juicy, promising nothing of strong concocted salts; whereas the roots of clover are very hot and tart, which argues that they have drawn to them and digested many nitrous and salt parts, which, when rotten in the earth, may well impregnate it.—Quære about the roots of peas-halm, and of the halm of vetches; for I must suspect those roots to communicate to the earth the same benefit that clover-roots do, and a greater benefit than only by mellowing it.

§. 49. All plants with piked flowers, as saint-foin, and which Of mow-carry a gradation of flowers one above another, on the same spike, ing close put forth the lowermost blossoms on the same spike first, which to the go into seed in the same order, till at last the topmost buds flower ground, and seed; and of plants which bear many flowers on a gradation for the of joints, as the pea, hop-clover, common crow-foot daisy of the sake of field, the feed.

field, &c. I observe the lowermost blossoms on the joints blow and seed first; and I do suspect, that all those plants, which carry their blossoms on in a successive gradation of joints, have those series of joints all at first included in a huddle in one small pod; at least it has been so with as many as I have observed, and as before noted of the pea; which, cluster of blossoms still advance upwards, leaving a joint bearing blossoms behind, and so on: thus it is in hop-clover; on which, when it is in flower, the cattle for a short space of time feed but sparingly, and on the uppermost parts, and topmost flowers, because, the flowers on the lowermost joints being run to seed, the seeds eat bitter, which the cattle dislike.—From hence it is obvious, that such grafs mowed for seed ought to be mowed close to the ground, and the stones to be well rolled down; else the best of the seed, growing on the lowermost joints will be lost.

Of French-grafs. §. 50. ¹ It is evident, that where French-grafs is sown, on those parts of each field, where the earth is weak, shallow, and poor, there the French-grafs will first decay.

§. 51.

¹ Mr. Miller says, this plant, if sown upon a dry, gravelly, or chalky soil, will continue eighteen or twenty years; but, if it be sown upon a deep, light, moist soil, the roots will run down into the ground; and in a wet season the moisture will rot the roots, so that it seldom lasts above two years in such places. This is esteemed one of the best sorts of fodder for most cattle, and is a great improvement to shallow chalky hills, upon which it succeeds better than in any other soil, and will continue many years. Mr. Lisle and Mr. Tull both agree with Mr. Miller in regard to it's being damaged by wet, but Mr. Tull will by no means allow that a shallow chalky soil is most proper for it. As he has wrote very largely on the culture of this plant, I imagine the following extract from his work may be agreeable to the reader.

EXTRACT from Mr. Tull, chap. 12. of St. Foin, or Sain Foin,——
Sanum fœnum, Sanctum fœnum, or French-grafs.

There is a vulgar opinion, that St. Foin will not succeed on any land, where there is not an under stratum of stone or chalk, to stop the roots from running deep; else, they say, the plants spend themselves in the roots only, and cannot thrive in those parts of them which are above the ground.—I am almost ashamed to give an answer to this.—'Tis certain that every plant is nourished from it's roots (as an animal is by his guts) and the more and larger roots it has, the more nourishment it receives, and prospers in proportion to it. St. Foin always succeeds where it's roots run deep, and, when it does not succeed, it never lives to have long roots; neither can there ever be found a plant of it, that lives so long as to root deep in a soil that is improper for it.—An under stratum of very strong clay, or other earth, which holds water, may make a soil improper

§. 51. Being at Holt, I was told by Mr. Baily and Thomas Miles (the winter having been exceeding wet) that the wet winter had killed abundance of French-grafs round about the country, especially where it was near the clay,—and I found it to be so; therefore neither cold nor wet land are proper for French-grafs.

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§. 52.

improper for it; because the water kills the root, and never suffers it to grow to perfection. If there be springs near (or within several feet of) the surface of the soil, St. Foin will die therein in winter, even after it has been vigorous in the first summer, and also after it hath produced a great crop in the second summer.—The lighter the land the seed will come up from the greater depth, but the most secure way is, not to suffer it to be covered deep in any land, for the heads (or kernels when swoln) are so large, and the necks (or strings that pass from the husks to the heads) so weak, that, if they lie much more than half an inch deep they are not able to rise thro' the incumbent mold; or, if they are not covered, they will be malted^a—The worst seasons to plant it are the beginning of winter and in the drought of summer: the best season is early in the spring.—It is the stronger when planted alone, and when no other crop is sown with it: the worst crop that can be sown with it is clover or rye-grafs; barley or oats continue but a little while to rob it; but the other artificial grasses rob it for a year or two.—The qualities following are signs by which to chuse good seed—viz. The husk of a bright colour, the kernel plump, of a light grey or blue colour, or sometimes of a shining black; yet the seed may be good, tho' the husk is of a dark colour, if that is caused by it's receiving rain in the field, and not by heating in a heap, or in the mow; and, if you cut the kernel off in the middle, cross-ways, and find the inside of a greenish fresh colour, it is surely good; but, if of a yellowish colour, and friable about the navel, and thin, or pitted, these are marks of bad seed. It's manure is foot, peat-ash, or coal-ash. The first winter is the time to lay it on, after the crop of corn is off.—(Note, other good farmers there are, who say no ashes or manure should be laid on St. Foin till it has been sowed two years, for it will force it too much, and the crop will not last so many years if ashes be sowed as Mr. Tull directs)—Before to suffer no cattle to come on the young St. Foin the first winter, after the corn is cut that grows amongst it; their very feet would injure it, by treading the ground hard, as well as their mouths by cropping it: nor let any sheep come at it, even in the following summer and winter.—St Foin is more profitable either for hay or seed than meadow grass, for the latter, if not cut in good weather, is spoiled, and yet it must be cut in it's proper season, which is but one, whereas there are four seasons for cutting St. Foin, and if you are disappointed in the first of these, you may stay till the second, and so on; besides the hilly-ground whereon St. Foin is chiefly planted, is more commodious for drying the hay, has less of the morning

^a Mr. Lisle differs from him in this, and advises, if the ground work light and fine, to sow St. Foin under furrow. See—Of sowing St. Foin.

Dunging
not good
for
French-
grafs.

§. 52. Being at Mr. Jeremy Horton's in Wiltshire, there were there Mr. Anthony Methwin and Mr. Holdway, clothiers, but experienced farmers, and I asked them if they dunged their French-grafs; they said, by no means; Mr. Holdway said, they looked on it in Gloucestershire, that dung did little good to French-grafs, the

morning and evening dews than the low meadows. The four times for cutting it are,—first, before blossoming,—secondly, when in flower,—thirdly, when the blossoms are off,—and fourthly, when the seed is ripe. He commends the first of these, which he calls virgin hay, much before the others for keeping working horses in good case, or fattening sheep in winter, and prefers it even to beans, peas, and oats. He adds however that this sort of hay is not to be had from poor ground, that is not cultivated, or manured with peat-ashes, soot, or the like.—The second, or that which is cut in its flower, according to the most common practice, tho' inferior to the first, yet far exceeds all other kinds of hay commonly known in England.—The third, which is cut when the blossom is gone or going off, tho' greater in bulk, is much less valuable than the former two, and, after these three, you have a fourth chance for good weather when the seed is ripe.

To make St. Foin hay.—A day or two after it is cut, when dry on the upper side, turn the swarths two and two together, opposite ways, and the ground will require less raking. Make them up into little cocks the same day they are turned, if conveniently you can; for when it is in cock, a less part of it will be exposed to the injuries of the weather than when in swarth.—Dew, being of a nitrous penetrating nature, enters the pores of those plants it reaches, and during the night possesses the room from whence some part of the juices is dried out: thus it intimately mixes with the remaining sap, and, when the dew is again exhaled, it carries up most of the vegetable spirits along with it, which might have been there fixed, had they not been taken away in that subtle vehicle. If St. Foin be spread very thin upon the ground, and so remain for a week in hot weather, the sun and dew will exhaust all its juices, and leave it no more virtue than is in straw. Therefore it is best to keep as much of our hay as we can from being exposed to the dews, while it is in making, and we have the better opportunity of doing it in this than in natural hay, because we may more safely make it into larger cocks, for St. Foin cocks (tho' twice as big as cocks of natural hay) by the less flexibility of the stalk admitting the air, will remain longer without fermenting.—When the first cocks have stood one night, spread two, three, or more together in a fresh place, and, after an hour or two, turn them, and make that number up into one cock; but when the weather is doubtful, let not the cocks be thrown or spread, but enlarge them, by shaking several of them into one, and thus hollowing them to let in the air, continue increasing their bulk, and diminishing their number daily, until they be sufficiently dry to be carried to the reek. The best hay I ever knew in England was of St. Foin, made without spreading, or the sun's shining on it. This way, tho' it be longer ere finished, is done with less labour than the other.—If St. Foin be laid up pretty green,
in

the dung chiefly encouraging bennet-grafs, and couch-grafs.— Mr. Methwin said, he would not believe Mr. Holdway, who had formerly told him so, but dunged some of his French-grafs, and found that the dung nourished a natural grafs, and caused it to come

in small round reeks, with a large basket drawn up the middle, to leave a vent-hole for the moisture to transpire, it will take no damage. These reeks, as soon as the heating is over, ought to be thatched; and all St. Foin reeks, that are made when the hay is full dried in the cocks, ought to be thatched immediately after the making them.

The seed is good for provender, and three bushels of it, some say, will go as far in nourishing horses as four bushels of oats. All cattle are greedy of it; I have known hogs made very good pork with it, but whether it will fat them well for bacon, I have had no trial.—

The threshed hay also, when not damaged by wet, has been found more nourishing to horses than coarse water meadow hay, and, when cut small by an engine, is much better food for cattle than chaff of corn.

—It requires some experience to know the proper degrees of ripeness, at which the seeded St. Foin should be cut, for the seed is never all ripe together, and, if we should defer cutting till the top seeds are quite ripe, the lower which are the best, would shed, and be lost.—The best time to cut is, when the greatest part of the seed is well filled; the first-blown ripe, and the last-blown beginning to be full.—The colour of the kernel is grey or blueish when ripe, and the husk, that contains it is of a brownish hue, but both of them continue perfectly green for some time after full grown, and, if cut in this green plight, will ripen afterwards, have as good a colour, and be as good in all respects as that ripened before cutting, add to which, there will be less danger of its shedding.

St. Foin seed should not be cut in the heat of the day, while the sun shines out; for then much, even of the unripe seed, will shed in mowing: therefore, in very hot weather, the mowers should begin to work very early in the morning, or rather in the night, and, when they perceive the seed to shatter, leave off, and rest till toward the evening. After cutting we must observe the same rule as in mowing it, viz. not to make this hay while the sun shines.—Sometimes it may, if the seed be pretty near ripe, be cocked immediately after the scythe; or, if the swarths must be turned, let it be done while they are moist, not two together as in the other hay aforementioned. If the swarth be turned with the rake's handle, 'tis best to raise up the ears first, and let the stub-side rest on the ground in turning; but, if it be done by the rake's teeth, then let them take hold on the stub-side, the ears bearing on the ground in turning over. It is commonly rain that occasions the swarths to want turning, or otherwise, if the swarths are not very great, we never turn them at all; because the sun or wind will quickly dry them.—Sometimes, when we design to thresh in the field, we make no cocks at all, and but only just separate the swarths in the dew of the morning, dividing them into parts of about two feet in each part. By this means the St. Foin is sooner dried than when it lies thicker, as it must do, if made into cocks: but, if it be cocked at all, the sooner it is made into cocks the better; because,

come upon the surface of the ground, but it did not enrich the French-grafs;—nor does it stand to reason it should, the faint-foin root running down so deep into the ground that dung cannot reach it; yet it will make the stalks a little prouder, but will neither make the root to tillow, nor matt.

§. 53.

because, if the swarths be dry, much of the seed will be lost in separating them, the ears being entangled together: when moist, the seed flicks fast to the ear; but, when dry, will drop out with the least touch or shaking.

Of threshing St. Foin there are two ways, the one, in the heat of the day, while the sun shines, in the field, the other in the barn. Of the former, the best manner is, to have a large sheet pegged down to the ground, for two men to thresh on. Two persons carry a small sheet, and lay it down close to a large cock, and with two sticks, thrust under the bottom of it, gently turn it over, or lift it up upon the sheet, and carry, and throw it on the great sheet; but, when the cocks are small, they carry several at once, thrown upon the little sheet carefully with forks; those which are near they carry to the threshers with the fork only; as fast as it is threshed, one person stands to take away the hay, and lay it into a heap, and sometimes a boy stands upon it, to make it into a small reek of about a load. As often as the great sheet is full, they riddle it thro' a large sieve to separate the seed and chaff from the broken stalks, and put it into sacks to be carried into the barn to be winnowed. Two threshers will employ two of these little sheets, and four persons in bringing to them, and when the cocks near them are threshed, they remove the threshing sheet to another place.—The sooner these threshed cocks are removed, and made into bigger reeks, the better; and, unless they be thatched, the rain will run a great way into them, and spoil the hay; but they may be thatched with the hay itself, if there be not straw convenient for it.

The better the seed escapes the wet in the field, the sooner it's own spirits will spoil it in the granary or barn. Seed threshed in the field, without ever been wetted, if immediately winnowed, and a single bushel laid in a heap, or put into a sack, will in a few days ferment to such a degree, that it will lose it's vegetative quality: the larger the heap the worse; but I have known it lie a fortnight in swarth, till the wet weather has turned the husks quite black; then threshed in the field, and immediately put into large vessels, holding about twenty bushels each, and this seed has, by being often wet and often dry, been so exhausted of it's fiery spirits, that it remained cool in the vessels, without ever fermenting in the least; and then it grew as well as any did that was ever planted. To prevent the fermentation above mentioned many spread it on a malt-floor, turning it often, or, when the quantity is small, upon a barn-floor, but much of it is spoiled even this way; for it will heat, tho' it be spread but an handful thick, and they never spread it thinner: besides they may miss some hours of the right times of turning it, for it must be done very often; it should be stirred in the night as well as the day, until the heating be over; and yet, do what they can, it never will

§. 53. On the second of November (anno 1703) I looked into my French-grass, to see the method of it's progression in it's growth; I pulled up some roots of it, and washed them, and I saw plainly, that at the top the root divided itself into many tufted branches, which tufts carried a few branches or grassy divisions, which closed together, all folding, at the bottom of the tuft, one within another: in the center of these tufts were the soboles or mistresses wrapped up by the said folding branches, which soboles were designed for the spring-shoot. In some tufts the soboles were better grown than others, according to the vigour of the tuft: these tufts taken up with the roots seem to stand off at a little distance from the roots, so as, (being fed in the winter, by sheep especially,) to be obnoxious to be bit off, and so the

Of the French-grass, and caution not to feed it after August.

will keep it's colour so bright, as that, which is well housed, well dried, and threshed in the winter: for in the barn the stalks keep it hollow; there are few ears or seeds that touch one another, and the spirits have room to fly off by degrees, the air entering to receive them. The only way I have found to imitate and equal this, is to winnow it from the sheet; then lay a layer of wheat-straw (or, if that be wanting, of very dry threshed hay); then spread thereon a thin layer of seed, and thus layer upon layer, six or seven feet high, and as much in breadth; then begin another stack; let there be straw enough, and do not tread on the stacks. By this means the seed mixing with the straw will be kept cool, and come out in the spring with as green a colour as when it was put in, and not one seed of a thousand will fail to grow when planted. I have had above one hundred quarters of clean seed thus managed in one bay of a small barn. We do not stay to winnow it clean before we lay it up in the straw: but only pass it thro' a large sieve, and with the van blow out the chaff, and winnow it clean in the spring.—This field-threshing requires extraordinary fine sun-shiny weather, and therefore, in most summers, it is but a small part of the day in which the seed can be threshed clean out. They, who have but a little quantity, carry it into a barn early in the morning, or even in the night, while the dew is on it; for then the seed sticks fast to the ear: as it dries, they thresh it out, and, if they cure it well, have thus sometimes good seed, but generally the hay is spoiled.—There are two misfortunes that attend carrying it in without threshing. If carried in the dews or damp, the hay is sure to be spoiled, if not both hay and seed, and, if taken up dry, the seed comes out with a touch, and the greatest part is lost in pitching up the cocks, binding and jolting in carrying home. To avoid this dilemma he relates a contrivance, which is intricate and impracticable to common farmers, and therefore I omit it.

Rats and mice are great devourers of this seed, and will take the kernels out so dexterously, that the hole in the husk shuts itself up when the seed is out of it; but, if you feel the husk between your finger and thumb, you will find it empty; also a sackful is very light. Incurious persons have sowed such empty husks for several years successively, and, none coming up, concluded their land improper for St. Foin.

the foboles, the hopes of the spring, may be lost; but, if you observe them whilst in the ground, these tufts are so closely seated, and let into the very ground, that the foboles in the bottom of the tufts do not seem so much exposed, but only the leafy branches round about the tufts, which are well grown, and not dependent on the foboles; for, if they are bitten off, the hopes of the summer-crop seems to be destroyed. Great regard ought therefore to be taken, in winter-feeding of this grass, by observing how far the foboles are advanced upwards, and whether within the power of the sheep to bite them off or not, before they are put into it. Besides these foboles, mentioned to be situated in the center of each tuft, there appears here and there an eye, or a bud, in the upper part of the root, but just to be discovered, not so big as a pin's head, which in all likelihood makes but a very weak branch the next year, but grows stronger and stronger every year, and thickens, as waxing into tufts, stronger and stronger, according as fresh foboles may annually arise out of the center of those of the last year's growth. Thus it seems, that what is but a foboles this year, thickens the tuft next year, and in it's center carries a new foboles, which grows stronger the more the tuft thickens; by what appears, the old spreading-branches of the French-grass, such as have grown-up after the feeding of the aftermaths till September, being of the nature of the winter-vetch, will endure the winter, and be the most vigorous branches of the next summer, if not fed; and whereas some say, you ought not to feed French-grass after Christmas, it seems they do well that feed it no longer, but they who feed it not at all after August do better.

Of the decay of French-grass.

§. 54. I observed by digging up French-grass roots, that their decay proceeds from the same cause that the decay of the broad-clover roots does, and that in clay-land they decay soonest; this decay is occasioned by the fibres perishing, and then the canker takes the top, and eats downwards.

Best manner of winter-feeding French-grass.

§. 55. After French-grass is mowed, if you are resolved to winter-feed it, I look on the following to be the best manner, first, to eat down all the wild natural grass with sheep, that being fine and green, by virtue of being shaded by the French-grass, but will burn away if not eaten, and it ought also to be kept down; secondly, to feed down the remaining part of the French-grass, which the scythe has left, but, after these are eaten, I would advise, that it should be hayned till towards September, because the roots of the French-grass running down great depths are apt, till summer is over, to draw a great quantity of sap, and, if during the months of June and July, especially if rain should fall, they should put forth gross buds, and tender shoots, and the cattle should crop them off, the root might chance to be choked by

a plethory, whereas about September the roots cease to draw in such plenty of juices, and begin to be quiet, and, if the branches should then be eaten off, the roots will not be so over-charged as to want branches to empty their redundancy of juices into.

§. 56. The reason why many plants are to be killed by often cropping, and yet the natural pasture-grass no wise suffers by it, I conceive, is, because the leaf of the natural grass is a continued spire, and, when it is bit, lengthens itself out again by growth, and receives all the affluence of sap in the root; and in case it could be bit below the leafy spire into the ground sheath, yet in the tuft, from the same root, are a multitude of issues monthly and weekly breaking out, enough to receive the sap from the the roots, so that the roots cannot be choaked by a plethory. Now, the plants, which are to be killed, by being cropped at spring and at Midsummer, are those, which, being full of sap, at those times only do make issues of shoots, which, being cut off, the channels consequently are taken away, and the exuberancy of the sap must burst the root-vessels and kill the plant. Some plants there are, such as hop-clover, broad-clover, and other trefoils, which may be said to partake of both natures aforesaid; for the trefoil, being bit off from its pedestal or stalk, does not grow again, (as the spires of common grasses do) that is, out of the same stalk do issue forth no new trefoil buds; therefore it seems good husbandry to suffer the trefoil-leaf to come to some maturity before it is bit; but again, on the other hand, it has a property common with pasture-grass, which is, to be continually putting forth buds and issues, one under another, from its roots, capable to receive all redundancy of sap; for which reason it is not killed by often cropping.

§. 57. At Holt in Wiltshire, walking in the French-grass with French-farmer Miles, I asked him, whether he found the French-grass good for fatting of sheep; he said, it was neither so good, nor would prove them so well as English grass; for the sheep would pick up the English grass from amongst it before they would heartily fall on the French-grass.—He said, the sheep might feed the aftermas of the French-grass till towards Christmas without hurting it, and after that the hurt it received was not from the winter, nor by the frosts, but because about that time, or soon after, it might spring and shoot up, and to take off that early shoot in the cold weather was that which might hurt it; for by the side of such early shoot a little dwindling shoot would spindle.

§. 58. Mr. Short Baily assured me, that sheep will feed very well on French-grass hay, and make little waste.—Mr. Randolph says, the sheep will eat French-grass hay till it be above three years old, but then it grows too stemmy.—Mr. Raymond says, Of French-grass hay for sheep.

in their country the sheep eat French-grafs hay very clean, if the grafs be cut before it blows out in flower.

Different opinions on foddering in French-grafs.

§. 59. Mr. Anthony Methwin thought, that foddering of cattle in French-grafs would do it as much harm as winter-feeding.— Mr. Short Baily was of a different opinion, unless you turn in great cattle, which might tread it too deep; but he was confident, that folding or foddering with sheep would do it a kindness.

Natural grafs destroys other grasses.

§. 60. I have observed, where natural grafs comes up near a hop-clover or broad-clover root, that such root will be but of short continuance, and will insensibly vanish and die away before any of the rest of the clover-grafs in the same field, about which no natural grafs comes up; which makes for what is said by gardeners of those grasses, viz. that they and weeds impoverish the ground, and draw away the nourishment from the plants.— Natural grafs consists of innumerable matty fibrous roots, which, without doubt, running on the surface of the ground, must feed on the nourishment which the clover should have, and these grasses do, I believe, so far rob the roots of trees of their nourishment, that the gardeners, who advise orchards to be ploughed up, among other advantages to the roots of the trees, think likewise, that those trees may find a farther advantage by having such grasses destroyed from the surface of the ground.

Of rowet.

§. 61. The strength and spirit of rowety grafs is observed, after the first snow that falls, if it lies a while on the ground, to go off very much, and to have little proof in it, to what it had before the falling of the snow.

The more you improve your grounds, the more rowet you will have after the corn is cut; for the stubble-land will carry a good grafs to maintain cattle till it is ploughed up again, and this will both save hay, and keep you from a necessity of threshing out corn to a disadvantage of price.

And of ploughing it in.

There is often a rowet in grounds, which your own beasts, as being used to sweeter grafs, will not eat, or sometimes the growing season of the year may not afford them opportunity to eat: in this case it will seldom be proper to buy in hungry beasts to eat it up; for they may either be dear, or, when they have eat up your rowet, you will not know what to do with them, they not deserving your sweeter meat; therefore in this case I hold it to be more proper to plough-in the rowet, for the improvement of your land.

Of lob-grafs. Sign of poor ground.

§. 62. The grafs which country-people call the hooded-grafs, or lob-grafs, is apparently of but little value; for it grows up with a single culm to a root, without grassy leaves, or herbage about it's roots; it generally grows on the poorest sort of ground; no wonder then, that so much of the seed of this is commonly seen

seen among the rye-grafs feed that is sold ; for the lands, that are sowed with rye-grafs, are generally poor in nature, and impoverished farther by corn ; so these grounds are apt to yield abundance of lob-grafs, for the bearing of which I hardly find any ground too poor ; and I have observed, that poor ground will naturally carry a little crop of this grafs, tho' it can maintain no other sort ; the more therefore of this a certain indication of the greater poverty of the ground.—I have at this time, June the third (anno 1707) observed, that this grafs has perfected it's feed, in it's seed-vessels, when other grasses were but flowering, and as it's seed-vessels easily fall, so they naturally propagate themselves.

The way to destroy the lob-grafs, or hooded-grafs, is to feed your grounds to prevent it's feeding, or else to enrich them by manure, so that the tufted roots of better grasses may multiply as not to give room for the lob-grafs feed, which is a large seed, to take root ; the roots of that grafs seeming to be very weak, as having but few fibres, and so may easily be jostled out of the ground, as the innumerable fibres of other grafs-roots multiply by manure.—I suspect the lob-grafs to be but an annual. The French sow it, and call it fromentel.

The *testuca avenacea hirsuta paniculis minus sparsis* grows on walls, and hillocks, and on lynchets or balks in fields, and on dry places. Ray's *Synopsis*, 261.—This is what we call lob-grafs.

§. 63. There are several ranunculi common in our meadows, which, when green, blister and ulcerate the flesh ; these the cattle will not touch, but leave standing in the fields, and yet, as I am told, all sorts of cattle will feed on them greedily, when dried and made into hay. Doctor Sloan, fol. 25, mentions this, to account for the *caffavis-root*, which, tho' strong poison when green, being baked makes wholesome bread.

§. 64. My meads are very full of dandelion ; but I conclude it no sign of poverty, Ray, vol. 1. fol. 244. saying, it grows in gardens, and areas, and pastures, and flourishes through the whole summer.—I suppose it is a grateful bitter to the cattle ; I do not find but they eat it very well either in grafs, or in hay.

§. 65. The *gramen minus duriusculum*, or small hard grafs, grows plentifully on my white chalky lands, at Crux-Easton, not worth sixpence per acre.—Gerard says, this grafs is unpleasant to, and unwholesome food for cattle, that it grows in moist fresh marshes.—And Ray, vol. 2. fol. 1287. says, on walls and dry places : so that I find it is of the nature of moss, which grows equally either on walls or wet places, where the ground is out of heart, and wants strength ; therefore such grounds want their cordials.

M E A.

M E A D O W S.

Mush-rooms an indication of good meadow-land.

§. 1. FROM the observation I made of my own hill-country meads, I find that an indication of the goodness of the soil may be seen in the mushroom-season, by it's bearing (if it be a healthy pasture) plenty of mushrooms; for those meads of mine, the goodness whereof I full well know, by my soiling and feeding them do bear the greater plenty according as they are in heart, and the parts of the same mead proportionably to the goodness of the soil; whereas those meads, which are out of heart, bear no mushrooms.

Dwarf flax in meadows, sign of poverty.

§. 2. *Linum catharticum*, or dwarf-flax, Mr. Ray says, abounds in the drier pastures, especially on the hills.—I have great plenty of it in those meads that are very poor, but in meads which are in very good heart, tho' only parted from the other by a hedge, none of it will grow: I take it to be a great indication of poverty, where-ever it grows, and indeed, dry and poor, and fat and rich are reciprocal terms, when we speak of land; for dunging would moisten such dry lands, and alter their property, so that dwarf-flax would no longer take up an abode in them.

Of great and common meadow-grafs

§. 3. Mr. Bobart assured me, that the great or greatest of meadow-grafs, *gramen pratense paniculatum majus*, is the best hay of the meads, as being most grassy or leafy, that is, the culms proceeding from the roots have the most gradus of leaves on them, and are very sweet: the common meadow-grafs, *gramen pratense paniculatum minus*, has no leaves to it's culms, in comparison with the other, and only an herbage from it's roots that is low; yet Ray, I find, says, it is greatly coveted by the cattle, but takes no notice of the former for that excellency. Vide also Ray's Synopsis, f. 257.—But Gerard says, the common meadow-grafs, *gramen pratense minus*, grows on barren hills, and is only fit for sheep, and not great cattle.

Moss a sign of poverty.

§. 4. It seems to me, that the cause of moss in lands, or on trees, &c. is poverty: the *Rei rusticæ scriptores* say, that poor, dry, and hungry land is subject to moss, and it certainly is so; and we know also that a good strong sort of land lying wet, or a hill-country land on a cold clay, or lying shelving to the north, will be subject to moss also, and yet the land may be of a good sort, and value, when cured of the moss.—Nevertheless the same reason as above may be given for the moss abounding in the dry

† There is a middle sort of meadow-grafs between these two,

dry beggarly land as in the stronger sort of land mentioned after ; for what difference is there between land according to the first instance poor and dry, having no salts or vegetable spirits in it, and the other sort of land, wherein the spirits are bound up, and chilled, and rendered unactive, by reason of the coldness of the earth, it's wetness, or it's lying to the north, so that it's spirits cannot be rarified, nor set on wing, in order to exert themselves? what signify strong liquors, or juicy herbs, put into a still or limbeck, if there be no fire set underneath to move them, and make their spirits rise?—Again, as to dry, poor, beggarly land, and as to trees bearing moss, we may compare their state to that of every dry stake or hurdle-hedge, in which, as the sap and spirits of the wood are exhaled, which will be at a year's end, a moss will grow on the bark, and more and more the second and third year it stands, as rottenness comes on ; and so the moss on the body of a tree, or it's branches, is an infallible sign of the poverty of the tree, at least in those places where it grows ; it shews that it's fibres and fistular parts for conveying of juices, in those arms or limbs, are decayed, or decaying, or by some accident rendered useless.

§. 5. Columella is of opinion that the older the dung the less profitable it is for meadows. *Fimum pratis quo vetustius minus profit, quia minus herbarum progeneret, &c.*—Columella, fo. 106. The older the dung the worse for meadows.

§. 6. That hop-clover and wild broad-clover come up in meads, and pasture-ground, by strewing ashes and lime, and in some measure by chalking, seems to me to proceed from the heat of those manures, which render the principles of the vegetation more active, by attenuating them, and putting them into a brisk motion, whereby they become able to open and penetrate those seeds, which are plentifully brought into the ground, by the feet of both men and beasts ; but the principles of vegetation were too languid before for that purpose ; yet dung will in some measure do the same thing ; foot also, as I have experienced in my meads, has the same effect.—It is also to be observed, that pathways through meads and pasture-grounds are more subject to clover than other places, which proceeds from the same reason ; those paths by often treading become better land ; feeding-meads for the same reason produce clover.—I question much whether these manures laid on arable land that is laid up to pasture would under a long time produce the wild clovers, because the seeds are not in plenty on the surface but by long time. Why lime and ashes useful to meadows.

§. 7. Mr. Wise's farm at Newnham in Oxfordshire lying Of rolling much on the water-meadows, it happened that his meadows, and meadows the neighbouring people's were, just before hay-making time, after overflowed, and exceedingly stranded ; the neighbouring people floods. cut

cut their grafs in that condition, tho' hardly worth the cutting; Mr. Wite rolled his, which fo lodged and fastened the knots of every spire of grafs in the mud and strand, that from the knots there immediately sprung up a very rich aftermafs, which he thought paid him the damage of lofing his firft crop of hay, and he mowed it to his great fatisfaction.

When to
few grafs-
feed in
meadows.
A mea-
dow, tho'
thin of
grafs,
fould be
mowed.

§. 8. Columella recommends the fowing of grafs-feeds in meadows that are thin of grafs, the feed to be fown in a mild feafon, about February, and then to dung the mead. fo. 110.

Benefit
from feed-
ing mea-
dows.

§. 9. It was a very burning summer (anno 1702), and we had no hay in the meads, but only bennets, and thofe not worth cutting: however the farmers and labourers all agreed, that it was for my profit to mow them, tho' it fould not pay the charge of mowing; for, faid they, the aftermafs will prove away abundantly the better; whereas the grafs will not grow afrefh, unlefs the dying bennets be cut off, neither will horfes, nor other cattle eat the bennets all the winter; fo the dead rowet will continue on the ground, and will prevent the growth of the grafs next summer, and fpoil the mowing of the meads the next year, and further, the bennets, if not mowed, would hurt the eyes of the fheep;—and they all faid, they knew this to be true by experience.

Of raking
up hay
after fod-
dering on
meadows.
Of hayn-
ing up
meadows.

§. 10. Walking in the meadows on the 28th of May (anno 1714) I faw it was very manifef, that by feeding the meadows for two years laft paft, inftead of mowing them, I had greatly increafed the broad-clover honeysuckle, and deftroyed the yellow rattle or coxcomb-grafs.

§. 11. When meadows have been foddered on in winter, take care to rake up the hay before the worms have drawn the ends of it into their holes; for then it will not rake up, but will both hinder the mowing, and make the new hay fufy.

§. 12. I think meadows ought to be hayned from about the middle of Auguft till the end of October, that, the fown graffes then going off, there may be rowet till the latter end of December for odd horfes; I think this will pay beft, and if then hayned, in cafe the meadows are in good plight, they will bring a head of grafs againft lambing-time.

§. 13. What up-lands you defign for mowing, in order to make hay, fhut them up in the beginning of February. J. Mortimer, Efq; F. R. S. fo. 25. *

* See the article Hay.

P A S T U R E S.

§. 1. **H**AVING, as I thought, greatly improved Crux-Easton, Pastures in the hill-country fitter for sheep than great cattle. by laying down grounds to grass, that were more natural for bearing grass than corn; I considered thereon, that I might greatly increase the number of my great cattle, i. e. my cows, &c. and I purposed to keep oxen, knowing that I had a length of grass for a bite for them; but I found myself mistaken in this respect; for our hill-country ground, though it be a clay, and improved by manure and pasturing; yet is of a cold and sour nature, and though, by giving it time to grow, it may carry grass to a length to answer the aforesaid purposes, yet the tops of such grass will be coarse and sour, as running to a length beyond what the staple of the ground can well carry, and so will do less service, in proportion to the length of time it will require to arrive to so great a growth as to maintain great cattle, than it would have done, by a less and shorter growth, in maintaining sheep; for the grass, in such case, being kept short, and not of a length beyond what the strength of the ground will carry it to, it is in proportion so much the sweeter, and better for improving sheep than it would be, when run to a greater length, for supporting great cattle; as the common saying is, A lark is better than a kite.—Again, the keeping of sheep upon such land will make a much quicker return, inasmuch as the grass, on hungry, or poorer pasture, will grow the faster (when it is so kept down, by keeping sheep on it, as not to exceed an inch in growth) than it could have done by keeping great cattle; in which case, tho' you let it grow to a greater length, suppose three times as long, it will require five times the time, or perhaps more, in growing the two inches beyond the first inch, than it was in growing that first inch: if all this be true, it is apparent, that on such ground you may maintain a much greater number of sheep in proportion than you can of great cattle; i. e. suppose the proportion of a sheep to a cow to be five to one, you shall in this case be able to maintain seven or eight sheep to one cow, and no one can doubt, where the land is equally fit for either, but that ewes and lambs will pay better than the keeping of cows: how little profit I can, in proportion, make of a dairy, in comparison of what I can make of sheep, I am fully convinced by the great turgid udders of the cows at Gausuns, and the middling udders of the cows at Pomeroy in Wiltshire, and the lank udders of my cows at Crux-Easton; nay the cows at Holt carry much better udders than mine, and those cows generally go with the sheep, which shows the feed is much sweeter than mine.

X 2

§. 2.

The good-ness of another ground, lies not in it's length, but in it's sap and gross-ness; for, if a ground be poor in juices, the grass will be so long in growing, and the sun will so harden and confirm it's fibres, that it will eat hard, and afford less nourishment than the same sort of grass, and of the same height, which grew in half the time, the fibres of which will be tenderer than the other.

Sign of good and bad pasture. §. 3. This is a general rule that may be depended on in pastures; where grasses are, that naturally grow in barren grounds, such lands want manuring, and then the better sort of grasses, which carry strong roots, will easily overcome such poor grasses, they having but weak roots, and such pastures are to be looked upon to be in a better, or in a worse condition, according to the perfection and breadth of the leaf, and the length of the culm or panicle, which such poor grasses carry; again, if by manure you so alter the property of your pasture as to bring up the clovers, you must still observe the breadth of the leaf such clovers carry, and the largeness of the flower; for, if they arrive not to that growth you see them do in very good pastures, you may be assured, your ground will still pay well for farther dunging.

Of the richness of certain pastures. §. 4. Sir W. Raleigh, c. 3. fo. 31. says, Quintus Curtius makes this report;—that there are pasture lands lying between the rivers Tigris and Euphrates, which are of so rich a nature, that they dare not suffer the sheep to lie long upon them for fear they should be surfeited and killed,—which is incident to our rank grasses, as clover, and quick-growing pastures of natural grasses, especially in the spring.

Of ploughing up ferny rowety pasture. §. 5. I have observed ferny grounds (which have lain long to rowety grass, and to a four impoverished grass) fit almost for nothing but to make cattle lousy; I have seen these grounds ploughed up for two or three years, and laid down again without being sown to grass, and have often observed such grounds to have put on a fresh face, and to have born a more sappy and juicy grass, and to have afforded a tolerable good pasture.—The reason of this I conceive to be, that these rowety grasses (having for many years shed their seeds, of which the ground was full, and the seeds alive) being by the ploughing killed root and branch, the seeds of those grasses take root, and bring forth a young tender herb, which continues so for a few years, till the roots decay again, and then it is fit to be ploughed up again.

Of laying up pastures for winter-rowet. §. 6. As it is better to plough up lands at the latter end of July, or the beginning of August, for a barley, or a peas-fallow, than to fat so late in the year, as has been noted before, so it is better to lay up grass-ground at the same time of the year for a winter-rowet, such as will endure the frosts; which will in all likelihood

lihood pay better than late summer-feeding: those who can only use the present minute, and go to that which is most obvious, and for a present advantage, in a road with the crowd, must expect but a vulgar advantage.

§. 7. I was at Pomeroy in Wilts in October (1699) viewing Of hayn-lands with farmer Stephens: it was a mighty year for aftermafs-ing up grafs, and he gave me to understand, that he hayned the grafs pastures ground which he had fed all the summer, for winter-feed, that the cattle might then have a good bite, and kept feeding the aftermafs-grafs after the hay was off, because the grafs of the fed grounds is stronger than the aftermafs-grafs, and will better endure the winter frosts, and snows; whereas, were the aftermafs-grafs suffered to grow to a good height; it would, if frosts came, be quickly cut off, or, being washy and weak, if snows fell, it would be beaten down, and grow rotten ^b.

D O W N S.

^b Mr. Miller, to whom the world is greatly obliged for his excellent dictionary, under the articles of Barley and Trefoil, complains of the ignorance, obstinacy, and covetousness of the farmers in sowing grafs feeds with their corn, and he again repeats the same complaint, when he gives rules for laying down land for pasture.—His argument against this practice is as follows.—If the corn, says he, hath succeeded, the grafs has been very poor and weak, so that if the land has not been very good, the grafs hath scarcely been worth saving; for the following year it has produced but little hay, and the year after the crop is worth little, either to mow or feed. Nor can it be expected to be otherwise; for the ground cannot nourish two crops; and, if there were no deficiency in the land, yet the corn being the first, and most vigorous of growth, will keep the grafs from making any considerable progress. So that the plants will be extremely weak, and but very thin, many of them, which came up in the spring, being destroyed by the corn, for where-ever there are roots of corn it cannot be expected there should be any grafs; therefore the grafs must be thin, and if the land is not in good heart, to supply the grafs with nourishment, that the roots may branch out after the corn is gone, there cannot be any considerable crop of clover.—In answer to this, the farmers argue from experience, and deny the fact, to wit,—“that if the corn hath succeeded, the grafs has been poor and weak, and scarcely worth saving;” for they say, it very rarely happens that a good crop of corn damages the crop of grafs that is sown with it, but, on the contrary, they acknowledge that the grafs has more frequently damaged the barley.—By neglecting to sow grafs with our corn, say they, our ground lies idle, and we lose a year's profit; for they will not allow September to be the proper season for sowing grafs immediately after a barley crop, for a reason I shall hereafter mention, tho' it may sometimes succeed.—They assert, that the corn is a shade and safeguard to the grafs, and that the latter is very seldom destroyed but generally protected by it:—that the roots will branch out when the corn is gone, and the grafs get up after harvest.

D O W N S . .

§. 1. **I** Think it very advisable for gentlemen who have great downs, to plough a furrow across them in some places, that they may turn the best of such lands into arable; and they may have many inclosures, that, by reason of their poverty, may be fitter to be turned into rye-grass downs than to be inclosed, and then not to be ploughed above once in five, six, or seven years.

BULLS

harvest, tho' it had been before kept down by the barley;—that the roots of the corn taking up part of the ground appears to them to be of no real hindrance to the growth of the grass after the crop is cut; for the roots of the corn, dying away at the time the corn is cut, cease to rob the grass of it's nourishment, and by their occupying part of the ground, the grass is thereby prevented from coming up too thick, and the plants standing at greater distances from each other have more room to tillow and spread; whereas, on the contrary, if clover were sowed by itself, at least in the common way of sowing, it would be in danger of coming up too close, and of running up into a weak spire;—that it is common, even on poor land, the first year after corn, to cut a ton of clover from an acre, on good land a ton and an half, and sometimes two tons, which is supposed to be as great a burthen, and perhaps a greater, for the reasons before given, than the same land would produce if sown with grass only.—As clover and rye-grass however are but of a short duration, they agree, that their crop is, generally speaking, not very considerable the second year, when they feed it off and fallow the ground for wheat. It appears notwithstanding, from Mr. Lisle's account even of this second year's crop of broad-clover, that it is not of that contemptible value that Mr. Miller has represented it; for, in his observations on Grasses, he reports, that twenty acres of broad-clover of the second year did from the middle of April to the middle of May maintain twenty-three yearlings, and eight steers of four years growth, besides a great many hogs, and yet the pasture grew on them, and run more and more to a head every day, though early in the spring the sheep had fed it down bare, so that the ground was not hayned till the beginning of April, and the wind, as well as drought opposed the growth of the grass; for no rain had fallen for five weeks before, and the wind had been north and easterly for six weeks, so that no grass of any other kind did wag: and in another place, in comparing the profit of vetches with that of broad-clover, he says, the second year's crop of clover is a very great profit beyond the rent of the ground.—The farmers however, admitting their crop is of no great profit to them the second year, wish Mr. Miller could make good his assertion, and put them in a way of laying down land, which has been in tillage, to grass, in such manner as that the sward should be

BULLS and OXEN.

§. 1.^a **C**OLUMELLA and Palladius agree in the character of a good bull, that he should be large in limb, gentle in temper, and of a middle age; for the rest they refer

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as good, if not better, than any natural grass, and of as long duration; but, in their opinion, the chief rules he lays down are not practicable, especially in large concerns, and among farmers in common husbandry.—His first rule is, that when ground is laid for grass, there should no crop of any kind be sowed with the seed. This has been already answered.—His second is, that the best season to sow the grass seeds upon dry land is about the middle of September, or sooner, if there is any appearance of rain.—To this they reply, that grass seed sown at that time of the year is generally killed by the frost; so that, if you sow it at that season, you are in great danger of losing your whole crop, and, if you defer it to the March following, you lose a year's advantage; it is much safer therefore to sow it with corn in the spring, particularly on cold land, and grass so sown will be much forwarder the year following than that sown in September.—But Mr. Miller has taken notice of this objection, and, to obviate it, advises to well roll the ground in the end of October, or the beginning of November. This the farmers own might be of great use, but it must be on ground that is naturally very dry indeed, or it is not easy to be practised; for the misfortune is, the weather is commonly so moist during the months of October and November, that it is then exceeding difficult to roll the ground, which is wet and dawby at that season, and cleaves to the roller, and there hardly happens one year in twenty that you can roll it.—His third rule is, to lay the ground down to grass by sowing the best sort of upland hay seeds, and Dutch clover or white honeyfuckle.—None of the farmers I have had an opportunity of consulting have any great experience in this kind of clover; their objection therefore to this manner of laying down ground arises from the difficulty of obtaining any great quantity of this fine sort of upland hay seeds; for grass for hay is cut before the seed is ripened, and out of ten bushels of hay seed not three will be ripe enough to grow, and this last is the number of bushels Mr. Miller advises to sow upon every acre of land; besides, say they, in all pastures, be they never so fine, there will be spiry and bent grass, which is what chiefly ripens, the finer grass being kept down, and seldom producing much seed. They conclude therefore, that this may be a good rule for a gentleman, who has only walks in a wood or garden, or a small piece of land to lay down to grass, but that it will not be of any advantage to farmers, for it cannot be introduced into common practice.

^a Membris amplissimis, moribus placidis. mediâ ætate; cætera fere eadem omnia, quæ in bubus, neque enim alio distat bonus taurus à castrato, nisi quod huic torva facies est, vegetior aspectus, breviora cornua, torosior cervix, ventre paulo substrictiore. Colum, lib. 6. cap. 20.

us to what they have said of the ox, for the only difference between them, says Columella, is, that the bull has a sterner countenance, a livelier look, shorter horns, a brawnier neck, and a freighter belly.

Marks and age of a good bull. §. 2. I find by farmer William Sartain of Wilts, that a light headed bull, with thin horns, not thick at the root, is preferable, *cæteris paribus*. And the farmers of Holt say, a bull will live very quietly with oxen, or young beasts, all winter, till towards May-day, when he may grow a little rank.

His age. It is usually said, that a bull of two years old is the best to bull cows; but I find by experience, that if he be of the hill-country breed, he will, unless he be very well kept, be too small to bull the cows of three and four years old.

Of his breed's degenerating. §. 3. Mr. Raymond, who has better breeding pasture, and warmer ground than I have on the hills, says, that, if you have yearling heifers, and a yearling bull of the Gloucester-brown kind for a choice breed, one must often be renewing, or keeping up the breed, by buying one of those yearling bulls; otherwise the breed will soon degenerate.

Of a bull's killing oxen with his breath. §. 4. I had, in November (anno 1711) an ox fell lame in the field, as he was ploughing, and I had in the same field my herd of kine, and a bull going with them; the bull had never been yoked; however the men ventured to take him, and yoked him to an ox.—The bull bellowed as he went along, for two or three turns, but without making any resistance; he ploughed quietly that day, and the next; whereupon I was very well pleased, and thought to have continued ploughing with him, but my oxmen said, if I did, he would kill the ox he went against.—I thought they meant by horning him, or bearing on him, but they said, the bull would kill him with his breath.—I was surpris'd at the answer, and asked how that could be; they said, by blowing on him with his breath, which was very strong, and that in Wiltshire they, for that reason, always ploughed with two bulls together in the same yoke.—But, said they, the strength of their breaths presently ceases on their being gelt.

The better safe a bull is in the better he bears cutting. §. 5. In the beginning of December (anno 1711) I sent for the gelder of Kimbery to cut this bull, and he came and cut him, and he said, he thought he would do well; but, as the bull seemed to be out of case, I asked the gelder, whether that was better or worse for him; he said, they counted, that the better condition the bull was in it was the safer, and that he would bear it the better.

When good beef alter cutting. §. 6. Mr. Biffy says, if a bull be gelt, his bullish nature will be ploughed out in three years time, and he will make as good beef as any ox.

§. 7. It is agreed on all hands by the farmers about Holt, viz. A bull kills by farmer Sartain of Broughton, farmer Stevens, farmer Lofcomb, &c. &c. that an ox does not care to plough side by side, or under the same yoke with a gale, or a bull, till his bullish nature is ploughed off, i. e. that is to say, till a year at least be spent in work; and the chief reason they assign for it is, that the oxen cannot abide the strong breath of the gales; besides, with their short horns they can hit the oxen in the face.—They said, it was plain the strong breath of a bull will daunt an ox; for a bull of a year old was sufficient to keep the largest oxen in order, amongst an herd of cows, and to keep the oxen from riding them; for, as soon as the oxen once smell so small a bull's breath, they presently acknowledge his superiority without contesting it, and run away from him.—Many farmers for this reason will by no means yoke an ox with a bull, because the bull's short horns, as well as his breath, are apt to beat the ox out of the furrow, and to tire him, by his endeavouring to use an equal strength to draw sideways from the bull as to press forward.

§. 8. The north-country beasts that are of the western parts, much exceed our's in bulk and weight; for, though we have as deep feeding in Somersetshire, and in the vale of Wiltshire, as they have in the North, yet because we work our bullocks, that stops their growth, whereas in the North they plough with horses, and keep their bullocks unwrought till they are fatted and killed.

§. 9. Collumella would have the oxen be provided with large hoofs, unguis magnis, lib. 6. fol. 159. But the cows with small hoofs, or of a moderate size, unguis modicis, ib. fol. 166.

§. 10. Being at Holt in Wiltshire in May (anno 1711) Mr. Smith my tenant of Deadhouse, knowing that I had newly kept two teams of oxen, asked me how they held out in seed-time that spring; I told him, very well, for the spring had been so cold all the seed-season as not to make a trial how they would bear the heat; but, said I, tho' it has been very hot weather since I have been in Wiltshire, yet I believe, that at my return I should be informed they had born the heat well in their fallowing for wheat.—Now they have been at grass near a month before the hot weather came, whereby their bodies are well cooled, there is no doubt replied he, but they will endure the heat much better; but the time for their being overcome with heat was in the spring, their bodies during the winter having been dried up with dry meat, especially if any of the hay you gave them was mow-burnt or high dried, which would dispose them to scour; the reason of which he thought to be, because it heats them so much as to make them catch at every mouthful of green grass, which sets them on scouring; for which reason, he said, his

Working young beasts hurts their growth.

Signs, small or large hoofs. Of oxen heating and scouring.

his father used always in hay-making time to take particular care to dry a reek of hay thoroughly for his working oxen against spring, that it might not take any heat, but come out of the reek green, which colour it loses by heating, and that though such hay loses much of its smell, yet it is thereby made much cooler for the bodies of the oxen, and they will eat the more greedily of it.—He said, he found, that in winter the oxen would eat heated hay without scouring as well as the horses, and if French-grass hay be well housed, and cut green, he cannot make his oxen eat of it beyond Candlemas, but if over-dry and ripe, they will not eat it after Christmas.—From hence it seems, the longer you can at first hand provide, and keep your oxen at aftermas, the better and cooler in their bodies will they be, when they come to their work in the heat of the spring; and so they will be, the less heated hay you fodder them with in winter.

Of break-
ing a
young ox.

§. 11. ^c In breaking the young ox, Columella says, you should not suffer him to stop midway in the furrow you are drawing, but always let him rest at the end, that the hopes of resting may incline him to go through with greater spirit. If your furrow be above 120 feet long it will fatigue him too much, and therefore it ought not to exceed that length. It may be observed here, that the measure of an acre of land was the ordinary quantity that a yoke of oxen could plow in a day, from whence it took the name of jagerum; the furrow above-mentioned to be ploughed at one heat, was called actus, and was of 120 feet, and this being doubled in length made the two sides of an acre; so that when Columella advises a furrow not to be carried above 120 feet at most, he intimates the customary manner of ploughing, and agrees with Pliny in ascertaining the measure of the Roman acre, which is said by the author last mentioned; to be 240 feet by 120: this contains 28800 square feet; our acre contains 43560 English feet square; so ours is near double the Roman acre. Two oxen therefore might, in pretty light land, very well plough a Roman acre in a day.

^c Sed nec in mediâ parte versuræ consistat, detque requiem in summâ, ut spe cessandi totum spatium bos agilius enitatur: fulcum autem ducere longiorem quam pedum centum viginti contrarium pecori est; quandoquidem plus æquo fatigatur, ubi hunc modum excessit. Colum. lib. 2. fol. 98.—Jagerum vocabatur, quod uno jugo bovum in die exarari posset; actus, in quo boves agerentur, cum aratur, uno impetu justo; hic erat 120 pedum, duplicatusque in longitudinem jagerum faciebat. Plin. lib. 18. cap. 3.

My

My oxhind took three of my steers to break them, and to inure them to the yoke; he yoked two of the steers, being two yearlings together, and so suffered them to walk about the ground, where there were no pits, nor ditches, for them to receive hurt by; he also tyed the bushy parts of their tails together; the reason of which was, because they should not be able to turn their heads to each other so as to strike one another with their horns, or, by bending their necks too much, by endeavouring to face one another, and then striving, break their necks; in this posture he let them go in the ground, if without holes or ditches, all night, or else turn them into an empty open barn, so yoked, and thus used them two or three times before he worked them.

§. 12. If you turn off plough-oxen to lie by during the winter, in order to plow with them again in the spring, the young steers broken the summer before, which have not been housed in winter, my ploughman judges best for that purpose, because they'll best endure to lie abroad in winter: next to these the younger beasts will best endure it.

Young beasts best endure turning out at winter.

§. 13. Working makes oxen's claws grow larger and broader than otherwise they would do; therefore a broad full claw is a sign that an ox is, or at least has, been a good working beast, for hard working and free working will, either of them, make an ox's claw so to grow, because a hard working, especially a free working beast, puts his claws strong to the ground as he treads, and thrusts them hard against it, which will cause the aforesaid effect; whereas a false working beast will tread tenderly and lightly on the ground, and consequently never spread the horn of his claw.

A broad claw a sign of a good working beast.

§. 14. I always ordered my oxhind, the morning the oxen are to be * cued, to tie them where they may stand in some muck-hill, or moist place, in order to supple their claws; for as our nails, after washing our hands, pare the better, so will their claws do the same, and the nails drive the easier. After cuing, the oxen are always tender in their feet, and therefore should be favoured for a day after, and not worked in hard or stony ground, and, if they are at stall in the winter, the dung from their hinder feet should be flung forwards under their forefeet to keep them supple; their hinder feet will be moist enough of course.

Of cuing oxen. * shoed.

If you fling off plough-oxen for the winter, it is good to new cue them, or at least to turn them off with good cues on their feet; for, when they are not worked, their cues will last a long time, and in the mean while their claws will grow out well, and harden against spring.

If

It is not proper to let oxen go to carting in coppices within two or three days after being cued, till the cues are a little settled to their feet; otherwise they may be apt to tear them off amongst the stubs of the coppices.

Of pitching their feet. §. 15. Cato, fol. 13. says, you should anoint the bottom and inside of your oxen's feet with liquid pitch before you drive them on the road, that they may not wear out their hoofs.— I do not perceive, though they used oxen so much, that they shoed them.

Of drawing by the horns. §. 16. ^a Columella takes notice of the custom in many of the Roman provinces of drawing by, or, as he terms it, fixing the yoke to the horns, and says it is condemned by all the writers on husbandry, and not without cause, for oxen cannot draw with that force by their horns as by their necks and breasts.

A man better than a boy to go with the ox-plough. §. 17. I am of opinion there is nothing saved by taking a boy to drive an ox-plough, though you plough with but six oxen; a man will keep so much the greater awe over them, and will make them go trig; nay, there is a considerable benefit, if two men go with the plough, for them to change hands in the middle of the day, and drive by turns; so much more notice will the oxen take of a different voice, that it will quicken them.

Of feeding oxen after work. §. 18. About half an hour, or somewhat more, after my oxen came home from their day's work of harrowing-in oats, I went into the ox-house, to see what order things were in there; my oxen were all laid down in their stalls, chewing the cud, but no meat in their racks, not a single stalk of hay; I thought this hard usage, unless my ploughman had first fed them, before they went to their dinners, and the cattle had eaten that serving up: therefore I asked my head-oxherd concerning it; he said, they never served their oxen with fresh hay at their first coming from work, but there was always some of the oughts or leavings of their breakfasts left in the racks for them, which was then, when they were hungry, welcome to them, and they required them first to clear the racks of that before they gave them fresh hay.— I note this, because some idle hinds might fling such oughts out to the Dunghill. The evening oughts or leavings, if the oxen will not eat them, ought to be laid by for horses, &c. because, their bellies being well filled over night, they are nicer in their food in the morning, and must have fresh meat.

^a Illud, quod in quibusdam provinciis usurpatur, ut cornibus illigetur jugum, fere repudiatum est ab omnibus, qui præcepta rusticis conscripserunt, neque immerito; plus enim queunt pecudes collo & pectore conari quam cornibus. Colum. lib. 2. fol. 98.

§. 19. After

§. 19. After many years using my ox-teams I was (anno 1719) almost inclinable to dispose of them, they being so chargeable to me in winter, in hay and vetches ; but, whilst I had these thoughts, a Wiltshire farmer, of whose judgment I have a great opinion, told me, he should think I might at least keep one ox-team very advantageously, if it were only to help to eat up my winter-straw, my cow-cattle not being sufficient for that purpose ;—to which I replied, that to keep oxen all winter to eat up my straw would do me little service, when by virtue and strength of the straw I could not pretend, in winter, to do any work with them ;—to which he answered, that was a mistake ; for I might very well work them some time after they had eat up their fodder in a morning, viz from nine o'clock till two, if I put them not to too hard work, and that such working every other day would rather do them good than harm, and would get them a stomach to their meat.—I made a scruple of working them so many hours, and said, I could contrive work for them of great use to me, and work them but from nine till twelve ;—but he insisted, that I might work them from nine till two, if I contrived it so as to give them the best of my straw, though he acknowledged that straw was not so good with me as with them in the vale ; he said farther, that nothing in winter beat out cows or oxen more than their being wet on their backs or loins ; it was therefore of great consequence to keep them dry over head, in order to hold them to their proof ; for, if cattle carried their hides wet day by day, it was as bad to them as it would be to us to wear wet cloaths, and must make them sink or pitch.—From hence I resolved, that I would oblige my servants, during the winter, at least in wet weather, to tie up my cow-cattle in shed-houses, and to bring up my oxen from their straw abroad, in wet weather, to eat it in the ox-house ;—and for the same reason it seems to me, that, if I work my oxen in winter, as above proposed, by virtue of straw, I ought not to work them in cold and wet weather ; for working in one such day will beat them out (as the farmer called it) and make them to pitch more than working three days in dry weather.—To this however I objected, that, though I tied up my cows and oxen in wet weather, yet I could not avoid letting them out to water in the wettest day, and though it rained never so hard ;—to which he replied, that letting them out to water at such a time would do them no hurt, it was only their continuing in the wet for hours together, that did them prejudice.—He said farther, that, if I put the cows or oxen under skillins, or penthouses, though they lay open to the air and wind on one side, that mattered not, provided their backs were dry.

Of keep-
ing oxen's
backs dry,
and of fod-
dering
them with
straw in
winter.

The

Not beyond six or seven years old. The same farmer making me a visit, I told him what good success I had had in foddering my oxen with straw the last winter, and how well notwithstanding they did their work.— He told me, he did not doubt but they would do so, otherwise he would not have persuaded me to it; but, said he, I would not advise you to keep oxen, you propose to work, with straw in winter to above six, or however, not to above seven year old at farthest; for, when oxen are past that age, they fall off of their stomachs more than younger cattle will, nor can they hold their flesh with so coarse meat, and work withal, as younger cattle can.

Chaff for oxen.

§. 20. Barley-chaff is not proper for oxen, but wheat, and oat-chaff they may eat: the barley-chaff is apt to stick under the roots of their tongues.

Vetches for oxen.

§. 21. The plough-oxen may eat freely of the winter-vetches, and they will do them the most good at the beginning of winter, before they are forced to be housed, and whilst they have yet some grass left in the field to eat along with them; for the cold rowety grass, and the dry and hot winter-vetches will qualify one another.

* or bennetting.

By all means, however, if, in the hill-country, you pretend to fat oxen, or to work oxen in the plough, take care to have a good reek of old vetches in store against summer; for it will rarely happen but they will have great want of them, at least throughout the whole month of July; for, the pasture-grass in the hill-country, either burning up, or giving off growing by Mid-summer, it is the oxen and cow-cattle's * bennetting-time, till a fresh spring shoots up by means of rain in August, when the corn-fields begin to open to their pasture, though the sheep which bite close may fare well: at this time such a provision of vetches to go on with the rowet, and the small pickings of grass left, will be a vast support to, and of great consequence with the oxen; nor is the want of old reeked vetches, in this case, to be supplied with green vetches, which at this time of the year may be had in plenty; for, though at this season they are a good maintenance for horses, yet they are unkind to the horned cattle, and will be apt to scour them, and make them sick.

Of giving them hay in small parcels.

§. 22. It is agreed by the Wiltshire farmers, that from about the beginning of March, to the beginning of May, i. e. till the ploughing oxen are put to grass, more especial care ought to be taken to give them hay in their rack, in little parcels, small pit-tances at a time, because, the hay then growing dry, and the oxen growing hot, their breath will be so much the more apt to blow their fodder, and then they will not eat it.

Of scrubbing posts for oxen. To save the dead hedges.

§. 23. In inclosures in the hill-country, where there are dead hedges, especially if oxen are kept there, rugged posts set up in the fields, for them to scrub against, will be of great use to the oxen, as well as a safeguard to the hedges.

§. 24. It was the 15th of November (anno 1713) when my Oxhind proposed to me to take my plough-oxen into the house for the winter, it being then dry and mild frosty weather; on the contrary my bailiff was of opinion, that they might lie out a few days longer; but the other said, the weather being dry was the reason that he proposed housing them at first when their backs were dry; for it is a saying in Wiltshire among plough-men, that, if in winter you stayed till the rain came before you housed oxen and then their backs were wet when you first housed them, their coats or hair would be apt to peel off in the winter.—^c The antients are very particular in their directions to keep the backs of oxen dry, and to rub them well when they come from work, and pull up their hides that they may sit loose and not cling to their flesh.

Of housing oxen when their backs are dry.

COWS and CALVES.

§. 1. ^a **T**O keep cows from being high in case before bulling, and the bull to be in high case is Columella's rule, as well as Varro's. ^b It appears also by Columella, that in August and September they gave their cows leaves as a good part of their food. ^c He is likewise of Varro's opinion, that, if the bull turns off to the right, it is a bull-calf, and, if to the left, it is a cow-calf, but that only in case the cow takes not bull again, which rarely happens. ^d He and Palladius are in general agreed on the marks that distinguish a good cow, to wit, that she should be tall in stature, long in body, of a vast belly, broad forehead, black large eyes, neat, light horns inclining to black, hairy ears, flat jaws,

^c Boves, cum ab opere disjunxerit, substrictos confricet, manibus comprimat dorsum; et pellem revellat, nec patiat corpori adherere, quia id genus morbi maximè est armentis noxium. Columella, fol. 99.

^a Propter sæturam hæc servare soleo, ante admisuram, mensem unum, ne cibo et potione se impleant, quòd existimantur facilius macræ concipere: sed tauri è contra impleantur duobis mensibus ante admisuram. Varro, lib. 2. fol. 58.

^b A calendis Julii in calendas Novembris satientur fronde Colum, lib. 6. cap. 3.

^c Mas an sæmina sit concepta significat descensu taurus cum iniit; siquidem, si mas est, in dexteriores: ad idem Aristoteles.

^d Altissimæ formæ, longæque, maximi uteri, frontibus latissimis, oculis nigris et patentibus, cornibus venustis, et levibus, et nigrantibus, pilosis auribus, compressis malis, pælearibus et caudis amplissimis, ungulis, modicis, et modicis cruribus. Col. lib. 6. cap. 21.

jaws, a dewlap and tail very large and long, hoofs and legs of a moderate size.

Choice of a cow. §. 2. Markham in his *Country Contentments*, fo. 71, says, in the choice of a cow, she should ever have four teats, but no more; her forehead broad and smooth; her belly round and large: a young cow is the best for breed.

Marks of a good cow. §. 3. A notable dairy-woman informs me, that in Leicestershire they observe, and she has observed the same herself, that a cow with thick horns, which do not lessen and thin in a taper manner, gives not so much milk as the cows with slender horns do.

Mark of a fat cow. §. 4. If you would choose a cow to feed, handle her navel, and, if that be big, round, and soft, she is surely well-tallow'd. Markham, lib. 1. fo. 62.

A good cow known by the thriving of it's calf. §. 5. When a cow has a calf, one may discover by the thriving of the calf, as soon as by any thing whatsoever, whether the cow gives very good and rich milk, or that which is but wafhy; but some, when they bring the cow and calf to market, will beforehand fill the calf's belly with two cows milk; but then the cows udder, by it's fulness, will be apt to shew it.

Age of a cow. §. 6. In discourse with a notable cow-keeper, he said, that he counted not a cow old till she was eighteen or twenty years old, and that cows would very well live so long, though but few, as he believed, kept them beyond twelve, or thereabouts; they would not abate of their milk till they came to be very old.

But another of the same profession replied, if a cow be kept above eight years old, though she might give good milk without abatement, yet she would be worth nothing for fating, she would be tough; and that she must be helped up, when she was down, unless she were very well fed; he also said, that many young cows would take a trick of not rising of themselves, but of lying, when down, till they were helped up.

Varro, lib. 2. *De re rustica*, c. 3. fo. 51. says, a cow is not good for breeding after she is ten year old.

Known by the horns. The age of a cow, after she is three year old, may certainly be discovered; for every year after that age at the root of her horn she will put forth a rundle, like a curled ring: on examination I saw an instance of it in one of my own cows.

And the teeth. An old cow also will lose her fore teeth in her lower jaw, and, if you should buy such a cow for the sake of a good calf by her side, and believing she may give good milk, if she has lost a tooth before you must not think of keeping her above a year or two at most, but must fat her off. If a cow be pot-bellied, it is a certain sign she is old.

Age, when a cow is in perfection. §. 7. The farmers of the Isle of Wight agree, that a cow is not in perfection for giving the most milk till she is six year old, and

and that it is common in that country, where a person rents land of one landlord, and cows of another, to give ten shillings a year rent for a grown cow; but as for a heifer of the third year, which is the first year of her giving milk, you may have her milk for her keeping, and though she may the next year let for ten shillings, yet she will not give so much milk then as she will do afterwards.

§. 8. I was telling farmer William Sartain, and farmer Isles, Caution my tenants in Wiltshire, the cold winters in the hill-country fell so hard on old cows with calf, they being long kept to straw, to keep a which is with us sourer than ordinary, that I was resolved I would not keep a cow to the pail for the future beyond six year old; — cow be- they agreed that I was much in the right of it.—Farmer Isles said, yond six the cows keeping so long and hard to straw, and having but little years old rowet for them, was the occasion of their running out so much in the hill- to be pot-bellied, as they usually do.

And I am since confirmed by experience, that in cold hill-country air, where the straw is also coarse, by reason of the cold land it was produced from, cows should not be kept till they are old, but be sold off at six, or seven years old at farthest; because such cows, after that age, and in such a place, will pitch much at the end of the winter, especially after calving time, nor will they pick up their flesh again before summer is far gone; whereas young cows will bear the hardships of winter with four fodder much better than old cows.

§. 9. Mr. Biffy coming to see me, and looking out into the Signs of a backside, told me immediately, that I had a free martin.— free mar- I asked him how he knew a free martin from a cow; he said, very tin. well, it being easy to be seen; for, said he, the bearing of a martin gathers up more like a purse, and is not so firm and turgid as that of a cow; her head also is coarser, and opener horned, like an ox, neither has she such an udder as an heifer not with calf, but a smaller.—He said, the meat of a free martin, if well fattened, would yield an halfpenny in the pound more than cow-beef would do.

Amongst the cows the Romans knew that there were such as Free mar- we call free martins, which they called tauræ, and such they tin known yoked with oxen. Columella, lib. 5. fo. 166. to the Ro-

A free martin is a sort of a barren cow, which hardly carries any teats to be seen; she will never take bull; she fats very kindly, and in fatting she'll grow almost as big as an ox; she is counted especial meat. When a cow brings two calves, a cow-calf and a bull-calf, the cow-calf will be a free martin, and will never bear a calf; but I believe the bull-calf is not affected in the like manner, but will propagate his species as other bulls.

Y

§. 10. Mr.

Signs of a barren heifer. §. 10. Mr. Biffy laying his hand on an heifer, said, she was barren; I asked him how he knew that; he said, very easily; for, said he, when a cow has not taken bull, or not gone through, her bearing will be firm, and turgid, whereas, after she has taken bull, and proves with calf, her bearing shrinks, and grows lank, and then again, about two months before her calving, it grows turgid; but this fulness of your heifer's bearing cannot proceed from her being so forward with calf, because she looks lank, nor can I feel any calf; for he felt her; and, said he, if we graziers knew not these things, we should suffer much.

Why the Lancashire breed de- generate in Leicef- tershire. §. 11. Captain Tate of ——— near Loughborough, observed to me (anno 1706) that, notwithstanding the Leicestershire land was richer than that of Lancashire, yet they could not keep up the Lancashire breed of cows and calves they bought of them, but they would degenerate so, that in the third descent they had their Leicestershire breed again.—He could not tell me the reason of it, but the next day meeting with Mr. Clerk, he said, he conceived the reason to be, because they in Leicestershire were not so choice in the breeding, and managing of them as the dairy-men in Lancashire were; for, said he, in Lancashire I have known them give eight, or ten pound for a bull-calf of a year old, which shall then be in his prime, and large enough for bulling the cows, but will then decline and grow worse at two years old; then, to make their calves large, they wean them with unskimmed cow's-milk and whey, whereas we in Leicestershire give them skimmed-milk and whey, after their having had new-milk a month, and this regimen it is that so much improves the Lancashire breed beyond ours.

I asked the abovesaid Mr. Clerk, why the dairy-men in Leicestershire did not prove as good husbands, and order their cows as well as those in Lancashire did; he said, it would not pay, nor be worth while; for their land was better than that of Lancashire, and turned to a better account in breeding coach-horses and mares, and fatting of cattle, and they kept but small dairies, and therefore it would not be worth their while, where they milked but a few cows, to go to such a price for a bull.—He said, they observed farther, that their large breed of coach-horses, if carried into Yorkshire, would degenerate and grow small, and if the padd, and saddle-bred of York-shire, were brought into Leicestershire to breed, they degenerate into a fleshy heavy-limbed sort of horses.

Our hill-country farmers and dames are of opinion, that weanling-calves, or yearlings, brought out of the vale, do well in the hill-country; for they are no otherwise kept than they ought to have been in the vale, that is, wintered with hay; but it is true,

cows

cows from the vale do not do well when they come to the hills.

§. 12. Being in company with farmer White of Catmore in Berkshire, and farmer Crapp of Ashmonsworth, Hants, I was saying that I had winter-feed, especially rowet, for more beasts than I had, and did therefore intend, about Christmases, to buy in beasts of a year and an half old.—No, said farmer White, I would advise you to buy heifers forward with calf, and, as you have rowet, you may keep them the better, and in all likelihood they'll fetch a good price in the spring; for last summer (anno 1701) was so dry, that abundance of calves either went through, or will come in late; therefore a forward heifer must yield a good price;—and you will not fail in having them that are forward with calf at Christmases; if you go behind them, and draw their teats, and, if milk comes, they are for your purpose.

§. 13. I asked a notable Wiltshire dairy-man, if it was not a frequent practice to fill the calf's belly with milk the morning they drove the cow and calf to a fair, to be sold, in order to make the cow's udder appear full all day, and whether they had not a way, by drawing a string through the calf's nostrils, and tying it in the roof of the mouth, to keep the calf from sucking; he said, some did practise these things, but he never did; nor would he ever buy a cow in a fair, if her milk seemed to be pent up in her udder, nor where no sign of the calf's having sucked that day could be discovered; for in such case he should suspect some cheat; nor did he ever serve a cow or calf as above said, and yet never found but they went off as well as other people's, who might use such arts.—He said, they had also a way of besmearing the cow's teats with cow-dung, and then the calf would not suck, and in driving the cow to the fair her udder would be so dirty, and dusty, that it would not be seen.

§. 14. I would never advise any man to let his cows; for it never gives any content to either side, and the tenant will in all likelihood be negligent in letting the cow take bull, that he may milk her the longer; for if she be not with calf, she will give milk all the winter in good plenty, and, when spring comes, he cares not; for he knows she must be changed off.

§. 15. A person who lives in Moorfields, near to the cow-keepers and renters there, and says, he is acquainted amongst them, tells me, that the cows are fed with such foul and rank food, that it rots them in the space of two years, two and an half at most, and the cow-keeper's practice is of course to put them away fat by such time, lest they should be found dead on a sudden. They are soon fatted, being good meat all the time they

are milked; the food they give them is grains, cabbage-leaves, and bean-shells, of which last their milk will taste strong during the season.

A cow or calf well summered is half wintered.

§. 16. I was sensible this year (1718) that a cow well summered is, as the saying is, half wintered; for this summer was two years I weaned twenty calves; that summer being wet, there was consequently plenty of grass, and those calves were very lusty against winter, and eat their straw, and throve very well all winter with straw, and the advantage of running in my wood; but, on the contrary, this last summer being very dry, and grass running short, my weaned calves, eleven in number, were pinched before winter, and so came but poor to their straw, the consequence of which was, they never eat their straw well, nor did they care to abide in the coppice to pick on the brier-leaves, as the former calves used to do; so five of the eleven dropped off in the winter by the wood-evil, and the other six I was forced to take to hay by the middle of February, and could hardly preserve them, nor could I thereby raise them but very little by the middle of April.

A cow after calving eats much more than before.

§. 17. I asked farmer Chivers of Gaufun in Wilts, how much hay he consumed in a year; he said, above sixty ton;—I thought that was a great quantity for his stock; he replied, his was a dairy of cows, and that, when they had calved, they would eat a prodigious quantity of hay.—Why, said I, have cows when they have calved greater stomachs than before? Yes, said he, a cow when she has a calf to maintain, and is also milked, will eat as much as two other cows; a cow in that case will eat as much as an ox.

Id. a milch-cow in winter.

Many other farmers agreed, that a milch-cow would in winter eat as much hay as a fatting-ox; for, said they, the drain from milking her is so great, that it keeps her up to a good stomach.

French-grass in spring not equal to broad-clover for cows, &c.

§. 18. The spring (anno 1714) proving so cold and dry, that I could have no prospect of mowing a good sward in the French-grass, about the 24th of May, I put in my working oxen, and milch-cows to feed it down, it being, as I thought, a noble bite for them; but we soon found, that the cows yielded less milk than when they went in the broad-clover, nor did the oxen fill themselves so well as to be able to go thro' with their work, and so my oxhind feared.

Vetches, &c. a cordial to cows after calving.

§. 19. Being at Pomeroy in Wilts, and seeing farmer Stephens had sowed vetches, I asked him, why he had done so; he said, they were excellent good to give his cows that calved in winter, or early in the spring; for such cows would often be chilled in their calving in cold weather, and such meat would be a cordial to them; he had had, he said, cows take such colds in their calving

calving, that their bones would be sore a great while after, so that they would not be able to set a leg forward; in such case he made a great toast for them, and put it into two quarts of strong ale, and gave it them, repeating it two or three times, and found it did a great deal of good.

The country-men generally agree, that to give a cow rough Id. rough barley when she has calved is very helpful to the bringing away the cleaning.——*Quære*, whether the reason must not be, because it is a heartener, and a strengthener, and that the cleaning stays behind by reason of lowness in the cow.

When cows calve, especially if they have had any hurt, or are in poverty, the cleaning often does not come away well, but will hang down, and if it be neglected, and the cow has not in a day or two a drench to bring it away, by heaving and straining to bring it away, she will fall into the running of the reins, which will come from her like the white of an egg; this will much daunt the cow, and sink her so, that she will not soon get her flesh again. To prevent this, and to bring away the cleaning, I have known it a common practice to give her a handful or two of misletoe; to which purpose Mr. Ray also observes, vol. 2. fol. 1584. *Commanducatæ fruticis frondes, & depastæ à jumentis & vaccis à rusticis nostris ad secundas remorantes ejiciendas utiles censentur.*

§ 20. In the hill-country, where the winter provision for the cows is but ordinary, it is certainly best to let them go dry when they go to winter fodder, or rather a little before that time, that they may be dry against they go to fodder, and then you should also contrive, as much as you can, to fodder them where they may have rowet:——this is the way to keep them in case all the winter, and to hold up your cows to a good body, and to bring them to the pail in spring with good udders, and to support a good breed of calves: by being let to go thus early dry, they will be better able to walk a field at some distance, where rowet may be had, or, if you have conveniency of foddering at a distance, they may abide where the rowet is to be had.

§ 21. The rule is, not to give the short fodder in wet weather, because the cattle will be more apt to waste it and trample it under foot, than they will that which is longer.

§ 22. Cows that are tied up in a cow-house never look so well, nor are in so good case as those that are foddered in a backside; for they want the airings, nor will they prove; tho' it is possible they may require less meat, as all unhealthy creatures do.

§ 23. I asked farmer Lake, what was the reason that it harmed a fat beast to lick himself; Mr. Bachelour of Ashmonsworth was then in company, and they both said, that where a fat cow licked, it would make a jelly in the place, under the skin.

And, said farmer Lake, such cows do not begin to lick themselves till they begin to pitch, and sink by faring hard; therefore the butchers care not to meddle with such cattle; for where they have licked the tongue leaves a mark, and the butchers can easily see it.—I suppose when they begin to pitch they begin to itch, which is the reason of their licking.

Of a cow's going to bull, §. 24. It was May the 11th (anno 1702) when some farmers, good judges of cattle, were looking on my calves, which were then yearlings, and they being in a lusty condition, the farmers said, if I did not keep them from the bull, they would take bull by Midsummer, which would spoil their growth.

They said farther, that cows would take bull the sooner for a bull's going with them; meaning, that if cows were lusty, they would take bull in three or four days time, if a bull were put to them, tho' otherwise their desire would not come so soon.

One of them said, for the hill-country cows that were small, a young bull of but a year old, and a small one, was best.—He had, he assured us, a lusty cow spoiled by a three year old bull, which flung the cow in the cow-barton amongst the dung, and put out her hip.

In the beginning of October (anno 1703) I observed a cow, that had gone thro' her bulling, riding my other cows; coming to Holt, and being afraid she might prove troublesome to my cows with calf in the foddering-yard, I asked Stephens of Pome-roy, if she would be for bulling every three weeks in winter, as well as in summer; he said, no; she might not be for bulling above once or twice in the winter, because it was winter.—But, said he, if a cow goes through in the summer, and is apt not to stand to her bull, if immediately after she is bulled you take about a pint of blood from the rump-vein of the tail, it will make her stand to her bulling:—and further, said he, if you would have all your cows come in well together, you must milk a cow while she is bulling, and give each of the other cows that you would have take bull a pint, or a quart of the bulling cow's milk, and they will in two or three days take bull.—Another said, that spatling-poppy would do the same thing: I had a maid, said he, lately used to the dairy-countries, who, when I had a cow not apt to take bull, went into the grounds, and gathered a large handful of spatling-poppy, and held it to the cow, and she eating it readily went to bull in two days after; and this, she said, in their country seldom failed.

Mr. Wiltshire of Road coming to Holt while I was there, I had some discourse with him about cows; it was in January (anno 1698); he said, he had one that had gone through this year;—I asked him how that came to pass; he said, he suffered her to take bull at a year and a quarter old, letting her go on Road-common, where there were young bulls of that age; so she brought

brought him a calf at two years old, and, when they calve so young, they usually go through the year following*.—I wondered much that a cow should calve so young;—upon which he said, down in Somersetshire they used commonly to let their young cows, where they were well maintained, take bull at a year and a quarter old.—The same day farmer Pain shewed me two fine heifers with calf, that took bull at a year and a quarter old, but it was by accident, and against his will, the bull breaking loose to them.—He said, what Wiltshire observed of such heifers going thro' the next year might be very likely in their poor keeping, but would not so likely fall out if they were well kept.

Farmer Stephens, and farmer Chivers say, unless the keeping be choice good (such as Gausuns near Bradford-Wilts) it is by no means proper to aim to have calves to come at Candlemas, nor to let yearlings take bull at Midsummer; it utterly spoils their growth;—nor does Stephens like that his heifers at Pomeroy should take bull till two years old.—Yet they say, that sometimes, if they are very well kept, tho' not often, heifers will take bull at a year old, that is to say, at the beginning of May, tho' regularly they will not take bull till towards Midsummer; but this is to be understood of such as were calved about Candlemas, there being almost a year's advantage gained over them that were not calved till May-day.

I was telling a great Somersetshire dairy-man of a heifer I fattened, which from Midsummer to March would never stand to her bulling, nor did she rise in flesh, fit for killing, by March, tho' she had corn with her hay most of the winter.—The farmer said, he had had such heifers, and that they never would fat inwardly: as soon as one finds them take to that trick, it is best to sell them off.

I was saying to Mr. Clerk of Ditchley in Leicestershire, that I had heard some farmers say, that, tho' a cow, which never had been with calf, would not fat kindly till she had been bulled, and was with calf, yet a cow that had once had a calf would take fat well enough, tho' neither bulled, nor with calf.—To which he said, that the latter might prove better than the former, but nevertheless the latter would not come forward, nor prove any thing so well before as she would do after she had taken bull, and was with calf, but would every three weeks be on the fret, and run about chafing herself; and lose as much flesh in the day or two she was for bulling, as she had got in three weeks before.—He says, if one buys in, what we call, barren beasts,

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to

* Sir Ambrose Phillips's shepherd says the same with farmer Wiltshire.

to fat, they will require, and take bull as soon as they grow a little in proof.

Id. and of
keeping
a bull to
go always
with the
cows.

§. 25. I have found by experience, that those who keep ploughing, and fattening oxen, as I do, ought always to have a bull to go with the cows, to keep the oxen from riding them; for otherwise it is impossible to keep them separate; for the oxen will break over hedge and ditch after the bulling cows.—The best way, in order for this end, is to buy a fine bull-calf from North-Wiltshire every year, and then you'll always have a bull of two years old, and a bull-calf, which will come up yearly for use, one year after the other; and the bull will be so master over the oxen, that the cows and oxen may go together without inconveniency; nay, it is a good way to have a bull go with cows, if it were on no other account than to prevent the other cows from riding those which were for going to bull.

Oxen
should be
kept sepa-
rate from
cows in
summer.

§. 26. It seems to me, that in the spring of the year, and throughout the summer, till the barren cows have taken bull, the oxen ought to be separated from the cows, both at grafs, and in distinct foddering-yards, because the oxen will be riding the heifers, and straining them, as well as beat out themselves.

There are often many damages and losses, which fall out in the way of husbandry, to rectify which, it may be, it is inconvenient at that present time, and so one bears with them; whereas it is ten to one but we shall be much more incommode in consequence, for want of rectifying at first the first damage or loss.—An hundred instances of this nature might be given; a cow, for instance, wants to take bull, and it may be, at the first approach of the spring, you are not provided with a bull, and, it being a busy time, it would very likely be a small inconveniency for you to spare a person to drive this cow to a neighbour's bull, perhaps a mile or two off; but this inconveniency of the two is generally the least; for, by not doing so, your oxen, if you keep any, will break out after this cow, and teach others to do the same, which they will hold to ever after, to a great inconveniency to your corn, &c. And it is almost incredible how even oxen in a distant ground will snuff up the effluvia of a cow going to bull, and break over hedges after her.

To know
when a
cow is
with calf.

§. 27. As I was shewing a cow to a butcher, this cow, said he, is with calf.—I asked him how he knew; he said, very easily; when a cow is twenty weeks gone with calf, if one went to the right side of the cow, and pressed hard against the flank with one's hand, and did it with a swift motion, one might feel the calf knock against one's hand, of the bigness of a ball; till the calf be twenty weeks old, or thereabouts, it lies up high under the flank, but then, as it grows bigger, it falls down lower, and then one must feel lower for it; and when there is another per-
son

son on the other side of the cow, and he shoves the flank on his side towards you, it will help the perceiving it, when she is but very young; and so the graziers, by the hardness and bigness of the calf they so feel, judge how far the cow is gone.

Two understanding farmers were with me, viewing my beasts, Id. and and they observed a heifer's udder to spring much; whereupon how far my bailiff said, she would calve in a day or two;——but the gone. farmers said, it might be a week first; for a heifer will spring fuller in her udder, and for a longer time before calving, than a cow.

William Sartain, an experienced farmer of Broughton in Wilts, assures me, a heifer will not, when she is half gone, so easily discover herself to be with calf as an elderly cow will, because the sides of an elderly cow fall in more; in judging of an heifer one may often be mistaken.—He says, when a cow is half gone, the graziers reckon that the calf preys on the cow, and that she wastes; not but that a cow may be fat in flesh, and very fit to kill, within three weeks or a month of her time; but in that case, withinside, and in her suet, she will be much impaired;—and one in the company added, her flesh, though fat, would not in that case spend so well; to which William Sartain agreed, and said, undoubtedly it would not eat so juicy as the flesh of a cow but half gone.

§. 28. In January (anno 1700) I was displeas'd to see the da- Of cows
mage the farmer's hogs did me, in roading about, and told him, over-lay-
I would have them penned up in his foddering-yard.—My dame ing them-
replied, if so, she must sell them; for they must not come into selves.
the foddering-yard amongst the beasts,—I asked her why; she
said, it would endanger the cows, being big with calf, over-laying
themselves; for, said she, the hogs would nuzzel, and make
holes in the straw, and the cows lying down in such hollows might
die before morning, because they could not rise.—The farmer
said, it was very true.—And I observed, that tho' no pigs came
there, they took care every night to lay the straw smooth.—I
spoke of it afterwards to Mr. Edwards, and he was well apprized
of the truth of it.

If a cow be tied up in the house, great care ought to be taken, when her calving time draws near, to watch her by day and by night, lest her calf should be drowned; for the cow's head being tied to the rack, she cannot turn back to lick the calf; besides she may calve in her dung, and so the calf may be smothered.

§. 29. If a young heifer be pretty forward with calf, that is, Manage-
ready to come the beginning of July, and grass should be like to ment of a
be plenty that year, it may sometimes do well to let her go on, heifer
and calve; she may pay better to the dairy than to sell to the with calf.
butcher; but, in case it should be like to be a scarce summer for
grafs,

grafs, ſhe muſt be heightened up in fat as faſt as may be, and be ſold to the butcher; otherwiſe ſhe may loſe all her keeping; for ſhe will fall away when ſhe comes near calving, and, in caſe ſhe calves, ſhe may yield no more than what ſhe coſt when bought in.—When a cow begins to come pretty forward with calf, her teats will be turgent, and ſpring forth.

Of a cow's flinking. Mr. Cherry of Shotſbroke's bailiff informs me, that to let a cow keep company with other cows, after ſhe has flunk her calf, will be apt to make ſome of the others flink alſo.

Nor to milk a cow that has warped. §. 30. It is dangerous truſting to milk a cow all the year that has warped, for ſhe will be in danger of warping again: ſometimes one may venture to milk on a very good young heifer, but it is generally very unſafe. It is generally beſt not to milk ſuch a cow; for that will keep her very poor, and unfit to ſell to the grazier; whereas, by letting her dry up, ſhe will be in the better caſe, and ſell the better, and pay more than ſhe would by milking.

Of cows warping, and going through. §. 31. Mr. Godwin of Glouceſterſhire told me in January, anno 1698,—that he had had ill luck this year in his cows; for three had warped, and one gone through. The calves, he ſaid, were ſquatted, and one of their heads had a hole beaten into it, which he judged to have been done by his cow that went through; for it ſeems, it is the nature of a cow that goes through to deſire a bull once every three weeks after, and ſhe will then be riding the other cows, which another cow that has warped, or gone through, will like very well, but the cows with calf will ſlip away, and ſtep with their hinder quarters aſide from ſuch a cow's leaping them, and then it often happens, that ſuch a cow's knees fall againſt the ſide or flank of the cow with calf, and ſo ſquat the calf.

Stephens of Pomeroy being preſent agreed to the above; and ſaid, that he never had but one cow that warped in his life, and the reaſon why he had been ſo ſucceſſful, he believed, was, becauſe he never had a cow go through.—It ſeems, the deſire in a cow that goes through for a bull every three weeks, generally laſts about twenty-four hours, but ſometimes it holds three days, during which time, Mr. Godwin ſaid, if he obſerved it, he tied her up.—I aſked Stephens, if he knew what made a cow apt to go through; he ſaid, he was ſatisfied it was for the moſt part from hence; if a cow ſhould come too early with calf, that is, before the huſbandman would have her ſo to be, and conſequently ſhould be deſirous very early to be bulled again, the huſbandman will balk that deſire two or three times together, that his cow may fall with calf at a more reaſonable time than otherwiſe ſhe would have done: after ſuch balks it is odds, ſaid he, but, when ſhe takes bull, ſhe goes through; and there is oftentimes a young

young heifer, that (in the year the farmer first desires she should take bull, and the first time of the heifer's desiring it in that year) when she shall be brought to the bull, will be very skittish, and will not stand to be bulled; in that case, said he, for fear of the foresaid danger, I have taken the heifer by the nose, and held her till she was served.——But, said Godwin to Stephens, in case a cow be subject to go through, do you know how to prevent it? Stephens said, after such a cow has taken bull, to bleed her well in the tail is the best thing I know of.

If a cow casts her calf, you must let part of her bag that will hang down behind continue so till it rots off; for if you pull it off, you will be apt, with it, to pull away what you ought not.—If you have a cow, that either warps her calf three months before her time (for if she warps but a month before her time, she may give milk never the worse for it) or goes through on her bulling, never proving big with calf, discretion must be used, whether you will milk her on, or fat her; and this ought to be, according as the cow is like to prove well for the pail or not.—The dairy-men think the afore-said bag that hangs down, the other cows smelling to it, is apt to make them warp also, as well as the warped cows riding the others.

They count a cow's warping her calf a month before her time not to be so bad as an ewe's losing her lamb; for the calf when first weaned cannot be valued at above half a crown, and it robs afterwards more butter and cheese than quits costs; whereas, a lamb will yield a crown after it has sucked milk that otherwise would never have turned to any account.

A neighbour of mine had three cows that flunk their calves, and yet he could find no hurt in the cows, nor could imagine the meaning of it; a little time after paying a visit to Mr. Dark of Beckington in Wilts, and speaking of the accident, Mr. Dark asked him, whether he had not rid some ponds or ditches that year, and spread the soil of them about; he said, he had; why then, said Mr. Dark, I have often heard say, that that will cause the cows to flunk. This seemed strange, but mentioning it afterwards to some of his workmen, they agreed, that they had before heard such a saying.

I asked Mr. Hawkins, an experienced grazier, if a three-year-old heifer, that had warped early, as suppose about January or February, would make sound beef; he said, not so good as one older would do, but she would tallow the better for having warped so early.—I suppose a barren beast, for the same reason, will do so too.

§. 32. Mr. Bissy said, it was very common, at this time of year, about July, for a cow to die in calving.—I asked, what reason; he said, at this time of the year their calving over-
Cows apt to die in calving in July—
Caution to keep them from such heated water.

heated them, and, tho' they were like to do well, they must be kept from cold water, of which at this time they would be apt to drink a great quantity, and would die thereon presently after; —and, when they are suffered to drink, they ought to have hay given them before they drink. —I asked him, if drinking when they calved was not dangerous in the spring; he replied, the cow was not then so thirsty as to drink to harm herself; however, he took great care then to give them hay before he gave them water.

Caution §. 33. June the 12th (anno 1718) I walked out on Oxen-leafe
—to give grounds in Wilts, with my tenants Tomkins, and farmer William
cows Sartain, to see Tomkins's cattle; there was a cow that had not
warm wa- then calved, but Tomkins expected her to calve every day; she
ter, and was a fine large cow, and in mighty case, for she was pretty good
but little beef: farmer Sartain said to Tomkins, he must have his eye to
at a time, that cow when she calved, and not to let her have water for twen-
when ty-four hours after she had calved, and when he did give her some,
calving in he must see that she drank but a little, and that it was warmed.
June or July. —I asked why that care must be taken; he said, when cows
calve in summer, or hot and warm weather, there must be greater
er care taken of them than when they calve in the spring; for
their bodies in hot weather will in calving be heated, and in that
case the cow will be very craving after cold water, on drinking
of which she will take chill and die; therefore in such case it is
usual to drive such a cow to the house as soon as she has calved,
and not let her drink soon, and when she does, but sparingly,
and of warm water, for about two days; and this cow, said he,
being in high case, will have the more need of such regimen;
for she will in hot weather heat herself so much the more in
calving. —I talked with farmer Chivers of Gausfuns about it the
next day, — who said, all this was true, and that his next
neighbour lost a cow a fortnight ago for want of such care.

Of a bull- §. 34. It is commonly said, that a bull-calf, as well as a pur-
calf. lamb, comes a week earlier than the females.

Of cows §. 35. Sir Ambrose Phillipp's dairy-maid was advising with the
milk turn- butcher what she should do with a cow that fell off of her milk,
ing salt. and her milk grew very salt: no hurt was visible in the cow, nor
had she got any cold. —I asked him, if either of those things
would have occasioned it; he said, yes; he had known either to
have been the cause of it, and particularly, when the late cold
(anno 1699) so universally seized the horses, the cows at Lough-
borough shared in it, and they fell off of their milk, and it turned
salt, and this was in June, and the farmers supposed the milk
would not come well again till the cow had had a calf.

To dry §. 36. A butcher of Whitchurch in Hampshire, being with
up a me, took notice of an old cow so forward with calf in June (anno
cow's milk. 1702)

1702) as to be within a month, the cow being also in good case; he said, it was a pity, and advised however to dry up her udder as soon as she had calved as the calf was a fortnight old.—He said, when we went about it, we would anoint the udder with tar, but not the teats, and half milk her two or three times before we let her go dry; he assured me, this was the method of the Somersetshire graziers,—and tar is a cooler, and a dispeller of tumours.

In Derbyshire, as some farmers of that country assured me, if a cow's milk does not dry up well after the cow is turned to fattening, by reason of the plenty of grass, and punishes her, they give her a pint of verjuice at two or three days distance, which effectually does it.

§. 37. Being in company with Mr. Bishop, and farmer Ryalls of Dorsetshire, we fell into discourse about milch-cattle, &c. Mr. Bishop allowed me, that milk of cows was thicker in winter than in summer, but had not so much cream in it, but much of the substance of the milk cruddled on the top; that the milk, whilst the cow was with calf, inclined towards bitterness and saltness.—He and Ryalls did agree, that, if cows were low in case, and eat only straw, they would not give good milk till they calved, but it would fall to raggedness six or eight weeks before their calving-time; but, if the cows were in good case, and had good hay, they might give tolerable good milk till they calved; however they thought it was not adviseable, in either case, to milk them within two months or ten weeks of their calving; for that it did certainly impoverish both cow and calf much more than the value of the milk came to, nor would the cow come in so early and forward in the spring for her milk; they also agreed, that, whilst creatures were young, as lambs and calves, they should be well kept, and they would shift the better for it ever after; for which a calf would, they said, come in a year the sooner for the pail; and they agreed, that, though Mr. Bishop sent his hog-lambs into Somersetshire for rich pasture from Michaelmas to Lady-day, and paid half a crown a-piece for keeping them, yet he was paid double fold for it.

Of milk,
milking,
&c.

In the months of May and June, say Mr. Biffy and Mr. Pain of Wilts, a cow in our good pastures ought to pay 3 s. per week in her milk, which rearing a calf till five or six weeks old will not do, so that about that time our butchers kill the calves, at a fortnight old, mere carrion; for such calves will not pay us above 2 s. per week.

§. 38. Mr. Maserly was saying, it was agreed on all hands, that an heifer's calf was much better for rearing for breed than a cow's calf.—I replied, it was so, but I was at a loss for what reason it should be so;—he said, he supposed, the only reason

An heifer's calf
better for
rearing
than a
cow's calf.

could be, because the heifer could not be milked at the time she went with calf, which robbing the calf in the cow's belly must needs do the calf a great prejudice.

Latter
fallen
calves not
so hardy
when
cows as
early fall-
en ones.

§. 39. My oxhind, who manages my ox-ploughs, and was for many years a farmer himself in the north-west of Wiltshire, says, according to his experience, and the experience of other farmers in his country, the latter fallen calves, suppose in May and June, are never so hardy afterwards when they are cows, nor will they bear the winter so well when they are cows, as those reared from calves which fell at the latter end of February, or the beginning of March.—It seems to me, that the reason for this must be, because the latter fallen calves must consequently be weaned late, suppose, about August, and calves always pitch, and fall away on their first weaning, and then winter comes on such late weaned calves before they have recovered their strength; and again, such calves not being so well established in their vigor and stamina vitæ, nor having had that share of the summer-sun which early calves have, never do arrive to that strength in their cords, and ligatures, and solids, as the early weaned calves do, and consequently, being also when cows of a more tender nature, do suffer more in winter, nor can they so well bear the hardships of it as the others can.—He affirms farther, that such late weaned calves, when they come to be cows, will never shed their winter-coat so soon, by a considerable time, as the early weaned calves will,—and indeed this is very true; for I have now, being in the month of June (anno 1712) a yearling calf, which, though he fell in June, and, being a very fine one, I kept him, and let him run with the cows all the winter, and he out-grew the calves that fell in March, yet pretty much of his russet winter-hairs are still on his back; whereas the coats of the early weaned calves are sleek and smooth.—He adds farther, that cows in a fair, in May or June, that have not shed all their winter-coats, are, in his country, as much concluded by knowing farmers to have been late fallen calves, as if they had seen them calved;—nevertheless I am sensible the occasion of this may also often be from the poverty, and hard winter's-keeping of the cows.—I have also now three cows of my own breed, which have not yet (though the latter end of June) kindly and perfectly shed their winter-coats, and yet are very well in flesh, which I believe to be from the aforesaid reason; for though I do not certainly know that they were late calved, yet, because of the coldness of our situation, and the scarcity of grass and hay in the spring, we are forced to contrive the bulling of our cows so, that the calves may fall pretty late.—It is certain, that the earliest breed of the spring, of all kinds, are most valued, and the farmers find the aforesaid account in them, as for instance, in colts, pigs, and lambs; the earliest

earliest are the most valuable, and to be endeavoured for, if the place will admit of it, and there be fit provisions for them.—School-boys, by experience taught, greatly prefer the singing birds hatched in March to those that come later, and it may be questioned, whether the early births of the spring may not have a special influence in regard to the vigor and strength of mankind, but that the soul of man, and the affections thereof, and the strange artful mixtures of food, under infinite noxious varieties interposing, exercise so vast and immediate a dominion over health, and in the well or ill disposing the constituent parts of our bodies, that it is difficult to make the observation thereof; yet some little better judgment might be made in the wilder part of the Indies, where the savages conform themselves more to the methods of mere animal life: I should think the setting out on the race with the sun, even in the last case, cannot but give some advantage.—Note, from hence it seems to me reasonable, when we go to fairs early in the spring to buy barren beasts for fattening, to buy those that are sleekest, i. e. have nearest lost their winter-coats, because it seems they will thrive fastest.

I have taken notice, that calves late calved do not shed their coats so early in the spring, when they come to be cows, as those cows do that were reared from calves calved early in the spring, and being willing to know the opinion of some of the notable dairy-men about Holt, I found most of them had made the same observation.—Thomas Miles added, that such late-calved calves generally carried thick hides, and the reason he gave for it was, because the cows, which calves about May, by that time got into good flesh and heart, and so nourish their calves the better; for which reason their hides are thicker.—Farmer Chivers said, that, when such cattle were not forward in shedding their coats, it was a sign, that their strength of nature was backward, and their blood cold, for that cattle's blood in the winter, when they were out of proof, if they were let blood, was sensibly to the hand colder than in the spring, and colder in April than in May.

Note, there is, on the approaching spring, a certain degree of proof requisite to give activity to the blood to go to the extremities of the capillary vessels, in order to form new roots of young hairs, till which be done, the old ones still continue their roots, and are not expelled.

§. 40. Farmer William Sartain says, about them in Wiltshire Of giving the farmers geld the bull-calves at a month old, and then, in a calves hay week, or at farthest a fortnight's time, after they have recovered at their their being daunted by gelding, they wean them from the cows ^{first wean-} by giving them some locks of the sweetest hay they can get, in ^{ing.} some convenient place, where there is an outlet to grass; and that the

the calves will delight to brouse on the hay more than the grafs; and this they make them to do for a fortnight before they turn them wholly to grafs.—I asked him for what reason they gave such calves hay at their first weaning; he said, to dry up the water in them, and to harden their bodies; otherwise, if they were at first turned wholly to grafs, it would be apt to scour them too much at first, and make them pitch;—but Farmer Chivers said, on fat ground, such as Gausuns, they only wean the calves that fell about Candlemas at six weeks old, in order to their taking bull the next year, and then there is no grafs, yet they do very well on hay alone.

Of weaning calves.

§. 41. An experienced dairy-man in Somersetshire tells me, if you rear a calf, he rather approves of weaning him at six or seven days old, which may be done by warming the skimmed-milk for him, into which if you dip your finger, and put it into his mouth, he will suck, and then, if you put a little bundle of hay, and give it into his mouth, he will suck that, and so, if the hay be put into the pail, and his head thrust to it, he will suck the bundle of hay in the milk, till he has drank it all up.—He says, he observes the calves weaned thus early to grow better, and make larger cattle than those weaned at seven or eight weeks old; for then they will pitch very much upon their weaning: however this way is very good, when the cows are poor; for the milking of them will not draw them half so low as the calves sucking will do.

Another, of great note in the same country, agreed, it was best to wean a calf early from the cow by giving him the milk out of the pail; for then he might run with the cows all summer; whereas, if he was suffered to suck the cow till he was five or six weeks old, he would be apt to suck her again after being weaned, especially if the cow be any thing fond.

A new dairy-maid of mine (anno 1706) desired she might wean my calves at two or three days old, as soon as they could have drawn down the beefings; for she said, they would not be so apt to suck one another.—I note this the rather, because we used before to keep them long with the cow, and they used to suck one another.

Being in the Isle of Wight (in August, anno 1708) I asked my tenant farmer Farthing and his wife (that farm depending much on breeding cattle, and consequently in weaning calves) how they weaned calves; for some years I had found ill success in trusting to the servants weaning of calves; some of them by ill and sour diet, for want of their keeping their troughs sweet, grew lousy; others fell into diseases by being over-fed; I found by them, that, amongst other things, they gave a rule to their servants, in the measure of feeding, in this manner, viz. they ordered every calf

calf to be fed by it's self, in a bucket, by a prescribed quantity, viz. they gave three pints to a calf on it's first weaning, and advanced it gradually, as the calf grew, to five pints, as the calf was able to take it, before being turned grazier for itself, and this was the largest quantity they ever gave one calf in a day.—

They fed every calf at a separate bucket ; for they found many inconveniencies in feeding them together ; some calves having a greater stomach, or being quicker feeders than others, would eat too much, and the slower feeders would suffer, and have too little.

I had a mind to know dame Farthing's opinion of weaning the calves by letting them run with the cows rather than suckling them by hand : she said, if they took their weaning by running with the cows, they would not be so gentle, nor stand so well to the pail, as the others.

Farmer Stephens, farmer Box, and all the farmers at Holt agree, that it is a very good way to give weaned calves, when first turned out to grass, skimmed milk, morning and evening, in troughs, for some time, but say, in their country they cannot afford it, because of making cheese of the skimmed milk, and their hogs must have the whey.

Being at Holt the 23d of May (anno 1719) I went to Pomeroy, where farmer Stephens had a calf of but a month old, which he intended then to turn to grass.—I asked him, if he was not too young to eat grass, and live on it, he said, no ; they would take their weaning as early as that, but calves usually fell so early in the year, that there was no grass, but at this time of the year there is grass and leaves every where for them to pick on, upon which account they might now as well wean a calf at a month old, as in March at six or seven weeks old.

If in weaning calves the grass be apt to scour them, putting a little salt in their milk will be a means to put a stop to it.

§. 42. I saw two half-yearling calves of mine in December Of calves (anno 1701) sucking one another for a long time together ; two sucking Gloucestershire yeomen being with me, they said, that tar must each be put to their teats, to prevent it ; for otherwise in their coun- other: try they look on it, that such calves will, when cows, get a trick of sucking themselves or each other.

§. 43. In taking a view of my lambs to see if they were meat for the butcher, my shepherd caught a fat lamb by the tail, for ^{Damage} which a butcher of Whitchurch chid him ; but the prejudice ^{from pull-} thereby I knew not, till my butcher the market-day after told ^{ing a calf} me I had spoiled a calf by halling him by the tail, whereby his kid- ^{or lamb} neys were very red, and his loins strained, by which his thriving ^{by the tail.} was spoiled ; he said it was the worst thing that could be done to a calf at his sucking-time to hall him about by the tail, or any other creature whatsoever, for the reasons above said.

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§. 44.

Of calves-coops. §. 44. In Hertfordshire and Essex the calves-coops are set so that the sun may come as little at them as can be. From J. Mortimer, Esq; F. R. S. fo. 169.

Calves stunted. §. 45. If calves and lambs cannot be well supported for the two first months in a kind way of fattening, it is hard to make them fat, but they being stunted at first will be pot-bellied.

Of bleeding calves. §. 46. Farmer Stephens of Pomeroy in Wilts tells me, (September 1712) it is now the practice of the butchers all over the country to buy the calves, or agree for them as soon as weaned, and to come when they are about nine days old, and bleed them in the neck, taking the quantity of about half a pint, and to come three or four days after, and bleed them again the same quantity, and a third time the butcher comes three or four days after that, and bleeds them a pint. Note, he is sure a pint is the least quantity they take from them the last bleeding; he rather believes it is a quart.

Mr. Perdue of Winchester has had good skill in fattening calves, and the butchers would prefer a calf of his beyond any others.— He says, he used, according as his calf was lusty, at about a fortnight old to take from him about a pint of blood, and about a fortnight after another pint; he used to bleed them in the neck-vein;—he says, he placed their pens so hollow from the ground that their piss might run through and off, but never used to remove their litter, but every day give them a sprinkling of fresh wheat-straw over their old bed; by this means, said he, the calf lies clean and dry, and much warmer than otherwise it would do, for, said he, a calf cannot lie too warm, and the heat of the dung, fermenting under the straw, will much contribute to warmth.

Of milk and bean-flour to fatten calves and whiten veal. §. 47. The method of the housewives in Leicestershire, if a cow gives but little milk, so that the calf is not well maintained, is to scald bean-flour and put it into the milk: giving them this milk very hot they think much contributes to the whitening the veal, as the bean-flour does to the fattening: you must give it them hotter and hotter by degrees, at first lukewarm, till at length they will be able to drink it as hot as you can endure your finger in it.

A cow-calf may be killed older than a bull-calf. §. 48. I was commending the goodness of my veal to a great dairy-man, and said it was of a calf two months old. Then, answered he, the calf must be a cow-calf, for otherwise it would eat strong at that age; the case is the same with a sucking-pig; a sow-pig will eat well at a month old, but a boar-pig at that age will eat strong.

§. 49. Sir Ambrose Phillipps's keeper says, that veal cannot be white till after a calf be a month old; for till that time a calf does not begin to be white in his flesh.

§. 50. If yearlings or calves are so well provided in winter-time with rowet, which they can come at, that they need be foddered but once in the day, that time had best be early in the morning; because there is usually a hoar-rime on the grass, till the sun rises to melt it, whereas the rest of the day the feeding on the rowet is very good till evening.

No white
veal of a
calf less
than a
month
old.
Time of
foddering
calves in
the win-
ter.

Diseases in COWS and CALVES.

§. 1. **M**R. Smith of Deadhouse in Wilts, walking with me at Gausuns, a poor woman came forth, and asked him, what he thought of a cow she believed to be ill; he thought the cow was not ill, because her nose was moist, and that, if a cow or a beast be ill, that moisture presently dries up; Mr. Bissy said, so it was observed also in the yellows, and red-water, which, it seems, are only a higher degree of the black-water.

A moist
nose a sign
of cattle's
being well

§. 2. I asked Mr. Clerk of Leicestershire, whether he used to let his beasts blood that he bought in for grazing; he answered it was not only a safe way, but they would also thereby thrive better; he said, if oxen bought in had been hard worked, or cows hard drove, it was very proper to let out their corrupt blood, if it was only on that account, after they had been a week or a fortnight settled to grass; besides, as to other cattle, it was very well to bleed them when they first came into proof, lest they should overflow with blood: it is, he said, the same also with horses.

Of bleed-
ing cattle
before
grazing.

§. 3. I met Mr. Putchin, a great grazier, and a country-fellow, who lamented he had lost a cow of the murrain: we fell into discourse about the murrain, and they both agreed, that in such a case it was very necessary to bury the beast that died presently upon the spot, by digging a hole for it close thereto, and to drive beasts away out of the ground, and keep them from smelling to it, for, whilst it was above ground, they would be apt, if they could come at it, to smell to a dead beast; and, to prevent the rest from having the distemper, they rubbed their nostrils with tar, and daubed an egg over with tar and thrust it down their throats.—Sir Ambrose Phillipps's shepherd agreed to all this, only said, he blooded them also.

Of the
murrain.

§. 4. In the month of November (anno 1707) I lost two calves by putting them into young fresh broad-clover that was gross, and of this year's stubble.—They call the distemper the joint-murrain; or

Of the
joint-
murrain,
or

murrain; farmer Munday, who lives by Aldern-Mead, Hants, says it is common for calves to die so in the vale,—but it is not so on our hills.—The calves must be bled in the jugular-vein, a pint of blood, and be drenched with it, with a handful of salt mixed with the blood.

Quarter-evil.

The joint-murrain in calves, mentioned above in 1707, I find by others is called the quarter-evil; I find by farmer Stephens of Pomeroy, it falls on yearlings and two-yearlings at spring and autumn, that is, October, and it seems to me to be owing to the quick rising of grass at those seasons, especially where, through the goodness or moisture of the ground, it grows faster than the sun can concoct it's juices, which chill and coagulate the blood in those cattle, and occasion a settled jelly in the neck, shoulder, or loins. The said farmer approves the medicine above prescribed, but says, he has found by experience, that an egg-shell filled with tar, and minced rue, and with a stick thrust down the throat (with blood-letting) is the best remedy; he says, to prevent this mischief, he has always found it best to let the yearlings and two-yearlings go with the cows, especially at such times of the year.—The reason for which I conceive to be, that the cows eat up the grosser grass, and thereby the calves feed the sweeter.—I find by him, that he never knew milch-kine to have the quarter-evil, for which this account, I think, may be given, viz. the morbifick matter is discharged by the cows with calf in the foulness of their urine.

Of the blain. Vid. diseases in sheep.

§. 5. In discourse with my old shepherd, in July anno 1697, (who says, he has been a shepherd ever since he was ten years old) about the blain, he said, it fell on the cattle only at the spring of the year, and was over before the latter end of July; it comes from a little red worm that the cattle lick up, of which he has seen many; if it falls under the tongue, the beast may be cured, if it be taken in time, and the bladder occasioned by the bite be broken and rubbed with salt; but, if the blain-worm be broken in the mouth of the cow, and be swallowed, and goes into her guts, he knows no cure for it; and yet, if the blain-worm be picked up by the cow, and swallowed whole, it will go through her, and do no harm. Mr. Edward's servant tells me, he has seen two blain-worms in the bladder under a cow's tongue; my shepherd says, he never knew it to fall under a sheep's tongue; if they have it, it is by breaking the blain-worm, which being so swallowed he knows no cure for it.

On the 23d of March (anno 1705) I went down to Gausuns, where I saw Chivers amongst his beasts; he was saying, he could never stir from them at this time of the year; for at the first spring of the grass their blood would suddenly rise, which is the blain, and a beast was soon lost; and then he shewed me one which

which was growing bad. I asked him how he knew the rising of the blood; he said, that a beast's eyes would run with water, and, before he dies, as the distemper rises, his eyes will swell, and his blood, when bled under the rump, will feel hot: in such case, said he, we give them the following drench; a pennyworth of English liquorish, of English anniseed, of turmeric, of long pepper, of horse-spice or diapente * ana, ground all small, and * of each just boiled up in a quart of strong beer;—but, if by the heat of the blood one finds the distemper to proceed from a hot cause, quantity then the horse-spice is to be omitted.—He says, though he has as of the rented good lands, yet he never had land subject to the rise of liquorish blood before.; for it must be very quick growing ground, as indeed Gaufruns was.—Mr. Biffy says, the bladder under the tongue in the blain will sometimes be as big as a pigeon's-egg, and, if they cannot find the bladder there to break it with their hand; they rake their bum-gut, and find it in their back.

Discouring with a Devonshire yeoman on the diseases incident to cattle, and particularly the blain, he said there is a distemper that falls on a bullock in the spring, between April and June, occasioned by the overflowing of the blood, which they in their country call the bladder; the bullock will be taken with a swelling of his lips, and running of his mouth, and swelling of his eyes, and running of them; if it be discerned before he falls, he is cured by thrusting a pen-knife upwards, from the root of his ear, and bleeding him in that manner, and pulling out his tongue, and rubbing it with a handful of salt.

When I was at Mr. Cary's in Dorsetshire, Mr. Bishop told me for certain, and upon his own experience, in talking on the blain in cattle, that, if one run a bullock so distempered through the ear, near the root, with a knife, it would cure him, and was the certainest remedy he knew of; he seemed very ignorant of such a thing as the blain-worm, but knew well in such case, that a bladder arose under their tongues, and that many for the cure would rub the bladder with water and salt, and break it.—He thought there was no cure for the red-water in sheep; but said he Red-wa- had often had the fancy to rip up the skins of their bellies, and let ter, out the water, and sew them up again, he said the hog-sheep were most troubled with it.

§. 6. They have in Wilts a disease on their cows, which they The hask. call a hask or husky cough; the cow will cough huskily, and seem not to be able to bring up any thing, and loll out her tongue; this distemper seldom falls on them in the summer, but at the beginning of spring, and on the yearlings and calves more than on the cows: the remedy is, to take a pint of lukewarm milk from the cow, and put into it a quarter of a pound of the fat of rusty bacon minced small, and give it the beast to drink; you may if

you will, put into it a little fallad oil ; it will do the better, and keep the beast fasting two hours before and after.

Of indigestion.

§. 7. Notwithstanding the cow-kind chew the cud, yet they are subject to indigestion, as may appear from what I this day observed in some of mine (July 22) which having the night before broke out into some winter-vetches, which I was then cutting for winter-fodder for my sheep, eat plentifully of them, and the next night they scoured, and I observed in their dung the grain of the vetches whole, and in great quantity.

The maw-bound.

§. 8. There is a distemper in cows called maw-bound ; their maws will be so bound, that what they eat will not digest, or pass, and will grow so hard, that what has been taken out, when the cow has been dead, would endure kicking about without breaking ; at the same time the cow will have a blackish watery looseness : the first symptom it generally discovers itself by is, the cow will be subject to coughing ; it is cured easily at the beginning by giving them a purge of cream of tartar, aloes, &c. * Columella has taken notice of this indigestion in the cow-kind, and tells us the signs of it are frequent belchings, and noise of wind in the belly, cramps, loathing of food, heavy eyes, &c. and adds, that if it be neglected, it is followed by worse symptoms, such as swellings, gripings in the guts, groans, restlessness, and frequent agitations of the head and tail.

The distemper in cows called the maw-bound, Mr. Clerk says, comes from a surfeit by being over-heated by driving, or when a new cow is worried by others ; he says, a cow will likewise sometimes be maw-bound by eating of sedges in the water. The cure is, to give her a quart of cream, just upon it's breaking, before it is turning to butter, viz. when it is oilyish ; he says, the calves will also sometimes be taken with a cough ; the cure is, to boil a pound of bacon, and give them a quart of the liquor in the way of a drench ; it will cure them after once taking.

Of scouring.
See Diseases in sheep, §. 13

§. 9. Farmer Way, and others said, that my tenant at Woodhouse would always sell a calf at a month old for twenty shillings, and his way was, as soon as the calf was calved, to boil a piece of the inside bark of oak as big as one's hand in milk, and give it to the calf to drink, and this at once taking would prevent the calf from scouring, though he gave it never so much milk after ; whereas the danger of filling a calf's belly is of making it scour ; then he would boil barley-meal and chalk in milk, and put it in a trough

* In bove cruditatis signa sunt crebri ructus, ac ventris sonitus, fastidia cibi, nervorum intentio, hebetes oculi, propter quæ bos neque ruminat, neque linguâ se deterget. Si neglecta cruditas est, & inflatio ventris, & intestinorum major dolor insequitur, qui nec capere cibos finit, gemitus exprimit, locoque stare non patitur, sæpe decumbere, & agitare caput, caudamque crebrius agere. Colum. lib. 6. fol. 161.

a trough to stand knee high, and the calves would be frequently licking it.—Note, chalk is binding and drying, which I conceive to be the true reason why it is given to calves, the binding quality preventing the flux, consequently nourishing and making fat, as likewise making the flesh white.

For the scouring of a horse, cow, or sheep, take wheat-flour; tie it up in a cloth, and boil it in a pot of water five or six hours; then bake it in an oven with a batch of bread; then take it out of the cloth, and keep it in a pot; when you use it, take a quarter of a pound of it, and as much bole-armoniac beaten very well together, and a handful of bramble-leaves chopped small, and mix it with a pint and an half of cold spring-water, and so give it to a horse, and let him drink cold spring-water; give it in milk to a cow.

A very good dairy-woman in Leicestershire assured me, she was positively confident on many and frequent trials, that if a calf has a lax or looseness, though never so great, giving it nine horse-beans to swallow morning and night, will certainly put a stop to it in once or twice taking; she has tried other remedies without success, but never missed of success in this; a mistress of her's, who kept a great dairy, told her the secret, which at first she thought a jest.

§. 10. The following receipts for the red-water in cows and bullocks are frequently used amongst the dairy-men in Leicestershire. Red-water.
 —The best,—bleed first either in neck or tail; then make a good See red-water in sheep. §. 13.
 strong posset with spice, and give it blood-warm; then take a penny-worth of aqua vitæ, a hat-crown full of yarrow; pound and strain all the virtue out, and put it to the aqua vitæ; then take a red willow-stick and burn it to a coal; and pound it small, and put it all together, and give it as soon as it can be got ready.—
 Another,—take of shepherds-purse, red-shank (that is, herb-robert) yarrow, knot-grass, of each alike, and shred them all together; then put them into a quart of milk, and heat it with a red-hot iron, and give it blood-warm.

For the red-water in a beast;—take mouse-ear and herb-robert, of each an handful, the inner bark of a barbery tree a pretty quantity, but not so much as of either of the other two; chop them very small, and put thereto a quart of new milk; then make it as warm as milk from the cow, and give it with a drenching-horn to the beast in the morning, and keep him fasting one hour after, and, if the blood turn not the next day, give him another drench of the same, but no more; for if the second draught does not cure him, you must kill him, and eat the meat; for it is never the worse or unwholesome for that disease, and the longer you let him live the leaser he will be, and at last will die of himself.

Note as to the red-water, and the above receipt, it is to be observed, the ingredients are easy to be had, and that mouse-ear is a great astringent, and excellent against the dysentery and watery humours, unde, says Mr. Ray, *ovium gregibus noxia censetur.*—The barbary in all it's parts has likewise the same virtues.

The wether in the reins. §. 11. For the wether in the reins ;—take two penny-worth of long pepper, and three spoonfuls of henbane-seeds, beat them together, and mix therewith a pint of thin grounds of ale or beer ; heat it blood-warm, and drench the beast, and then wind him up warm in hay.

Note, as to the wether in the reins in cattle, the henbane or the seed of it is excellent good against the gonorrhæa or muliebria profluvia. Vid. Ray, fol. 711.

Of the wether before or after calving. §. 12. For the wether that comes forth either before or after calving,—take anniseed and liquorish of each one ounce bruised, fennigrick a penny-worth bruised, the leaves of setwall, (i. e. valerian) and primrose-roots, of each an handful picked, washed, and shred, and then pounded ; boil all in three pints of strong ale, or beer, till it is half wasted ; then strain it, and divide it into two parts, and into one part of it put a piece of sweet butter, as big as an egg, and give it to the cow blood-warm, and keep her fasting an hour after, and the next day give her the other part of the drench blood-warm, with a piece of butter in it, as before ; it is best to give it in the morning fasting, except there be need to do otherwise, and then the first part may be given at any time, as soon as it can be made ;—and, if it be after calving, and that the cow should heave much, then the wether must be thrust in, and sewed up to sticks with a strong awl and shoe-thread, and the beast be kept warm, and drink warm water for five or six days after.—If the wether hang out much, some use to burn dry bean-stalks, and with fresh hog's lard make the ashes up into balls, as big as great wall-nuts, and thrust one of them into the beast, in the midst of the wether, and when she heaves it again, put in another ball, and so till she is well.

In the above receipt, setwall or valerian is good against burstings, primrose-root is very restraining, & *cohibendo alvi profluvio magnopere confert, ventriculum atque adeo universa intestina soluta roborat, & scæno-græcum, secundum veteres, fæminarum malis plurimum subvenit.* Ray. Bole-armoniac is very astringent, good against the diarrhæa and dysentery, and *menstrua profluvia.*

The yellows: §. 13. Sir Ambrose Phillipp's shepherd said, that their beasts were never troubled with the yellows, but that the beasts in some other places in the neighbourhood, where the feeding was very gross and fat, were subject to it ; so that he supposes rich feeding may be the chief cause of that distemper :—he thought bleeding was the best way to prevent it.

A gentleman in Worcesterſhire told me, January 1696, that his cows had the laſt ſummer been very ſubject to the yellows;— I aſked him, if they were dangerous; he ſaid, they often died of them.—I again inquired, how they appeared; he ſaid, the whites of their eyes would look very yellow, their ſtomachs fail, nor would their food prove them; their udders would ſwell, and their milk fall away, and look yellowiſh; he ſaid, if it fell on their back and loins, it was not eaſily cured, but, if it fell only on their udders, it might be cured by letting blood and drenching, and, if it were taken betimes, blood-letting only might do.— An hour after a farmer came in, and agreed to this, ſaying that he knew not what the yellows on the back and loins were.

A certain farmer ſaid (in July anno 1701) that a cow of his had lately had the yellows, and the firſt coming of them to be known was by her milk being wheyiſh, and in rags, before ſuch time as her udder looked yellow; he ſaid farther, the remedy he uſes, is, to bleed the cow preſently, and then to take hot embers, and milk ſome of the cow's milk into them, and rub her udder therewith at evening milking-time for two or three evenings;— he ſays, the cure by hot embers has been by experience very well approved of. In this diſtemper, if a cow has not a ſpeedy remedy ſhe often loſes a teat, and ſometimes her udder.

§. 14. They have a diſtemper in Leiceſterſhire frequent among the calves, which in that country they call the black-legs, but Mr. Glenn, who lives at Utoxceſter in Staffordſhire, calls it the wood-evil. It ſeems it is a white jelly, and ſometimes a bloody jelly ſetting in their legs, from whence it has it's name of black-legs, and often in the neck between the ſkin and the fleſh, which will make them carry their necks awry.—I find by Sir Ambroſe Phillip's ſhepherd, it is of the ſame nature with the wood-evil in ſheep, which, he ſays, are alſo ſo affected, and ſo properly may be called the wood-evil; and like the ſheep, if it falls in the calves joints, they overcome it, but if in their bowels, they die, nor is there any cure.

§. 15. Farmer Stephens ſays, for the haſſacks in calves he takes thin ſlices of the very * raſtiest fat bacon he can get, and ſhreds it into ſmall diamond-cuts, and then makes milk blood-warm, and puts as much of the ſhred raſty bacon into it as will answer the quantity of bread uſually put into milk, and of his milk and raſty bacon he uſually gives two hornfuls to each calf, which cures them without fail, when they have been ſo bad as to loll out their tongues; he ſays, the quantity of milk you may give to each calf may be three quarters of a pint.—Farmer Chivers ſays, for this diſtemper he gives two or three balls, as big as cheſnuts, of an equal quantity of butter, tar, and rue chopped ſmall, and puts them down the calf's throat beyond the quilt.—Farmer John Sartain ſays, it

it is looked on that haffacks often come on calves by their feeding on drier grafs than ordinary, or by reason of their wanting water.—— This might be the main occasion of it in the calves I brought out of Wiltshire, because my grafs was drier than that, and, though they had plenty of water, yet it might be such they did not like so well as what they had been used to in the vale, calves being nice; and drought seems likely enough to be the cause of it, both in respect of food, and for want of water, because it is generally agreed that the broufing on wood will give calves the haffack.

Mr. Beach says, he has stood by and seen his father and his tenants give the following drench to their calves for the haffacks, viz. take about three quarters of a pint of milk, and heat it blood-warm, and put to it two spoonfuls of fallad-oil, when the milk is thus blood-warm, and give the said quantity to each calf; it will be about two hornfuls.

The pipp. §. 16. If a calf takes the teat into it's mouth, and refuses to suck, suspect the barbes under the tongue, almost in the manner of the pipp, which you may take away gently, &c.——*Maison rustique.*

Oat-hulls in oxen's eyes. §. 17. I saw an ox's eye almost out, as I thought; three farmers standing by said, it was only an oat-hull, which among the fodder would frequently get into their eyes; powder of sugar or ginger blown into their eyes would, they agreed, cure them.

Of greafe in the beels. §. 18. I saw (in August anno 1699) one of Sir Ambrose Phillipps's cows with a bunch and swelling on the outside of either hinder leg, and I asked the cause of it. His dairy-maid and the shepherd said, that the cow being in high case when she calved about Michaelmas was two years, heated herself in calving, and, cold weather coming upon her, she took cold, and so the greafe fell into her heels, but she was never the worse; it was only an eye-fore.

The loore or fore between the claws. V. the loore in sheep. §. 16. §. 19. Farmer Elford of Upcern in Dorsetshire tells me, cows will be so fore between their claws that they cannot stand, and will pine upon it; this he and others informed me, in that country was called the loore, and they agreed, that a hair-rope rubbed between their claws till the place bled would cure them; but Elford adds, that what will speed the cure is, to take verdigrease and lard, and mix them together, and anoint the place: this he uses to do, and had it as a great secret from a cow-doctor.

Discourfing with old Wilkins, a notable farmer of Hathern in Leicestershire, he and another creditable husbandman agreed, that the fowle or loore in sheeps feet came from their going in wet ground, and was increased by the long grafs and rushes which got between their claws, the pasture-sheep being most troubled with it, but it seldom afflicted the folded sheep; he said, bleeding
a cow

a cow troubled with it on each side the claws, would, at the beginning, before it was too far gone, cure it without doing more: but then it was, he said, a common saying, that you must cut up the turf she bled on, and carry it, and hang it up in a hedge, and, as the turf grows rotten, the claw will grow well: but, said he, the meaning of cutting up the turf and carrying it away is, because, if the fresh blood of a cow lies on the ground, the whole herd will come and smell to it, and fly about the ground, and fall foul on, and push one another, and spoil one another: for which reason, if a cow be bled in the tail for the worm in the tail, they always staunch and dry up the blood in the wound perfectly well, before they turn her out to the herd, otherwise they would smell at her, and push her, and one another.

§. 20. Being in May (anno 1712) in company with Chivers, Tail-soaked. Stephens, &c. and having lately had a cow tail-soaked, or with a worm in her tail (as before noted) I was desirous to discourse on that subject with them, and I found they all well knew the distemper, and had it amongst their cattle: they agreed, that, though it sometimes fell on cattle in good case, yet it more generally afflicted poor cattle.—They did not seem to observe, as Mr. Hayes, a gentleman farmer, whom I before had consulted on this distemper, had done, that a cow which had once had it was more liable to it afterwards than another cow.—I asked them, whether they had ever seen a real live worm in the tail; Chivers only in the company pretended to have seen such a thing, and said, he once saw a long narrow fleshy string, like a thread, cut out, it was of a red colour, and moved; they all agreed that the cow could not rise up in such a case; and that the cure was to slit the tail where it was soft, and with a rag to bind in salt, rusty bacon, foot, and garlick beaten together, and one of the company added rue; but the tail must not be bound too hard, nor continue bound above a week, lest the cow should lose the brush of her tail: they say, in such a distemper, a cow's teeth will be very loose: it seems, cows teeth are always in their best health somewhat loose, if you thrust them inwards with your thumb; mens teeth will also be loose under ill habits of body.—Note, it seems to me, that both the medicine of oil of turpentine rubbed in, as mentioned in another place, and this medicine, act their cure by heating the marrow of the cows back and loins, with which the spine of the cow's tail has a communication, for the disease seems to lie in the back, and that the tail indisposed alone could not in such manner affect a cow as to weaken her to the degree above related.

Speaking farther of this distemper to a Dorsetshire farmer, he told me, they call it the worm in the tail; the joint of the tail near the rump will, as it were, rot away, and the teeth of the cow grow loose, and her stomach fall off, so that it will in a very little

little while sink the stoutest cow or bullock, though it seldom falls on a bullock in good case, but generally on cattle when they are poor.—The cure is, to cut a deep gash in the sore, at the rump, and rub a handful of salt into it, and so bind it up with a rag.—Again, talking of it to farmer Ryalls, he agreed to what the other had said, only he added, they mixed foot and a clove of garlick with the salt, and that the tail must be well and carefully cut, or else the kine might be in danger of losing their tails; he says, though they call it the worm in the tail, there is no worm there, but he takes it to arise from the blood, when the blood runs high.

The D A I R Y.

Of clean-
liness in
the dairy. §. 1. **S**O much cleanness in scalding relates to a dairy, that Chivers of Wiltshire averred (farmer Sartain being present, and consenting thereto) that the dairy-farms spent as much wood in fire to that end, in summer, as they burned for other purposes in winter.

If the milk-vessels are not kept clean, they will be sour, and the cheese will be sour before it can come, and will eat sour and choaky.

Of cool-
ness. §. 2. Chivers took notice how a cool dairy was a great means towards preserving the cream the longer from turning sour; said he, my milk-house is too small for so great a dairy as mine is, for the milk coming in hot, the steam of it heats the air of the room.

Of cows
not giving
down
their milk. §. 3. My next neighbour, had a calf penned up, and the cow grazed in a ground by it, and the cow being kept from her calf, and yet able to come up near to the pen, grew unlucky to pigs that were routing in a dunghil near, and gored one of them in the eye, whereupon she and her calf were turned out together, but then the cow would not give down her milk to them that milked her.—I asked the farmers wife, a notable dame, the reason of it. She said, when the calf was penned up, and the cow was brought to it, when they milked her, the calf was hungry, and would suck hard, and the cow would give down her milk to the calf, and then the maid also might milk her, but when the calf was turned abroad with the cow all day, when the maid came to milk her, the calf not being hungry, the cow would hold her milk up from the maid; and so, she said, other cows were apt to do.

A gentleman farmer of Gloucestershire told me (anno 1698) that he had a cow of six years old that had usually given good milk, but the last year she would hold up her milk, and would not give any, and he knew not what should be the reason of it.—A farmer coming in, I asked him his opinion about it. It is odds, said he, but

but some body has ill-milked her ; for if one milks such a cow by halves, that is, to step away and come again, or to keep talking and milk her in a very slow manner, the cows patience will be tried, and so she will get that trick.

§. 4. I asked farmer Clerk of Holt in Wilts, how many cows a very good dairy-maid might be able to milk in an hour : he said, and they present all agreed, that it was a good hour's work in their country, where the cows gave a great deal of milk, to milk six in an hour ; he said, he thought his wife could milk as fast, and with as much strength as any body could, and she could once he believed have milked eight, but she was not able, though of a middle age, to do so now ; farmer Chivers and farmer Stephens agreed to this.—They also said when cows began to give off their milk, they would, if not milked clean, soon go dry.—I put the question, when it was that the cows began to give off the height of their milk ; they agreed, that they began to abate about the time of the blossoming of the wheat, and so on, till a good aftermas came, and then for a little while their milk would increase again, but cold and rainy weather in the autumn will dash the cows, and then their milk will abate again.—I take the reason why the cows milk abates about wheat-blossoming time, to be, because about that time the grass of the field blossoms also, and the flush of the sap is come to it's height and maturity, and then abates ; for the roots of the grass at that time begin to harden and grow dry, nor do they take in the juices of the earth so freely as they did before, and so grow drier and drier till the seed is hardened ; which seed being so brought to maturity, the roots of the grass for some time, till the cold and winter checks them, strike fresh sap-roots, or buds preparative to the ensuing spring, and which will the next year be the spring-roots and increase : on these new efforts or essays, as aforesaid in autumn, after the seed of the grass is perfected, depends the start of the autumn-grass till the cold checks it, which we call the aftermas, and from whence the cow's milk somewhat increases.

§. 5. Good housewives may know whether cows are well milked or not ; for if the quantity of milk does not yield so much cream as it should do, were the cows milked dry, then they may be assured when that the cows stroakings are not milked away, for, if the stroakings are left behind, much the greater portion of cream is left in the udder ; because the waterish part of the cream comes away first, and the fittest at last ; for they, being the last of the cows milking, lie up higher in the udder ; and consequently are more digested and concocted by the internal heat of the cows belly.

§. 6. Sir Ambrose Phillipps had a cow which, when milked, gave blood with her hinder teat ; and the dairy-maid endeavoured, to milk her as usual, but she was so bruised, that she could not stand.

How many cows a woman may milk in an hour &c.

Of a cow's

udder that has been bruised.

as I observed myself, with great pains to milk that teat; and, after squeezing with all the power she could, there would come forth a string of coagulated blood two or three inches long, which being removed, the like would follow three or four times together, and then there would come forth milk from that teat, as at other times, though much distained with blood: the cow all the while would endure the milking, only when the maid stroaked the upper part of the udder behind, to bring down the bloody matter, her hurt being conceived to be there, she would not endure it; this held for near three weeks.—And it seems they had known the like before: it was supposed another cow had run her horn against the bag of the udder behind, and bruised it, and they anointed the udder behind only; all the rest of the teats gave good milk.—It seems, if a lazy maid, who would not have taken so much pains with the teat, had had the managing of the cow, the bloody milk having had no vent, would have spoiled the udder.

Of a cow's udder growing hard after calving. §. 7. Sometimes a cow's udder will be hobbled after she has calved, that is, will be very hard like a board; the cow will not give down her milk well, and her udder will afterwards quarne, that is, grow knotty; in such case, till her udder is come into order, her calf ought not to be taken from her, because she will not give down her milk so kindly to the hand as she will to the calf, and thereby her udder will be apt to grow fore; and break as womens breasts do.

Of hill and vale-cows. See §. 27. Of cheese. §. 8. Mr. Whistler observed that the hill-country cows milk did not yield so much cream to the same quantity of milk as the vale-cows milk will do.—But surely this must proceed from the poverty of the hill-country cows, they being generally poor in case; of your thin necked and bodied cows, that are washy and flue, are observed to give a great deal, though but thin milk: but seeing our beef and mutton, when fat, eats as sweet as any in the world, I cannot conceive why the milk of our cows, if they were in as high case as the vale cows generally are, should not yield as much cream as their cows milk does.

I have heard it observed by some farmers and dairy-women, that cows with yellow horns, or with thick necks give generally very good creamy milk, and that cows with thin necks are generally remarked to be flue cows, that is, cows that will not thrive with their meat; and these will give a great quantity of milk, but it will be of a blue or grey colour, and will yield but little cream. A cow, they say, should not be milked within about ten weeks of her calving, for though she will give good milk to the very day of calving, yet the calf will be thereby starved. A cow should be milked very clean, or her milk will dry away.

Profit of a cow. §. 9. Farmer Moseley out of the Isle of Wight, and his wife, being at Crux-Easton, (anno 1698) they gave me the following account

account of a dairy ; viz. that 45s. per cow rent was counted a good price in the island, that formerly it used not to yield so much, but, upon the rise of butter and cheese, it now fetches as above : take one cow with another in the island, if they give two gallons of milk per day it is well ; which will yield four pound of butter per week ; and from June to Michaelmas, if a cow yields 70 lb. of butter to be potted, which comes to 23s. 4d.—and an hundred weight of skim-milk cheese at 1½d. per lb, that is 14s. per hundred, it is what is commonly expected ; besides which, there is the May-butter, for in the island they begin not to pot till June : then it is said, a cow's whey will maintain a pig ; but, said he, it will not ; the calf also may be valued at sixteen shillings.

§. 10. In case the first milk, which they call the beaftings, be not taken away clean from the cow, upon her first calving, it will go near to make the cow's milk to dry away. Of taking away the beaftings.

§. 11. The Roman writers on husbandry forbiding the colostrum or beaftings to be given to the calf, as if it was a poison, I asked farmer Stephens about it, he being in his way a notable observer, and milking a great part of his dairy-cows with his own hand : he said, at first he did let the calves suck the beaftings, and found no inconveniency in it, but said he, I have very often observed, when a cow has warped her calf, and we have put a calf of ten days or a fortnight old to draw down the udder (which is better done by a calf than by hand, because the cow is apt to hold up her milk when milked) that a calf of that age has been much purged by the beaftings, and received a great deal of harm thereby ; and therefore he held that the beaftings might surfeit, and had better be drawn off ; it stands to reason, if one saw what a curdled body they are of. Of giving the beaftings to a calf.

§. 12. Thunder will so break the cream, and turn the milk in the milk-pans, that no cream can be skimmed up for butter ; nor will the curd for cheese hold together, but will break asunder. Of thunder breaking cream.

§. 13. Though it be commonly said, that a quart of cream will produce a pound of butter ; this must be understood of a quart of cream that has settled two or three days, for three pints of cream just skimmed from the milk will yield in three days standing little better than a quart. If you bring in the milk, and strain it presently into the pans, without letting it stand to cool before you strain it, there will be much the less cream. Of a quart of cream making a pound of butter.

§. 14. Farmer Elford of Chubbs, near Upcern Dorset, says, Best butter he reckons the best butter and cheese to be made after June ; and whatever may be said of May-butter, or cheese, he thinks it not so good by much as that made afterwards ; and his reason is, that though the grass comes on thick in May, yet till the end of June the cattle do not recover their winter hardships, and Best butter and cheese made after June. Vid. 304. Of Cheese. tho'

tho' the grafs be in good cafe in May, yet the cattle muft likewise get into heart before they can give abundance of milk, or that is very good.

Of scald
cream for
butter.

§. 15. I am informed, that throughout Devonshire they make their butter in a different manner than elfewhere; for they fet the milk over the fire in many brafs pans to warm in, which makes the cream rife, and when a bladder riles in the middle they take it off the fire, and take off the cream, and put it into a tub, and it then looks like a clouted cream; then a maid only by putting in her arm and ftirring it, brings it to butter prefently, which is very rich butter, but the cheefe that is made of the skim-milk is very poor and has little goodnefs in it.

Butter
dearer
about peas
and beans
time.
Of rennet.

§. 16. It is agreed by the dairy-men about Holt, that againft peas and beans time grafs-butter riles in it's price by reafon of it's confumption on thofe legumens, therefore good houfewives collect butter a month before that feafon, and falt and pot it.

Of rennet.

§. 17. I have heard that a young heifer's maw, that has never been with calf, makes ftronger rennet, and is better for cheefe than a calf's maw.

The richer the pafture the longer the cheefe muft be kept.

§. 18. I find by the converfation of Chivers, John Sartain, and many other judicious dairy-men about Holt, that cheefe made between hay and grafs is apt to heave, (i. e. when the cattle eat of hay and grafs, as in the beginning of the fpring) and is a ftronger fort of cheefe than grafs-cheefe, and therefore is not fit to be fent to market under a year old, becaufe till then it will not be mild: in a word, I find by all the information I can get, that the richer the ground is (as it is with the ftrongeft beer) the cheefe of it muft be kept the longer before it is ripe, fo as to eat mild and palatable, and then none will eat better.

Of cheefe.

§. 19. I am informed by farmer Stephens, my tenant at Pomeroy in Wilts, who is the moft experienced man in all things relating to a dairy that ever I met with; firft, that, if milk be four, the cheefe thereof will always eat * chocky and never eat fat, though there be never fo much cream put into it, which is the reafon why chedder-cheefe often eats fo, being made fo large, that they keep their milk collecting too long; fuch cheefe in toafting will burn and bladder, a fure fign it is not fat.—Secondly, fuch cheefe (to fhew it is dry and not fat, notwithstanding a great deal of cream be put into it) will in it's coat on the milk-houfe fhelves look white and dry, and never gather a blue coat: neither will cheefe over-falted ever gather a blue coat, but in toafting burn at the fire, tho' never fo much cream be in it, and will look white and dry in it's coat.

* Dry,
chalky,

In Somerfetshire
and Wiltshire.

§. 20. Being with Stephens about Eaft-Lydford near Somerton in Somerfetshire, and having there bufinefs with a great many farmers, I found by Stephens and the confeffion of thofe farmers, that

that notwithstanding their lands were much richer than those of North-Wiltshire, they could not pretend to make such good cheese as was made in North-Wiltshire, and that the North-Wiltshire cheese of the same sort would out-sell the Somersetsshire cheese by three shillings or four shillings in the hundred weight.—It was allowed also, that the Somersetsshire women could not make a cheese with a yellow coat like those of North-Wiltshire; wherefore the Somersetsshire women, to disguise it, put saunders into their milk, to give a yellow colour to the coat of their cheese, which giving also a yellow colour to the inside, when people put in the taster, they find the art, and upon discovery take exceptions, for the inside of the North-Wiltshire cheese is white.—And it was confessed by all and agreed, that down farther westward, though the lands were better, yet the cheese was worse than in those parts of Somersetsshire I speak of.—This allowed of difference between the North-Wiltshire and Somersetsshire cheese gave me many speculations into the reasons for it, and I asked them present about it.—Stephens above-mentioned would have it, that in Somersetsshire they were not so good housewives as in North-Wiltshire, nor would he give any other reason, notwithstanding I had said, if the difference consisted in art, intermarriages would soon rectify that mischief, and a farmer that is choice in the breed of his bull and his cow, and goes far for them, would also send for the best dairy-maid in the country of North-Wiltshire; for the difference he speaks of amounted to at least twenty pounds in two hundred pounds rent per annum, and it was not to be conceived a whole county would be so stupid as to suffer such a loss, when the North-Wiltshire parts wherein he lived, were but twenty-four miles distant from those parts of Somersetsshire I was then in.—They allowed also at Winchester fair, if the fair was dull, the Somersetsshire men must stay a day the longer before they could sell.—I cannot give a reason for this, unless the following be one, viz. Somersetsshire lying low and wet, though the grounds are very rich, the juices of the grass are from thence less spirituous, and less concocted and digested, more gross and gnash, and consequently the cheese wants the virtue of that from the North-Wiltshire grounds, where though the grass may grow slower, yet the watery juices are more rectified and qualified: therefore all this, if it be true, must depend on these suppositions;—First, that dry grounds, by reason of poverty, afford no rich juices, and consequently no good cheese, for we must not say, because North-Wiltshire being drier than Somersetsshire outdoes it in cheese, therefore the hill-country in Hampshire being drier than North-Wiltshire has better cheese, for the contrary is evident.—Secondly, that there is a medium in the watery temperature of the earth, either extrem of which viliorates the juice, where

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there

there is not an equal heat of the sun or fatness in the earth to correct the juices of the superluxuriant grass.

In North-Wiltshire, wet spring, and the summer was wet and showery till July the greater 18th, and a great burden of hay and grass there was in North-Wiltshire, unless in the water-meads, where they were stranded; however, cheese bore a great price, viz. twenty-four shillings per hundred, for that first made in the spring; and the tenants of Holt who were going with their cheese to Maudlin fair at Winchester, which is on the 22d of July, expected a higher price: the reason of which was this; the last summer was so very dry, and the winter-meat, both hay and straw, fell so very short, that the generality of cows were much pinched, so that the cows about Holt gave but little more milk or cheese this wet summer than they did the summer before; again it is generally noted that in North-Wiltshire when they make most cheese, they sell it dearest, and when the least, they sell it cheapest; the reason is, in wet springs and summers, the generality of North-Wiltshire not lying low and wet, as Somersetshire does, in those years they make most cheese there, whereas the land of Somersetshire and Lincolnshire, and the deep lands of England lie all the spring and summer under water, or so much in a poach, that the grass is chilled, and cannot grow; but in the North-Wiltshire summers it is the direct contrary: then in cold wet summers the first cheese-fair of our parts, which is Maudlin-hill fair, carries the best price of all the later fairs, as falling before the Somersetshire cheese can come to a fair.

Of the blue coat or vinnow on a cheese.

§. 22. Stephens having before made it one of the characters of a good cheese to carry a blue coat on it, or a vinnow: I asked him whether it were good housewifery to wipe that off. He said, there were two sorts of vinnow on cheese, one in the nature of mouldiness, or long downy vinnow, not blue, which proceeded from the moisture of the air and weather, especially towards winter, and such vinnow cannot be too often wiped off; and if neglected, it will eat into the cheese, and give it a bitterish taste within the coat; whereas the blueish vinnow he spoke of proceeded from the inward sweat of the cheese, and would come on the cheese in dry weather as well as moist.

Of three sorts of cheese.

§. 23. Of the three sorts of cheese, viz. the hay cheese made some time after the cows calving, the spring-grass cheese made in May and June, and the aftermash cheese, though the aftermash cheese be the heaviest, and but tasteless, yet it is the fattest of the three, and, if it be kept to a good age, is a singular good cheese; for then the cows milk has the most cream: the hay cheese, if the cattle feed on good hay, will cast as yellow a colour on the coat as any, and being made in the spring will have a very hard

hard and smooth coat, having the spring to dry it in ; it is a very good cheese, and very profitable in a family, being very tart on the tongue, and will go very far in spending.

§. 24. Being at Pomeroy in Wilts to taste cheese in the begin-Of after-
ing of November, (anno 1714) Stephens, having sold his cheese mafs
made in the spring, had only the early aftermafs cheese fit for cheese,
spending left ; but he and his wife assured me, such cheese was
fatter and mellowier than the cheese made in April, May, and
June, though the spring-made cheese was tarter : I asked them
how the aftermafs cheese could be termed the fittest, when cer-
tainly the gras in May and June was richer than in July, Au-
gust, and September.—They said, they supposed the reason to
be, because the cows about April having brought calves, which
were not weaned from them till about the beginning of May, the
cows were low in flesh and condition, having had little gras to
support them till then, and when the flush of gras comes in May,
it is true they give a great deal of milk, but not so much cream
in proportion, nor so fat milk as in the aftermafs season, when the
cows being got into good heart, and flesh, they better concoct
and digest the juices of the gras with those of their own bodies.
—So, from thence, said I, it must follow, that a poor cow
must always give thinner milk than a cow in good flesh. Again,
I suppose on this reason depends in some measure the tartness of
the cheese made in the spring, because the cows have not then
good juices in their own bodies to qualify and mellow the acrimo-
ny of the juices of the gras, nor has the sun had time to concoct
the juices of the gras, which are therefore eager and tart.

§. 25. Mrs. Biffy the elder of Holt assures me, that broad-clo- Broad-
ver will not make good cheese ; for it will taste strong and bitter, clover will
yet they have not found it to heave : she also says, that neither not make
the milk nor the butter taste well. good
cheese.

§. 26. It is agreed by the dairy-men in Wiltshire, that the
higher in the cieling a milk-house is, and the less heat underneath,
as from cattle in a stable, &c. so much the better for a cheese-
loft ; for heat makes cheese heave, especially if the land it be
made from be rich. A cheese-
loft should
be high
and cool.

§. 27. When farmer Sartain and farmer Stephens were making Where
remarks how the cows of Gaufruns exceeded those of Pomeroy in cows give
milk, yet they agreed that no cheese exceeded that of Pomeroy, the least
and that those dairies, where the cows give so much milk, did milk, the
not make the richest cheese ; for, said they, where the cows give milk has
the least milk, the milk has more cream in proportion to the cream in
quantity.—* But this seems to be contrary to a former observa- proportion to the
tion : and farmer Sartain said, this I know by the farm at Holt, tion to the
for when I lived there, none made better cheese than I did, tho' quantity.
I rented only the arable and poor grounds.—Upon which I object- * Vid. §. 8.
ed

ed soon after to farmer Sartain and farmer Chivers, how then it came to pass, that poor ground would not make rich butter? to which Chivers replied, that doubtless it would; that is, said he, if you should have a sufficient large dairy, and milk enough to make butter every day, or every other day at farthest; for then the cream being sweet, the butter would be sweet and rich also; whereas poor and small dairies churn but twice a week, and then, the cream being turned, or upon turning, the butter cannot be good. And the cream of four and coarse grass, such as mine is at Crux-Easton, will sooner turn sour in proportion to the sourness of the grass.

Spring-cheese rises in price towards Candlemas.

§. 28. September 5th (anno 1712) being at Holt in Wiltshire, I encouraged my tenant Stephens of Pomeroy to come to Crux-Easton in Hampshire at Michaelmas to sell his spring-cheese; viz. that made in May: and he seemed inclinable to do so.—Of which design of his I acquainted farmer Chivers the next day.—Chivers smiled, and said, he thought Stephens would be wiser than to go so far at that time of the year to sell his best spring-cheese; for, said he, such cheese does not likely meet with the best price till towards Candlemas, when the aftermas cheese is spent, for in autumn and about Michaelmas there is such abundance of soft aftermas cheese to be sold, and the poorer sort of dairy-men pour it so fast into the market, as also their spring-cheese (for then these dairy-men's harvest is over) that the spring-cheese will afterwards rise in it's value, like hard-keeping pippins, which yield double the price at Christmas that they would in autumn, when the country was full of all sorts of summer-apples, the great plenty of which summer-fruit depreciates for some time the price of the hard-keeping fruit: and in like manner, when the corn-harvest is just in, so many farmers occasions for money being to be answered, the best corn will not generally come to the best market till the glut is over, and the barns grow empty: I grant, said farmer Chivers, the latter made or aftermas cheese we must all properly sell, whether poor or rich, because tho' the aftermas cheese be in truth as fat as the spring-cheese, yet it is a heavy deadish cheese, and will grow tough or glueish by keeping, whereas there is no occasion for selling the spring-cheese, unless for want of money, because that will grow mellow and gain spirits by age.

In Wiltshire when wheat is dear, cheese is dear, and why.

§. 29. Mr. Raymond told me (in June anno 1709) it was always observed about them, at Puckshipton in Wiltshire, about two miles from Patny, that when wheat was dear, cheese was dear also, which seemed strange to him; because, said he, it was a wet and cold spring that made wheat dear, and then we have always the greatest plenty of grass, which one would think should make plenty of cheese.—I replied, according to a former observa-

tion,

tion, the reason was plain to me, because the country where he lived, and Pewfy in his neighbourhood, lay on warm sands, which land, and the hill-country of Wiltshire within two miles of him, bore great burdens of grafs, as he said, in wet and cold springs; but, said I, the deep and low lands of England such as Somersetshire, &c. &c. which sort of lands set the price to cheefe as well as wheat, miserably fall short of a crop of grafs in cold and wet springs, as I told him I was but then newly an eye-witness of, for I came then from East-Lydford in Somersetshire to him, being June 19th, and the grounds of that country had not then got a good bite of grafs, by reason of the cold wet spring, nor had they been able to fat cattle in time.

§. 30. Our hill-country land is so much the more improper for Hill-a dairy, because our foddering-season holds so very long, and is country so tedious, by means of our rowet-grafs falling off a month ^{land im-} sooner than their's in the vale, and the spring grafs coming a ^{proper for} month later; so that the cows must needs be in a low condition ^{a dairy.} at spring.

As I have taken notice that the clover is four in cold lands, so doubtless the butter and cheefe must partake of it's nature more or less, as the clover may be sourer or sweeter, which may reasonably be supposed to be the cause of the butter and cheefe at Easton being strong and rank ^a.

S H E E P and L A M B S.

§. 1. **I**T is very necessary in inclosed farms, that, if the shep- The shep- herd be not required to hedge at spare times, he should herd to however be required to mend, for his business being much in mend walking about the grounds, he has the opportunity of seeing what hedges. is amiss.

§. 2. My shepherd assures me, that by my shepherd's cart I Benefit of shall save the value of it this one year (anno 1701); for, says he, a fodder- it is impossible in this hill-country but broad-clover hay especially ing-cart. must be abundantly blowed away by the wind, when it is carried by bundles at the shepherd's back; whereas the sides of the cart will preserve it from the wind.

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§. 3.

^a Among other useful inventions with which the reverend and learned Dr. Hales has obliged the world, he has published one to sweeten milk that has got an ill taste from the cows eating of crow-garlick, cabbage, turnips, autumnal leaves, &c. which he effects by volatilizing the rancid oil with heat, and, when heated, dissipating it by ventilation.— See his Account of the good effect of blowing showers of air up thro' milk, and also a Plate of the instrument for performing it, printed for Richard Manby, in the Old-Bailey, near Ludgate-hill, 1756.

Advantage of keeping up a flock of sheep in open common fields.

§. 3. Having made some remarks on the small profit arising from a flock of sheep, I imparted the substance of it to a gentleman in my neighbourhood, of long practice in husbandry; he said, that I was in the right of it, who lived in inclosures, but if he, where there was intercommoning, must buy new sheep yearly at spring, that were not used to shift for their living, in their bare commons they would be starved; they must therefore keep up a flock accustomed to the place.—Add to this, that the winter-fold, by reason of the grass not being so sweet, and the frosts falling on it, is not so good as the summer-fold.

Best age of an ewe and sheep.

§. 4. Mr. Bishop of Dorsetshire his shepherd says, they generally reckon an ewe's third lamb to be the best; and they reckon a sheep to be at full growth and prime at four years old; though, he knew not, he said, but, if an ewe had great keeping, she might belly some time after that; some sheep would grow broken mouthed at five or six years old, and others not till nine or ten: when they find an ewe a good motherly one, and to bring a good lamb, they keep her till she is broken-mouthed.

Of sheep's teeth.

§. 5. Sheep at two years old have but two teeth, at three years old they have four teeth, at four years old six teeth.

O F B R E E D I N G S H E E P.

Sheep from a warm country do not thrive on the hills.

§. 6. I bought about forty ewes out of Oxenlease in Wilts (anno 1718) where the ground is coarse, and they also fared hard; I brought them to Crux-Easton in October, where they had plenty of hop-clover; they seemed to do very well till December came, and then they crowded up under shelter of hedges, and ran into the lanes, and their wool being thin, and short, and more knotty than our's, they could not bear the cold of Crux-Easton well, nor keep the open fields in winter, nor could we hold them with the best hay, but they would pitch.—From hence quære, whether it be so good husbandy as is imagined, to mend our flock of sheep or cows by a fine wool-sheep or Gloucester-brown; since the produce carry such thin fine-grained hides, as may not prove so well on our cold hills.

Sheep without horns the best.

§. 7. Sheep without horns are counted the best sort; because so much of the nourishment doth not go into the horns. J. M. Esq; F. R. S. fol. 177.

Of leather-mouthed or hants-sheep.

§. 8. I carried farmer Miles of Wiltshire to a field where I had some * couples fatting, I told him the ewes were leather-mouthed with thick lips.—He said, they were called with them hants-sheep; they were a sort of sheep that never shelled their teeth, but always had their lambs-teeth without shedding them, and thrusting out two broader in their room every year.—Being

* Ewes and lambs

ing

ing his shepherd, who said, he had been a shepherd thirty years; he knew the sheep by the same name, and said, that now and then, in buying a parcel of sheep, two or three would creep into their flocks, but he never knew of so many together as twenty, which at that time I had: he said their teeth would not hold them so long as other sheep, but would wear down to a thickness by reason of their biting on them from lambs, so they ought to be fatted a year the sooner.—Mr. Raymond being by said, there were such a sort of horses called by the name of hants-horses, that always shewed themselves to be six years old.

My shepherd bought me a score of couples; when he brought them home he said, they must be fatted, for they would not live in a flock, but would be starved: they were a small sort of sheep, and out of case. I wondered at it, and asked him how that could be. He said, they were thick leather-mouthed cattle, of which sort there were many in Wiltshire and Berkshire, and therefore they could not bite so close as our sheep, if they went in the flock with them.

§. 9. Mr. Oxenbridge of Wilts says, he grew weary of sending his † hog-sheep from Michaelmas to Lady-day into So- † Young
merfeshire; for, though by that means he brought them home sheep
in high case, and could maintain them so all the summer, yet he should be
found they expected as good keeping the next winter, and for well kept.
want of it would pitch, and not hold their flesh so well as those
which had always continued on the farm.—I told farmer Ryalls,
and Mr. Bishop's shepherd of this; they said, they were against
sending hog-sheep abroad, if there was land to maintain them
in the winter without pinching the flock; for, if the winter
proved hard, they would often be cheated of their meat, and be
neglected abroad: but a hog-sheep ought to be kept up well the
first winter, to be brought into good bone and limb; for, if a † † Young
thief be not kept up well, and should pitch in yeaning-time, un-ewe of the
less you take her lamb from her, and put it to an ewe, it is odds 2d year,
but you lose both thief and lamb; for it will bring the skenting called also
or scouring upon her and kill her; and it is a very good way to put a two-
a thief's lamb to an ewe that has lost her lamb; for the ewe will
maintain it well, and she is past improving, but the thief will
thrive much the better for having the lamb taken from her.

§. 10. Mr. Biffy says, an ewe-sheep that is a free-martin, be- A free-
sides the puffed stinking tail she carries, has a lesser and lanker martin
bearing than other sheep. sheep.

Farmer Collins of the Isle of Wight assures me, there are free-
martins in sheep both male and female; he has for a fancy some-
times kept one of each four or five years: he says, they will
stink like a goat if you come near them, so that one can hardly
bear the smell; and the female does not piss as other ewes do,

but her piss comes dribbling from her, and the piss of the male runs dribbling down along his yard.

Of ewes not taking ram. §. 11. Being at the fold with my shepherd, he pointed at an ewe, saying, what a fine ewe there is ! her tail is apt to be so rough, and loaded with wool, that next ramming I will clip her ; for, said he, I believe that last year the ram could not ram her for that reason.—I observed indeed her buttocks to be wadded with wool.—That year (anno 1702) I had about thirty of my best ewes that went through and proved barren, which might be for the abovesaid reason ; for I keeping my sheep very well, they might by ramming-time carry too much wool on their buttocks : the year before I also had about twenty proved barren.

In inclosures, when sheep are dear, an ewe-fold pays better than a weather-fold. §. 12. Discoursing with a farmer in the Isle of Wight about sheep, I said, now (in November 1718) sheep being dear, an ewe-fold would pay better than a weather-fold because of their increase.—To which he replied, it was undoubtedly so, in case the sheep went in inclosures, where one could give them their bellies full ; but in case they go on common downs or fields, then of necessity one must keep weathers, because they can fare hardier than ewes, or else your neighbour's flock will starve your ewes.

Of ewes and weathers. §. 13. The ewes must be well kept all the winter and better than the weathers : a weather's wool is of much less value than the wool of an ewe, and will scarce pay for his winter's keeping, but his tail in folding on the barley in spring, when the ewes must not be folded, will turn to better account.—Weathers among a flock of ewes will thrive better than by themselves, because they will beat off the ewes, and have the top of the grafs in summer, and the best of the hay in winter.

Of buying sheep for fattening. §. 14. In buying sheep for fattening at the first hand of the year in spring, one may be pretty secure of buying in those that will thrive, inasmuch as sheep, which seem forward in case early in the spring must be of a thriving sort, otherwise they could not be forward in flesh so early : but for the second fattening it is not so certain, forasmuch as sheep may be in good case at Midsummer, and yet have been a tedious while in arriving to that condition, and consequently will be so in their progression.

Of rubbing sheep's eyes with salt. §. 15. My neighbour's shepherd asked me, if I knew how to make rotten sheep sound ; on which I inquired of him, if he knew how to do it ; he said, to rub their eyes with salt would deceive the buyer, and make the whites of their eyes look curious and red ; that practice, said he, is common among the sheep-jobbers.—Afterwards I asked farmer Elton about it ; he said, he had heard that the sheep-jobbers did use it.

§. 16.

§. 16. Sir Ambrose Phillipps's shearers said, it was a common cheat about them, to get reddish clay, and dissolve it in water, and colour the sheep with it, and two or three hours after, when it was dry, to card their wool on their backs, to make the buyers believe they had been folded-sheep, and not pasture-sheep; for folding the sheep on the fallows gives their wool that reddish colour; and in case the sheep were forest, or pasture sheep, many would not buy them, because being not used to a fold, nor fallows, they would not be able to keep them in either, but they would break away.

§. 17. Lean sheep sell well at this time (June 8, 1707) though the spring and summer-part of the year to the 22d of May (when rain fell) has been the driest in the memory of man; I was at a loss for the reason of this whilst in Hampshire, which is a breeding country of sheep, but when I came into Wiltshire a grazing and fattening country, I soon saw the cause of the dearth of lean sheep; for it seems, a greater demand had been for their fat lambs for three years last past than ever was known, and greater droves of them carried to London, and when the ewe-lambs were fatted, the ewes were consequently fatted too, and this extraordinary consumption has wasted the breed of sheep, and consequently raised the price of lean weathers, but especially of ewes.—In discourse afterwards with Mr. Bissy on this subject, he allowed there had been greater drifts of lambs sent to London for these three years last past than usual, the reason of which was the breed of sheep greatly increasing, because there had been no rot, which moved farmers to fat lambs, because sheep were like to be cheap; but, said he, the aforesaid reason is not the only one, why lean sheep are dear, but the drought is the chief reason, for no rain falling till the 22d of May, and dry weather following, graziers bought sheep, fearing they should not be able to fat greater cattle, grass being so short, and the season of the year so late.

Being at the fold with my shepherd, I asked him, what ram-lamb he would save for a ram; he pointed at one, which he said was deep-wooled behind, and had broad buttocks.—That is true, said I, but yet I do not approve of him, because he is so wide-headed, that is, his horns stand so wide, which may endanger the ewes in yeaning by bringing such lambs of the breed, as I have often heard it observed by old experienced shepherds.—He admitted this to be a proper objection.

§. 18. At Loughborough Capt. Tate was saying, that he would buy him a Lincolnshire tupp to improve his flock.—Major Hartop was there, and bid him have a care that he was but of the lesser size, otherwise his ewes might die in yeaning, unless they were of small ewes.

they were large sheep. The next day I met Mr. Clerk with Captain Tate, and he said the same thing. We see it happens to little lap-bitches often if lined with a great dog.

Of the choice of a ram, from the ancient writers.

§. 19. ^a Palladius, Columella, and Pliny, speaking of the choice of a ram, direct us, not only to have a regard to the whiteness of his wool, but to his palate, and the veins under his tongue, for, if these are black or spotted, according to their notion, the lambs that proceed from him will have black or spotted fleeces.

^b Other qualities required in a ram, as delivered by the ancient writers, are these. His figure should be stately and tall, his belly big, swagging, and woolly, his forehead broad and well frizzled, his eyes of a hazel-grey, incircled thick with wool, his breast, shoulders, and buttocks broad, his tail very long and fleecy, his testicles huge, the ringlets of his horns circling inward. Not that a ram, says Columella, is more useful for having horns, for the best are those that have none, but because one of this kind is less ^{*} hurtful than those, whose horns are more open and extended: in climates however that are cold, wet, and subject to storms, we rather recommend the largest headed rams; for the greater and more spreading the horns, the more will their heads be covered and protected from the weather.

* Probably to the ewes in yeaning.

Of a ram, and the proportion of males to females.

§. 20. Mr. Bishop's shepherd said, that they reckoned a ram would serve thirty ewes, though they usually kept two or three rams over and above to their flock: they kept their rams well against ramming-time, but afterwards turned them out to the hardest fare; and if the ewes warped, they turned them out to the rams again, and they would bring lambs again about St. James-tide. The above is a large proportion of rams to ewes, for a good ram will very well serve no less than sixty ewes.

Mr.

^a Cujus coloris sub lingua habuere venas, ejus et lanicium est in foetu, variumque, si plures fuerent. Plin. lib. 8. cap. 47. — Non solum ea ratio est probandi arietis, si vellere candido vestitur, sed etiam palatum atque lingua concolor lanæ est; nam cum hæ corporis partes nigrae aut maculosæ sunt, pulla, vel etiam varia nascitur proles. Colum. lib. 7. cap. 3. Pallad. fol. 101.

^b Sint fronte lanæ vestiti bene, ravis oculis lanæ opertis, auribus amplis, pectore et scapulis et clunibus latis. Varro, lib. 2. cap. 2.

Habitus autem maximè probatur, cum est altus atque procerus, ventre promisso atque lanato, caudâ longissimâ, densique velleris, frontè lata, testibus amplis, intortis cornibus; non quia magis hic sit utilis (nam est melior mutilus aries) sed quia minimè nocent. Quibusdam tamen regionibus ubi cæli status uvidus, ventosusque est, arietes optaverimus vel amplissimis cornibus, quod ea porrecta atque maximam partem capitis à tempestate defendant. Colum. lib. 7. cap. 3.

Mr. Bishop said, he knew how not to be deceived in a fair by a ram that had his stones in his back, for a weather; for he had a thicker nose, and was ram-headed.

Jacob presented to his brother Esau 200 she-goats and 20 he-goats, 200 ewes and 20 rams, 40 kine and 10 bulls, Genesis, cap. xxxii. ver. 14. and 15.—Quære, whether that might not be the proportion of males allotted to females in those countries.

§. 21. Mr. Bachelour of Ashmonsworth is much for keeping the ram from the hog-sheep till they are two years old; for, says he, they make the only sheep for our hill-country, but hog-sheep in our hill-country make very ill mothers, unless extraordinarily kept. Columella recommends an ewe of two years old. Elige ovem bimam. Ewes in the hill-country not to be put to the ram till two years old.

The farmers are apt to give their ewes they fell at St. Leonard's the ram at Bartholomew-tide and early that they may thrive on it before they come to the market.

§. 22. I was saying to farmer Lake of Faccomb, Hants, that I wondered how my rams could break out, and get to my ewes, and ram them, because, we coupled them together, and kept them in close inclosures, and yet they must get out to the ewes, because twenty of them had lambed a little after Christmases.—The farmer said, I suspect some of your forward ram-lambs might ram them, they not being separated from the ewes, for such ram-lambs will ram the ewes; I myself, said he, had forty so rammed: and those ram-lambs of yours, which were lambed at Christmases, will ram your ewes again, if not separated as soon as the rams are. Of ewes being rammed by ram-lambs.

§. 23. Farmer Ryalls of Dorsetshire walking with me in Mr. Bishop's ewe-leafe, he went up to a lamb not long lambed, that was of a yellowish hue, so coloured I suppose from the ewe: he said, such a colour argued, that the ewe was in good heart and the ewe's case, but if the lamb when lambed was of a greenish or blackish cast, or of a pale white, it was otherwise. Colour of the lamb: mark of the ewe's health.

§. 24. In walking he turned up some of the sheeps-dung, which was of an intire clot, with one or two foldings in it: he said, and so did Mr. Bishop's shepherd who was with us, that it was a sign of such sheep were in good case, and had their bellies full, whereas, if their dung come away in pellets it was otherwise. Mark of the good sheep.

§. 25. Cows and sheep will fall away, and look hollow in the flank, a day or two before they calve or lamb, as if they had done so: and cows will always pitch upon their rump, that is, have more hollowness there than any where else. Sign of an ewe's being near lambing.

§. 26. Tailing the ewes in the spring-time, that is, cutting away the wool from under their tails and their udders, is very proper, especially in deep and fatting countries, where they fat their lambs, and do not fold: it keeps their udders sweet and free from chopping by the heat of their urine, so that the ewe may the

the better bear the lamb's sucking her, for her udder being sore, she will not let the lamb suck, but will wean it; and the sweeter her udder is, the better will the lamb like to suck it; whereas otherwise the lamb will be apt to take to grass, and wean itself, whereby a lamb intended for fattening will be prejudiced.

Of the
care of
ewes, and
lambs.

§. 27. In lambing-season the hill-country shepherds have a hard time of it, being obliged to watch the ewes sometimes for a month together, every night of the week, lest they should be frozen to the ground: it is sometimes very troublesome to make the young ewes of a year old to take notice of their lambs: if ewes are not wintered well, they will never have good lambs, but rascally ones; it is all in all to feed the ewes so, that they may bring good lambs. Oftentimes they are forced to give the lambs milk, which, if not boiled, will carry them off by a looseness.—The warmer part of the downy hill-country allow three tod and an half of hay to the wintering of one sheep, and suppose the half tod to answer the accidents of a severer winter than ordinary, but at Crux-Easton it is necessary five tod should be allowed to every sheep; for the winter is longer at Crux-Easton than most part of the downs, it lying under snow sometimes a fortnight, or a month together, when the other downs are free from it.

About lambing-time when they hurdle up the ewes new fallen in the mead at night, it is customary for them to go forth at midnight, and to stir up the ewes; for some ewes will be so lazy as not to rise all night, and their lambs will be almost starved by morning, whereas when they are thus raised, their lambs will have opportunity to suck.—By that means also a lamb may be saved, which the ewe could not lamb without help; and sometimes a lamb will be saved, which was in danger of being lost, by getting out of the fold between the hurdles. The ancients laid a great stress on the attendance and care of the shepherds at yeaning time, and Palladius advises to put the lamb to the teat as soon as it is fallen, but to take the beatings from the ewe first, lest they should be hurtful to the lamb.

Of ewe's
taking
Ram.

§. 28. My ewes not lambing so fast after they had begun in March (anno 1702) as usually, I was speaking of it to my shepherd: he said, he believed it was, because we folded them late in the year, on the cold wheat-land, after it was sowed, which made them not take ram so fast.

§. 29.

* *Pastor partus pecoris non secus ac obstetricum more custodire debet; neque enim aliter hoc animal quam muliebris sexus enititur, sæpiusque laborat in partu.—Columella, lib. 7. c. 3.—Agnus statim natus uberibus maternis admovendus est: manu prius tamen exiguum lactis, in quo spissior est natura, mulgendum, quod pastores colostram vocant: namque hoc agnis, nisi auferatur, nocebit. Pallad. in calendar. Novem.*

§. 29. Mr. Bishop says, he sees no difference between the horned and knotted sheep; if he sees a fine lamb of the knotted sheep he keeps him, though his flock be horned: he says, he has often a knotted lamb from the horned sheep, and a horned lamb is often bred from a knotted ewe;—and sometimes a black lamb from a white ewe and ram.

Knotted sheep often bred from horned, &c.

§. 30. It is to be observed, that the first lamb an ewe brings is generally potted, that is, pot-bellied, short, and thick, which is not so good a lamb as the long straight-limbed lamb is; ^d the antients separated these from the rest of their flock, as being of a weak nature, and not so long-lived as those that came from the older ewes.

The first lamb generally pot-bellied.

§. 31. It is adviseable to be provided with a cow with calf in winter, that the weak and sickly lambs may have milk in the spring; and the offall hay the sheep make will fodder her; but, if ewes are kind to their lambs, and have milk enough for them, it is better not to give them cows milk, for it does not agree with lambs so well as ewes milk, but is apt to scour them, for which reason they usually boil it.

Of cows-milk for lambs.

§. 32. If a lamb, when first lambed, is overcome by the hardship of the weather, wrap it in a wisp of straw, and bring it to a hay-reek, and it is still better if it be in a sheep-barn, where the sheep may go round it; thrust the lamb into a warm hole of the reek, and in a day's time, if any thing will, it will recover the lamb, and then you must bring the ewe to it, that it may suck: the reek is much more suitable to the nature of the lamb than the fire-side.

Of recovering chilled lambs.

§. 33. The main care to preserve lambs at yeaning time, if the snow should fall, is to bed them with straw. A young ewe will be shy of her lamb by reason of the tenderness of her udder: the young ewe, being forward, must be kept hurdled up for a day and a night, till she takes to her lamb, in the same manner as when a strange lamb is put to an old ewe.

Of the care of lambs.

When Mr. Bishop's shepherd had tamed an ewe that he had tied up to a strange lamb, he used, when he let her out, to tie her hinder and her fore leg together with a string, that she might not run away from her lamb.

If an ewe warps her lamb before her time, or the lamb comes at it's full time, but in an ill condition, or dead, it seems improper, to me, to put a twin lamb, or a thief's lamb to such an ewe; for such an ewe's milk will not be kindly, nor will the lamb thrive;

^d *Oviculas ex primiparis natas abalienare oportet, cœu minimè diuturnas.—Didymus in Geoponicis, fol. 450. Primiparis minores fœtus. Plin. lib. 8. c. 47.*

thrive; but, if the lamb comes at full time and sound, though dead, or is afterwards killed by an accident, then such usage is very good, and I have done accordingly.

If any good ewe lose her lamb by a fox, or weasel, or other accident, the shepherd ought to set a thief's lamb or twin-lamb to her: the lamb's head to be wiped with the sheep's green tail, till brought to it's nature; and

If there be no lamb in that flock to spare, a lamb ought to be sought in a neighbouring flock.

In lambing-time always put those ewes that brought twins apart by themselves; because, if you let them go with the other ewes and lambs, they are apt to lose one of their lambs, till they are a little settled with them.

*Palladius speaking of the ewes that have newly lambed, says, the lamb should be shut up with the ewe for two days.

Of wean-
ing lambs.

§. 34. As to weaning of lambs, in some places they never sever the lambs from their dams, especially in the best pastures, where the ram goes constantly with the ewes; because, when the ewe goes to ram again she will go dry, and wean her lamb herself; and in unsound pasture they reckon it best for lambs to run with the ewes, because they seldom rot while they suck, unless the ewe's milk fails. J. Mortimer, Esq; F. R. S. fo. 179.

Of care in
catching a
lamb.

§. 35. The butcher coming to kill me a lamb, which I helped to catch, I held it up by the back to weigh it; and, when he had killed it, I observed the blood, where I had griped the lamb on the back, was already settled in a bruised manner, though killed immediately upon it.—He says, it neither hurts calf nor lamb to catch it by the hinder leg.

Of cut-
ing lambs.

§. 36. They used at Crux-Easton formerly to cut their tup-lambs early, within six weeks old; but of late (anno 1697) they have put it off to St. James's-tide, because they find the lambs, when so old before they are cut, carry a better head for it.—In Wiltshire they cut them at six weeks old.—The Wiltshire farmers judge it is hard to keep the wound from the flies, when cut so far on in the summer.

Id. and of
spots on
lambs
thighs.

Farmer Farthing of Appleford in the Isle of Wight, who had in April (anno 1700) newly cut his lambs, assured me, that several of the lambs would have under their legs, on their thighs, red spots in the flesh or skin, as big as the top of one's finger, and if they cut such lambs they would most certainly die in less than twelve hours; nay, said he, if such lambs be but slit in the ear or ear-marked, so as blood be drawn whilst they have those spots, they look on it that they will die: but three or four days after those spots appear they will go away, and then they may be

* Per biduum natus cum matre claudatur. Palladius, fol. 118.

be cut:—he had half a score that he forbore cutting at that time for that reason.—He says, in the island they cut the lambs in the beginning of April at farthest, that they may cut them before these spots come forth, for they observe the spots to come forth when the hawthorn bushes begin to bud.—To all these points farmer Glyde did agree, and says farther, that if they had no spots under their thighs, yet, if they were in their bodies, which was not to be seen, it was the same thing; for he had lost lambs, and when he had flead them, he saw the spots.—Farmer Farthing's shepherd caught me a lamb or two to shew me the spots, which were like a bloody scurvy-spot.

In the island they approve of cutting lambs and not of girding; because girding makes them not limb so well in their thighs, nor be fat there, when they come to be fatted.

When I discoursed my shepherd, and farmer Elton about the red spots under lambs thighs, and told them, in the island they all looked on it to be mortal to cut a lamb at that time, I asked, whether they did not observe the same about them. I found they had heard something of it, but said, the method in their country was to sear, and if it be dexterously done, no blood will be drawn, nor do they regard whether they do it when the spots are on the lambs or not.

Sir Ambrose Phillipps's shepherd knew nothing of the red spots under lambs thighs, and yet cuts them about the beginning or middle of April; he observes not the sign, nor thinks it ought to be regarded, only he takes care not to cut them when the weather is too hot, nor in wet weather; for the wet falling on their loins at that time, is apt to give them cold.—He says, it is a common opinion amongst them, that if a man cuts lambs who has a stinking breath, or that takes tobacco at the time, either of these will poison the place, and make it apt to gangrene.—An Irishman, coming to Sir Ambrose's to buy mares and rams in that country for breed, wondered to see the shepherd cut his lambs on a day when the wind was northerly, and said, they should in Ireland look on it to be certain death to the lamb, if cut on such a day.

Formerly the butchers used not to like searing, but would have the lambs to be drawn because it hurt the leg of mutton, it never being full there, which was true as they then managed it; but of late we find searing to be the safer way, and to put the lamb to less pain than drawing, and we now prevent that mischief by searing as little of the cod away as possible.

The butchers assure me, that a pur or ram-lamb will never be so fat for the butcher as an ewe-lamb: they say, the pur-lambs I intend to fat should be drawn as soon as they are a fortnight old; they

they would fat much the better for it ; and if I should keep them to be weathers, though they will not run so much to a head as those that are cut or drawn later, yet they make better mutton.

June 3d (anno 1702) I cut my pur-lambs, the weather being very hot, and they seemed to my shepherd to do very well that night and all the next day, not being able to come to the pond to wet themselves ; the third day they had the liberty of the pond, when he observed, they would take the water, and even swim, they went in so deep : that week I lost six of them, which died of the rankling of the cutting : I had at the same time ten lambs cut, which went by themselves from the flock, being twin-lambs, but they could come at no water, and these did very well.—Therefore it may be shrewdly suspected that the other lambs rankled from their running up so deep in the water, and that they should be kept from water, especially in hot weather, for three or four days after their being cut.—Mr. Edwards assures me, he has often heard that going into the water was very dangerous for new cut lambs ;—but farmer Bond says, he keeps not his from water, nor has he found that it hurts them.

Mr. Biffy draws the stones both of his calves and his lambs himself with his teeth. I wondered at it, because it seemed at first, as if he thought touching the stones with the hand or an instrument might not succeed so well ; but he said, the only reason he knew of it was, because by the help of his teeth one man could do two men's work ; for whilst he draws the stones with his teeth, he has his two hands at liberty to hold back the strings of the stones that they are not drawn away ; for the strings run up into the loins and back-bone, and if care be not taken to keep them back with both hands, the stones would draw the very cawl after them, and then the lambs must die ; therefore the way is to draw the stones leisurely with the teeth, that you may be sure to hold the strings from drawing after.

Mr. Bishop says, in Dorsetshire they cut not their lambs till the latter end of May. I asked him the reason of it. He said, they kept them the longer from cutting, that they might be able to hold on the barley-grounds, which they would not be, if they were cut in March : their great fair for pur-lambs at Sherbourn is in July.—They have three ways in Dorsetshire for cutting lambs ; by cutting and searing ; by swigging, which is girding them hard round the cods, and cutting the cod away close to the string ; they know whether it be well done or not by it's not bleeding afterwards : and thirdly, drawing, which is done by making a slit in the cod as wide as an half crown, and drawing out the stones, which will bring away with them a back string, and stuns the poor lamb for the time : if this way kills them, it is in two or three days time, but in swigging they will die sometimes a month

a month after : Mr. Bistrop uses drawing, and says it is the best way : and so said another farmer.

About Holt they cut their lambs at a fortnight or three weeks old, though they should fall at Christmases ; and then, says Isles and William Sartain, they will eat as sweet as the ewe-lambs : they take care to cut them in dry or frosty weather, and not in wet, and not to keep them walking after it, and to raise them up three or four times, and keep them stirring that day they are cut.—Note, they all draw their lamb-stones with their teeth, which is the only way if you intend to fat them.—They say, it is so easy to do, that any one may do it.

They advise me to put my ewes to ram, in case I would fat my lambs, so as to come the latter end of January, or, considering the coldness of our country, in the middle of February.—William Sartain said at another time, that he scrupled not to draw the stones of his lambs at four or five days old, if they were come down, so as to take hold of them, and had commonly done it, but never lost any.

The north country, as Lincolnshire, and those counties that send their knot-headed lambs (i. e. not horned ones) to Smithfield market, (they being great lambs of large-sized sheep) do not send their lambs to London till about Midsummer, and hold on sending till about Bartholomew-tide ; those lambs are coarse, especially the males, because they do not geld them, though they fat them, which makes them the larger ; for they agree, that gelding them makes them of less growth, though the meat is the sweeter for it.

§. 37. Mr. Clerk was telling me how they managed their lambs in Essex to sell them so fat in the London markets, as they do before Christmases ; he says, they keep their ewes as high as ever they can, and house their lambs, and bring in the ewes to them at six in the evening for all night, and turn them out at six in the morning till nine, and then take them in again, and turn them out till six.—But as soon as an ewe's lamb is fatted off, and fold, they keep such ewes to serve the lambs that are left ; the ewes that fed all night are taken in in the morning about nine, and then the mother ewes are not called in in the day-time : the foster-mothers are held whilst the lambs suck : all the time of fasting the lamb has it's bed of straw changed once or twice in twenty-four hours, and a chalk-stone to lick on.

§. 38. Virgil seems to be wrapped up in his poetical spirit when he triumphs on the fruitfulness of Italy, and says,—“ that the lands bear two crops in a year, and the ewes lamb twice.” By which he must mean, that the ewes so lamb twice in a year, to bring up their lambs to a marketable condition, within the year.

B b

Of ewes
lamb in
Essex.
twice a
year.
compass

compass of the year, that is, so as to have taken their weaning or be fit for the butcher; otherwise if he means, that their ewes bring lambs twice within the compass of the year without rearing them, he says no more than what is common throughout the world.—The *Rei rusticæ scriptores* say, “that when the ewe takes ram again, she will wean her lamb.” But it seems this expression of the *Rei rusticæ scriptores* is generally to be understood; and doubtless, according to the common condition of flocks, the ewes are not in so good case as to suckle one lamb and breed another, and therefore will, if with lamb again, wean the sucking lamb.—But it happened otherwise with farmer Stephens, my tenant, for he had three ewes that went in good pasture, which brought him lambs at Christmas, which he sold fat to the butcher at Lady-day last (anno 1707) and at the beginning of June thinking his ewes to be mutton, for they looked big, he went to sell them to the butcher, who handled them, and found their udders spring with milk, and that they were near lambing, and accordingly did lamb the first week in June: and this his neighbours know to be true.—These ewes, being well kept, did in this case, it is evident, take ram three months before they weaned their first lambs: and these ewes had always been used to bring twin-lambs, and so of a more fruitful sort, though in this case they brought but single ones.

I am informed from Dr. Sloan, that in Jamaica ewes bring forth twice in fifteen months, without any regard to the time of the year; but cows as in Europe.

Time when lambs, &c. are eatable.

§. 39. When God demands the first-born of cattle for himself (Exod. xxii. 30) he says “seven days it shall be with it’s dam, “on the eighth day thou shalt give it me.” On which Dr. Patrick remarks, “that till then the young were not of a maturity, nor “accounted wholesome.”—To which I must add, that they are not so by that time in our cold country in England, where a fortnight is the soonest we think well of such creatures for eatables: but it is very reasonable to believe they were maturer in half that time in Judea; for it is apparent to me, on experience, that sucking-pigs, and lambs, and calves thrive much faster in England in the hot months of the summer, than they do in winter.

OF SHEARING SHEEP.

To let sheep cool before they are washed.

§. 40. Being on the 4th of June (anno 1701) to wash our sheep on the morrow, I asked my shepherd, what time in the morning he would drive them to the wash-mills; he said, they should not begin washing perhaps till ten, but he would begin to drive them by five in the morning, or earlier, that the sheep might have time to

to cool after they came there, before they were washed, otherwise it might make them ill.

§. 41. Going along with my sheep to washing, my shepherd asked me, if I should in a week's time want to kill a fat sheep, because if I did, said he, I will not wash him; for the tumbling and rubbing the sheep damages the mutton, if killed so soon after, but it is never the worse for it in a fortnight's time.

§. 42. In Kent, near Hiam-kill-marsh-priest, about ten miles beyond Gravesend, they wash their sheep in the following manner; —there being creeks, that are muddy, when the tide is down, but when the sea flows are deep in water, they tie ropes to three or four sheep of the flock, and hall them over, the rest willingly following, and then the said sheep are drawn over again in the same manner, and by the time they have swam over seven or eight times, which is as often as they well can do in a tide, they will be well washed:—and this washing they say is preferable to our scouring and rubbing them:—from hence it appears the salt water is not pernicious to their wool.

§. 43. I asked Sir Ambrose Phillipps's shearers, if they did not reckon a slow running water better to wash the sheep in than a quick-running stream, because it scoured better.—The shepherd said, he had heard it so reckoned, but he rather liked a sharp stream, for if it did not scour so well, yet it left not that oily smell behind it that the other was apt to do, which would invite flies to blow the wool between washing and shearing.—The shearers said, —they could not wash their sheep so clean as we could at Crux-Easton, because their sheep went much on a sandy soil, and the grit of that would not wash out so well as the clay.

§. 44. Coming over Appleford-common in the Isle of Wight, I observed the tails of the weathers sheared close all along down from the rump, so that their tails hung down like rats-tails: I inquired the meaning of it, and was answered, that they always did so in the Isle of Wight both to weathers and ewes, because they so bepissed their tails, that it burned and scorched up their dugs.—They sometimes began to do it in the beginning of April, sometimes not till May, according as the season proved.—My bailiff says, they have the same custom in Hertfordshire.

§. 45. Shearers ought to go very soberly and carefully to work, lest they cut off the ewe-lamb's teat, and yet, be they never so careful, that may sometimes be done; and in such case they ought to take care to mark such a lamb, that it may be fatted.

§. 46. I was talking of driving my sheep into a lay-ground of fresh grass after washing, and before shearing: but many that were present said, by no means; for that would scour them, and foul their wool; and also when drove into the barn, they would be trampling in their dung and daub themselves; therefore, said they,

we take care to give them the shortest pasture, after washing till shearing, we can get, that their dung may be pellets.

Of pricking sheep in shearing. §. 47. In shearing the danger is, lest any of the sheep should be pricked with the shears, which if done, and not taken notice of, so as to cut it out with the shears, it will be apt to rankle, and kill the sheep in twenty-four hours time ; but cutting does little or no prejudice if tarred.

Of sheep being smothered in the shearing-barn. §. 48. The night before shearing we drove the sheep into the barn, lest rain should come : my shepherd, and those who helped him were in fear lest any of them should be smothered, and therefore they ought to be looked to, to see they keep their faces in the air.—My next neighbour lost seven or eight in one shearing-time, and divers others have had the like misfortune happen.

Fatting sheep in inclosures to be sheared early. §. 49. Mr. Weedon, and Mr. Cowflade of Woodhay, usually shear and wash their fatting-sheep by May-day : the reason they give for it is, because their inclosures are very small, and consequently too hot, and therefore their fatting-sheep need to have their coats off so much the earlier, and they thrive the better for it.

Of plucking sheep. §. 50. † It was an antient custom (as the *Rei rusticæ scriptores* tell us) to pluck the wool from the sheep's backs, instead of shearing it, and this custom lasted in some places even to Pliny's time, and Varro derives the word vellus, a fleece, from vello, to pluck.

Sheep well kept may be sheared she earlier. §. 51. I never used to shear till the Monday before Midsummer-day, but I now (anno 1714) find I was in an error in so doing, and that, as my keeping is very good, by which means the wool grows the larger, and heats the sheep the more, and their fleshiness being such as to bear the cold the earlier in parting with their fleeces, I ought to begin to shear the first week in June ; and the sheep would not only thrive much the better, when the load of their wool was gone, but their new wool would also have more time to grow against Weyhill fair, which would make the sheep look more burly. Sheep when shorn have better stomachs, for the heat of the wool takes away their appetites.

What in scripture is translated the shearing-house, signifies in the original, the house of the shepherd's binding ; for they bound the feet of the sheep when they sheared them. Vid. notes on 2 Kings x. 12.

† *Oves non ubique tondentur ; durat quibusdam in locis vellendi mos.* Plin. lib. 8, c. 48. Et Varro de re rustica, lib. 2. fol. 64. ait, Ex vocabulo—vellera, animadverti licet, prius lanæ vulfuram quam tonfuram inventam.

§. 52. Two or three days before my sheep-shearing, I was consulting with my shepherd how to provide barn-room enough to house my sheep the evening before shear-day, in case it should be likely to rain that evening.—He was very desirous to have more barn-room than former shepherds, to keep his sheep cool; but had great hopes the weather would be so very fair, that they need not be housed till the morning of the shear-day; for, said he, the housing them over night before shear-day, when they are loaded with wool, heats them so, that when they are sheared they catch cold, and will be glandered, and snivel very much.

§. 53. The shearers agreed, that, if sheep were poor, it was a great advantage to them to have two or three good seasonable and moderate days of weather after shearing, for, if the sheep were poor when sheared, and two or three hot days came presently upon them before they were settled, it was wonderful to see what alterations it would make on them; their skins would turn scurfy and starky, and their wool stare and grow thin; and, if the weather should prove cold, and exceeding wet, it would quite chill such sheep; about six weeks ago, it being about Midsummer (anno 1699) a mighty cold and wet day and night falling on such sheep the next day after their shearing, they were fetched home dead in dung-pots; but neither of those sorts of weather had much effect on fat sheep, or those in very good case.

§. 54. I asked farmer Biggs, Mr. Edwards being present, why they sheared their lambs in this country, and not in our part of Wiltshire. They said, they judged we folded not so much as they: and that lambs being folded and kept hot thereby, it would increase their tick which breeds in them; and they observed the wool, if let alone, would quite eat out the flesh of the lamb, and bring it to be out of case.

§. 55. Many farmers in Hampshire always let alone shearing their sheep till a week or ten days after the washing; it is held that the sheep's sweating so long in their wool does it good, and makes it weigh the heavier.

Farmer Biggs and I discoursing on sheep-shearing, the farmer said, it was a great damage to wool to have the moth, which was chiefly got, especially if the wool was kept above a year, by laying it against a south, south-west, or other damp wall, or by shearing the sheep before the wool was dry after washing.—But, said I, how can one help it? if shearing-day be set, and it should so fall out that much rain should fall between washing and shearing-time.—Said he, the rule of the country is, that farmers, that use the same shearers, and are to come after, must put back their shearing-days, that you may stay till your wool be dry: but, added he, such hindrance seldom happens, for, lest rain should fall the night before shearing-time, they

that have barn-room use to drive their sheep in there the night before, or, if rain should fall on them the day before, they will drive them close up into a barn, where their wool will heat, and the wet soon be dried up: others will not drive them up into a barn the night before shearing, if not likely to rain, but will watch them, lest rain unexpected should come.—And they that have dry downs for their sheep to go in will keep them a week or ten days after washing, before they will shear them, that the sheep may sweat in their wool, which is a very good way; for by the oily goodness the wool gets, it will grow till that be spent after shearing.

On the contrary, Mr. Raymond and his shepherd were discoursing on washing and shearing, and proposed washing to be on a Monday, and shearing the Wednesday after.—I asked if that was not too soon; they said, no, the heat of their bodies and the sun would dry their wool in one day and a night, and that many farmers would shear the next day.—The shepherd seemed to be desirous of having it done the sooner, lest the fly should damage the wool by blowing it: all however agree the wool should be dry before it is sheared.

Of not marking sheep till two or three days after shearing.

§. 56. In shearing the sheep at Sir Ambrose Phillipps's, the shepherd gave them the ruddle-stroke, but not Sir Ambrose Phillipps's-mark.—I asked him, how that came to pass; he said, he thought it was better to let them alone two or three days first, for while they were so bare of wool they were apt to be burnt with the iron, which would make the place sore and subject to the flies.

O F F O L D I N G S H E E P.

Of the sheep-folds of the eastern countries.

§. 57. Numb xxxii. 16. "And we will build sheep-folds here for our cattle." Which looks as if such husbandry was in use then as is now-a-days. But quære the original, and see the 14th verse, which being compared with this, it seems their sheep were kept in immoveable houses, not in moveable folds as now-a-days.

Columella says, "Quæ circa Parmam & Mutinam macris stabulantur carpis." lib. 7. fo. 173.—Therefore it seems they had some way like our sheep-folds, and did not trust altogether in sheep-coats.

It further appears, that the sheep-folds of the eastern countries were not such as our's but houses, to which the parable of our Saviour in the tenth chap. of John has relation, as well as to the usage of the shepherd's going before, and calling the sheep after him. See from ver. 1. to 5.

Mr. Garret, who has lived four years in Spain, assures me, that, in those parts where he was, they fold their sheep as we do our's, only their fold is made net-wise with strong cords, and about six feet

feet high with the bottom staked down to the ground, and two cur-dogs, of a breed between a mastiff and a greyhound, lie within the fold, to guard the sheep from the wolf.

§. 58. In favour rather of keeping a weather-flock than an ewe-flock on the hill-country, besides other conveniencies, you may have the benefit of the fold for barley at the principal time when it does most good; viz. on the fallows between the latter end of February and the middle of April, when the ewes cannot be folded.

§. 59. The limitation of an ewe-flock for folding and keeping on throughout the winter, or be it a weather-flock, ought to depend on these rules; 1st, not to keep more at winter than you can keep a winter either by meads, or sowed grasses and hay.—2dly, Not to be satisfied that you can provide hay for them by sowed grasses, as broad-clover, &c. in case such lands, as are fittest to carry such grasses lie at a distance for mowing, whereby you must maintain them with dung, where, by reason of carriage, it will be chargeable, unless your fold can maintain more ground than your out-lying lands to your farm, which in the hill-country is not likely; and to carry but seven or eight pots of dung in a day, by reason of the distance, and mowing is not reaping a profit, but bare exchanging: but, if you have much land round about, and near your house, whereto you can carry thirty or forty load of dung a day, and which will bear broad-clover hay, then you may increase your flock proportionably.

§. 60. As to fattening your ewes and lambs out of your flock, if you have lands disposed for fattening, you ought to consider, if you break your flock by drawing out ewes with their lambs for that purpose, what flock you will have left to fold on your wheat-fallows, and how far your wheat-land stands in need of a fold; for if you leave yourself not sufficient, it will be indiscretion to weaken your fold; besides it will hurt your breed; for you will draw off many forward lambs, which might perhaps have carried on the breed otherwise, and when a hill-country farmer is settled in a flock, it is not good to be buying yearly, to keep up his complement, on account of many damages which may from thence ensue: it is better therefore in such case to buy ewes with their forward lambs to put into your fattening-grounds; but in case you sow wheat-land good enough without the fold, or have another way of manuring it, by liming, &c. then it may be very well to fat off certain numbers of your flock.

§. 61. Though, says a very good farmer of my acquaintance, I have but a mean opinion of winter-folding, or to fold on barley sown, and may in time fallow on grass-ground instead of, and barley-land, yet I would fold on barley-land fallowed or stirred, from the time my lambs were stiff enough after lambing to go on

such fallows, for, says he, the benefit of an acre so folded is three times as good as one winter-folded for barley.

Ewes and lambs preferable to weathers for folding.

§. 62. Farmer Glyde of the Isle of Wight, with whom I was talking of husbandry affairs, told me there was one thing he believed I knew not of, which he would tell me; he would, he said, advise me to fold my ewes and lambs on the barley-land in the spring, and divide my flocks in folding, for, said he, two hundred ewes and their lambs will do as much, if not more, good by folding on an acre of land, as four hundred weathers: I have, said he, folded apart on the same land at the same time two hundred ewes and their lambs, and in another fold of equal dimension five hundred weathers, and I have always found, that the folding of the ewes did me the best service, and brought me the best corn.

Of folding on barley, &c.

§. 63. My shepherd is of opinion, that ewes ought not to be folded on the barley-fallows, or any other fallows in lambing-time, but weathers only; for the lambs being wet when lambed would be dirtied with the fallows, and the ewes would presently forsake them: therefore the ewes ought in lambing-time to be folded in the meadows, where it is clean, and the folds removed as often as the cold wind should change from corner to corner.— And afterwards, he said, they ought to fold weathers on the barley till a fortnight after May, but the ewes never after Candlemas.

It is plain that the early folding an ewe-flock and lambs in April, on wheat-fallows, pinches the lambs, and so does folding them at that time on the barley-grounds, both which are too cold for them, especially in our hill-country; care ought therefore to be taken, that those lands do not of necessity want folding on in those months, but that they may be otherwise provided for, and that during that time the ewe-fold may be on grass-grounds, or lay-grounds designed for fallows.

We must be more cautious in April and May of folding an ewe-fold on the barley-land, they being wettish, than of folding them on the wheat sown in August or September; because the lambs in April and May make the ewes rise often and move, whereby the ground becomes much more trodden at that time of the year by the ewe-fold, than it would be by a weather-fold, or an hog-fold, as may apparently be seen, if the folds be divided.

• Young sheep.

To drive lambs late to fold, and let them out early.

§. 64. Telling Mr. Gerrish the great grazier, and farmer Isles, how dear Mr. Eyres our minister sold fat lambs to the number of fifteen May 18th, viz. for ten shillings and six-pence each, and that they had been folded all along to the very day he sold them.—They replied, that folding the lambs did very little hurt them with respect to their fat, provided they were drove pretty late to fold, and let out early in the morning.

§. 65.

§. 65. *Sunt qui optime stercoreari putent sub dio retibus inclusa pecorum mansione.* Plin. fo. 299. So it seems this was a folding in Italy. as we do, unless by *sub dio*, be meant, by day.

§. 66. Walking with Mr. Raymond into his arable-common-Of fold-fields October 25th (anno 1708) we met his shepherd pitching ing on the fold on the new-sowed wheat.—I asked him, whether he did wheat in not find that pitching the fold on the wheat at this time of the October, year, and a fortnight later, turned to a much better account than and of folding for the barley-crop for the year following.—Mr. Raymond winter-folding: and his shepherd readily replied, undoubtedly it turned to the best account to fold after this time on wheat.—I said, for my part, I had observed the fold carried on the land designed for barley so early in the winter had little effect, it's strength being spent and washed away by spring, so that it will make but little shew in the crop of barley next summer, and that therefore I chose to preserve four, five, or six acres of wheat-fallow that lies warm, and will bear sowing late, to carry my fold over to the latter end of October, rather than finish my wheat-fold by the end of September, and then carry it on my barley; for though the latter part of October might, in our cold country, be too late to sow wheat, yet it was better than to be so soon folding barley, which would be no better for it.—To which they replied, I was much in the right.—And as I have before observed how insignificant the fold is in the winter, especially in hard frosts, I imparted it to Mr. Raymond, who concurred with me, and said, he had folded on arable land in snow, and found not the least benefit: whereupon he resolved in such cases to fold on meadow and pasture, in mighty expectations of grafs, but it made no return, wherefore in snows, he now lets his sheep ramble.

§. 67. Whereas I have said, that in cold clay-ground, and in Of win-a cold high hill-country, a winter-fold does little good, yet I have ter-fold-by experience found the contrary in such parts of the hill-country, ing in the where the land is dry and light, and that it does great service to hill-coun-try. the barley-crop.— This difference may be reconciled thus, i. e. where the land, though called hill-country land, does not lie very high, for the height much tends to the chilling of the ground: again, the explanatory reason of this difference, though hardly accountable for, yet seems to me chiefly to lie in the chilling quality of the ground, which at first receives the dung and piss, and that deadens the ferment; whereas in warmer ground it's progression toward that end is supported by a sufficient benign warmth, since in both sorts of earth the urine does undeniably sink into To fold wide in the earth and mix with it.

§. 68. My ground being cold and feeding, I should in the spring spring on of the year, when I come either to pitch my fold on the barley-cold feed-fallows, or on the sown barley, set it very wide, in order to ing avoid ground.

avoid the usual inconveniencies of penning at that time, viz. the rankness and lodging of the barley, and the consequences, thinness, and coarseness.

Caution against folding on wheat in wet land soon after sowing. §. 69. It was the 10th of October (anno 1720) when my fold was going to be set on the wheat-fallows of a field, which was heavy land, and the fallows, where the fold was to go, were to be ploughed up the next day; I was afraid the land would be too wet to fold on after the wheat was sown, and spoke to the shepherd about it.—He said, he believed I might be in the right, especially since the rams had been some days put to ramming the ewes, because the rams would keep moving and stirring the ewes all night in the fold, whereby the ground would be battered and trod, and so squatted that the wheat might not get through.

Of penning sheep through hurdles, as in Herefordshire, you may see in Palladius's calendar, November, to avoid dirting and damaging their fleeces. §. 70. That the Greeks did pen up their sheep that they might tread the hurdles through hurdles, as in Herefordshire, you may see in Palladius's calendar, November, to avoid dirting and damaging their fleeces.

Of turning arable to meadow. §. 71. Farmer Miles, whom I have often mentioned with approbation, advised me, if I would turn arable into meadow, and lay it up to grass, to sling straw upon it that is less than half rotten, and then fold upon it the same night, and it will bring the ground on very fast.

Of winter-folding for barley. §. 72. Pursuant to what has been before said, that folding in winter for barley is not profitable, because, by waiting for the fold's running over the land, we lose the principal season of fallowing; yet however it may be proper to fold till Christmas, and then go on the wheat-lay; because we can lose no fallowing season by that; we cannot well have finished our fallowing any year before Christmas.

Id. in Leicestershire. I find by Mr. Antill and Mr. Clerk, and others, that in Leicestershire they have no winter-folding for barley; they leave off by Michaelmas at farthest, and sometimes cannot fold again till May; the reason is, their lands are so wet they would be always in a poach, and the coldness of the lands would kill the sheep: to help which defect, they * muck their barley-lands, and from thence begin their husbandry, and sow wheat the year after, often under furrow, on their barley-stubble, for they say, if they should dung their wheat-ground it would rot their wheat, and they sow peas or beans after the wheat, and then lay the ground to summer-fallow again, to be mucked in May for barley, or to fold for wheat; so that they carry out their dung before it is half rotten, or the seeds of the weeds killed: but in their inclosures they sow four crops of corn all on one earth, without dung, for the most part beginning with oats, and laying down to grass with wheat.

§. 73.

§. 73. I am told, that in Dorsetshire the aim of the farmers is, **Folding in** to fold on their sheep-leases in the middle of July, and so till Dorset-Michaelmas, that in the winter there may be a good head of **shire** grafs for the milch-ewes.

§. 74. It seems to be inconvenient to grasp at so large a wheat **Of fold-** or barley-crop, as hardly to be able to compass it without **ing unsea-** folding late on the wheat after it is sowed, or on the barley-**sonably.** land after it is sowed; for by being under the above necessity, in order to compass what one has engrossed, one may often be obliged to fold unseasonably on each sort of corn, nor will the fold in that case make good the damage done to the flock by the lateness of the season: and an ewe-fold is often damaged by folding on the cold land at the latter end of October; whereas it is better to come early with your fold off of the wheat-lands on to the barley lay-grounds, and from the sowed barley on to the wheat-fallows; for thereby you will fold the same quantity of ground of the respective grains without the respective inconveniencies.

Between washing and shearing-time sheep ought not to be folded, because of dirtying their wool, nor from the cutting of the lambs till a fortnight after, nor in sheep-leases or arable in very wet weather, for it will tread the grafs into dung.

§. 75. A servant of mine, a man of very good understanding, **Of fold-** tells me, he has been many years a shepherd, but could never ob- **ing in** serve that the fold ever did any good in frosty weather: particular- **frosty** ly he remembers a very sharp frosty winter, in which a whole **weather.** flock used daily to gather to a hay-reek, in a ground where they were foddered, yet he could not observe there was any better corn there than elsewhere.—I asked him the reason of it; he said, the frost wasted and preyed on the dung; and I the rather approve this observation of his, because of the great prejudice strong beer and spirits receive by being frozen, even so as to become mere caput mortuums.

If frost has the same effect on dung, by impoverishing it, that it is said to have on the sheep-fold, and on strong beer: quære, whether it be proper or not, to leave horse or cow-dung spread on land without ploughing it in.

Mr. Raymond is also of opinion, that the winter-frosts do very much deaden the folding of the sheep, and rob it of it's virtue.

§. 76. Farmer Elton said, the method he best approved of in **Whatland** folding was always to fold that land first that was first designed **to fold** to be ploughed, such as white or whitish land; they not being **first.** apt to bear weeds, nor will the fold be apt to cause weeds to come, and such land he would sow first, viz. at St. James's-tide.—**I said,** I should think, though such land should be sowed ever so wet,

wet, yet, if the month of August should prove dry and scorching, it would burn, and suffer by such early sowing—He replied, if sowed wet, yet so as it came up, he never knew the drought to hurt it.

Of folding on barley in a dry season

§. 77. It was a very dry season from the first of March to the sixth of May (anno 1701) during which time I set my fold on my barley.—Several of the farmers in my neighbourhood said, it would be apt to do the barley more harm than good, for the sheep would scratch up the seed; whereas if rain had come, so that the ground had not been in a dust, their scratching would have done no harm.—But I rolled before I set my fold, and so I presume the ground was so fast as to receive the less damage, it being also stony, and therefore the sheep could not scratch it so much as otherwise perhaps they might have done: the event was, the fold did no harm, but good.

Of folding about Salisbury and Holt in Wilts.

§. 78. Mr. Gilbert of Maddington was telling me, the way of husbandry about him, near Salisbury, was, to fold on their wheat after it was sowed till St. Luke's-tide, which is in the middle of October; then to draw off their flock for a month to fold their sheep-leaves, and then on the barley-fallows.—I asked some North-Wiltshire farmers, if about them they ever folded on the wheat-land after it was sowed; they said, no, they never knew it to be done in any part thereabouts, yet folding after the corn was sown did it more good than before; but the reason why they did not do it about Holt, &c. they believed was, because they were forced to lay up the wheat-lands in high ridges by reason of the deepness of the earth, and it's wetness, and the sheep, if folded on such land, would do nothing but lie between the furrows, which would do the land but little service: besides, they said, in the hill-country the land was rather of the lightest, and the treading of the sheep, after it was sowed, pressed it closer than it was before, and so did it service.

Of folding on clay and white land.

§. 79. Mr. Raymond assured me, that sheep folded on sandy lands would thereby be sensibly more impoverished than those folded on clay-lands, and this, said he, the shepherds agree to, who live where there are such different sorts of land.—The reason seems to be, because the sandy lands draw forth and drink up the outward moisture of the sheep, to fill up which emptiness out of the outward vessels, a fresh juice must succeed, and so on; or else that the sandy lands being hot make the sheep perspire more than clay-lands do, whereas the cold clay rather repels perspiration.

If sandy or light ground, as has been before hinted, draws the fat and moisture of the sheep-fold off, so as to impoverish a flock more than if they had been folded on cold clay-lands, it must be allowed on the other hand, that light ground may be better enriched

riched by a fold than heavy land, because the light ground imbibes more of the moisture and fat of the flock; and this gives some account why it is said, poor lands often pay better for their folding than strong lands: for the same reason winter-folding, when the ground is wet and cold, holds no proportion to summer-folding.

§. 80. Discourſing with farmer Biggs on huſbandry, he ſaid, he Of fold-
folded on the fallows all winter long, though never ſo wet; yet, ing on
ſaid he again, ſometimes the fold does harm: let it be never ſo fallows in
wet, ſaid he, early in the year, folding on the fallows does no winter.
harm; for, in the firſt place, there is heat enough in the ground
at the firſt hand of the year to keep off the chill, and then the
ground is not ſo ſettled, but that the rain ſoon runs through it,
but at the latter end of the year the ground is ſettled; then tread-
ing it with the fold in wet weather makes it hold water, by which
it may be chilled, and kneads the very wet into it, whereby there
will be the leſs corn.

§. 81. Before I came from Crux-Easton in February (anno Of fold-
1698) in order to go into the Iſle of Wight, I had a diſcourſe ing on
with an old experienced ſhepherd about folding the flock on barley.
fallows: he ſaid, as to wheat, it was excellent good, but they rarely
folded on barley-land after it was ſowed, for if it was a whitish
land, and a hot ſummer came, it would be burnt up: beſides, the
ſheep would be ſcraping at that time of the year on the barley-
land, and would take the corn out of the ground; but the wheat,
ſaid he, lay too deep for them to do ſo.—But when I came into
the Iſle of Wight, farmer Collins was of a different opinion, and
ſaid, he had always folded with good ſucceſs on hot dry ſandy
ground after it was ſown with barley, and was earneſt with me
to try it; for, ſaid he, you will quickly ſee the benefit, and
though the ſheep ſhould ſcrape, you will find the barley come
thickeſt there—There is land however about Huſborne and Stoke
in Hants that will burn by folding on in the ſpring, and get more
harm than good, if hot weather come, it being a hungry ſharp
gravel.

§. 82. As it ſeems to me, the double folding on the early Of fold-
wheat-fallows, to be ſown on one earth, cannot occaſion the ing on the
roots of the graſs ploughed in to ſhoot up afreſh, but rather pre- early
vents it, by treading the earth down into a hard plaſter, ſo that wheat
they cannot riſe; it is true, it may bring up a freſh new graſs, fallows.
which, having weak roots, will eaſily be torn up by the
draggs.

§. 83. * Columella, ſpeaking of feeding ſheep, ſays, there Manner
is of feeding
ſheep
among the
antients.
* Nec tamen ulla ſunt tam blanda pabula, aut etiam paſcua, quorum
gratia

is no sort of land, or food, but what (by the continual use of that only) sheep will be tired of, unless you give them some salt now and then to lick, from whence they may procure a new appetite to their meat and water. † All the summer time during the hot seasons they must be let out to feed as early as may be, while the dew is on the grass; and when the sun is about four hours high, they must be led to water and under shade, and again to feed towards sun-set. In the dog-days the flock should be so led as to feed with their heads towards the West in the forenoon, and towards the East in the afternoon; for it is of great consequence, says he, that the sheep's heads should be turned from the sun, which would be hurtful to them. And Varro gives the same directions, because, says he, the sheep's heads are extremely soft.—Perhaps this may be the chief reason of the rams and ewes in companies turning face to face, in hot sun-shiny days. During the winter and early in the spring they should be kept in their fold, till the sun has melted the hoar-frost from the grass, which would occasion rheums in their heads, and would also scour them: for this reason in the cold wet seasons of the year they should be watered but once a day. † They let their ewes, as Varro assures us, go out to feed with the rest of the flock, but kept back the lambs, which were suckled by the ewes at their return, and then again separated from them. † They also tethered their lambs at ten days old, lest they should dislocate or hurt their tender limbs by playing together

Of

gratia non exolescat usu continuo, nisi pecudum fastidio pastor occurrerit præbito sale, quod, velut ad pabuli condimentum, per ætatem canalicibus ligneis impositum, cum è pastu redierint, oves lambunt, atque eo sapore cupidinem bibendi pascendique concipiunt. Colum. lib. 7. fol. 175.

‡ Dum mane novum, dum gramina canent, et ros in tenera pecori gratissimus herba : inde ubi quarta sitim coeli collegerit hora, ad puteos et umbras ; rursus ad pascua producendum solis ad occasum, &c.—Et in caniculis, ante meridiem grex in occidentem spectans agatur, et post meridiem progrediatur in orientem ; siquidem plurimum refert, ut pascentium capita sint obversa soli, quia plerumque nocet animalibus. Hyeme et vere intra septa contineantur, dum dies arvis gelicidia detrahant ; nam pruinosâ iis diebus herba pecudi gravedinem creat, ventremque perluit, quare et frigidis humidisque temporibus anni semel tantum ei potestas aquæ faciendâ est.—Ita pascere pecus oportet, ut averso sole agat, caput enim ovis molle maximè est. Varro, f. 53.

† Matres cum grege pastum prodeunt, retinent agnos qui, cum reductæ ad vesperum, aluntur lacte, et rursus discernuntur. Varro, fol. 54.

‡ Circiter decem dies cum præterierunt, palos affigunt, et ad eos alligant librâ, aut quâ aliâ se levi distantes, ne toto die cursantes iater se delibent teneri aliquot membrorum. Varro, fol. 54.

OF FEEDING and FATTING SHEEP.

§. 84. When I was giving Mr. Lawrence of Dorsetshire a description of Crux-Easton, and the farmers management of their sheep there : he said, he knew how the farmers managed there, and that they were to blame ; for they might manage their sheep better, and have full as good there as at Upcern, if they would feed them well in the winter, and at the latter part of the year send them abroad for a month, as the Dorsetshire farmers do, into the vale-lands to refresh their own grass, and would fold on their sheep-flates : but, said he, they in Hampshire follow the plough so much, that they neglect their sheep ; and suffering their hog-sheep to run in the woods all the winter was a foolish thing ; for they lost their wool by it, and it stunts them in their growth, by keeping them so poor ; and it is the greater folly, as they are to come into the places of their old ewes, whereby the flock is spoiled : besides, said he, when they become ewes, they will always afterwards be losing their wool in the hedges : and if they in Dorsetshire find but one ewe in a flock apt by that means to be bare, they will sell her off at the next Weyhill fair.

Mr. Bishop of the same county said, he always takes care to keep his sheep up in high case in very cold weather, or in deep snow : and the better hay, and the more of it, you give your sheep, the better will their wool and their soil pay for it, and over-pay too.—He said, a weather would grow fat with hay sooner than with grass : and, if the snow be but moderately deep, viz. not above a foot, the sheep will scrape for the grass : but then in severe weather care ought to be taken to put them in a ground out of bleak winds, and where the grass is longest, as having been first hayned.—He approved not of the Hampshire way of sitting up with their folds in lambing-time ; for their walking up and down with the lanthorns greatly disturbs the fold, and makes the ewes apt to be frightened, and to run away from their stands in the fold, by which means the lamb is either over-laid, or separated from the ewe ; whereas otherwise the ewe and the sheep folded would keep in the same place.—He likewise says, the best thing that can be done in lambing-time is in hard weather to sling five, six, or seven trusses of hay into the fold amongst the sheep, for them to trample down, to save the lambs from being frozen, and to keep them dry : the hay, says he, is of an insignificant value to the service it does to the lambs.—He adds, if it be a wet season in lambing-time, the folds ought to be made the larger : if a hard frosty time, the closer the better, nor need one be afraid of the lambs being over-laid, if the fold is not disturbed.—He says, in lambing-time, the fold ought to be visited in

in the morning, and the first thing to be done ought to be to walk round it, and see what outermost ewes have lambed, and then slip a hurdle and draw the ewe and lamb out carefully, that the ewe may go away with her lamb to graze, and keep together; for, if the flock be let out with them at the same time, it is the nature of the ewe to go away to graze, and amidst the whole flock the ewe and lamb will soon lose each other: then you should go inward, still drawing out the outermost ewe and lamb.

An idiosyncrasy in cattle of the same sort.

§. 85. That there is an idiosyncrasy in cattle of the same sort, or species, has been already hinted; to which may be added, that farmer Isles my tenant assures me, that if they about Holt, i. e. in the vale, buy sheep against the winter out of the hill-country, such sheep will, as usually, expect a great deal of hay, though they have never so much plenty of grass.—And probably they may in a great measure expect it, through their constitution of juices; for otherwise it cannot be supposed how giving the younger sheep hay in the hill-country, but perhaps for one year, should entail a necessity of continuing it for the next, where the juices of the grasses so much exceed those of the hills.—To exemplify which, having bought sows with pig out of the vale, for the sake of a large breed, where they had been used to be fed only on whey; these sows, when they were brought into my yard in the hill-country, where there was plenty of shattered corn, sufficient to keep my own country hogs, which thrived well on it, grew lean, and made but a poor livelihood; and what more surprized me, the pigs of these sows which were littered with me, took after grazing, and, when they came to be great hogs, they would not stay in the stubble-fields to get their bellies full, but would soon beat out into the grass grounds, and so would the breed of the breed last mentioned do.—Thus says Horace, “*Fortes creantur fortibus, nec feroces aquilæ pavidas generant columbas.*”—And this idiosyncrasy seems more visible in beasts and men that live on the simplest food than in those that live on varieties.

To provide grass ground to receive the sheep occasionally.

§. 86. It ought to be contrived in hill-country-farms, which usually have but a few acres of meadow and pasture, and the rest in arable, that there be a few acres of arable (according to the bigness of the farm) laid down on different parts of the farm, therein commodiously to receive the flock of sheep after harvest, as often as the stubble-grounds may be dirty; for in wet weather, if the flock should go in such stubble, they would spoil more than they eat.—But yet, if grounds are laid down yearly to clover-grasses, as is usual in the hill-country, then it is to be noted, that grounds of the second year's clover are very fit to receive the flock of sheep in such wet weather; for ground of the second year's clover is well settled and covered with grass, nor will it be like

like to be trampled to dirt, it being firm, nor is it gnash and luscious, as the stubble-clover is, and so is very fit for the sheep, and will not put their mouths out of taste for other coarser grasses, as the stubble-clover will do.—Nevertheless fattening sheep may be suffered to feed freely on the stubble-clover; for they must be supported with other grasses, as good as that, had they not that, and sweet pasture of natural grass must be found for them when that is fed out.

§. 87. Having in November (anno 1707) a good crop of turn-Turnips
nips for the winter-feeding my flock of sheep, I had a desire, be-apt to
fore I entered on the doing it, to consult a farmer's shepherd, breed
who had for many years used his sheep to turnips: I understood wind in
from him, as also from others, that turnip-feeding was apt to sheep.
breed wind in the sheep and gripings, for which, while they were
under the distemper, they knew no remedy, but to cut their
throats, if they were fattening: you may perceive the distemper
by their stretching out their limbs, and spreading them: but, to
prevent this evil, they agree it is necessary to give the sheep some
dry meat in the evening, though coarse.

It is farther agreed, that an ewe-flock is not so subject to the above-said distemper by feeding on turnips, as a weather-flock would be, the lamb in the ewe carrying off the water, that, in such case, the ewes are over-charged with from the turnips; for the ewes, when with lamb, piss and dung much more easily and plentifully than the weathers do; which is but reasonable to believe, all creatures with young being apt to make water often, and dung, nor are they so able to retain it as when not so: and particularly physicians look on child-bearing women to be more secure from cholick, gout, &c. than when child-bearing is over, for the above-said reason.

§. 88. It is a thing commonly known, that after harvest sheep Sheep to
must be kept out of the barley-stubble till the hogs have eat up the be kept
scattered barley, lest by swelling in the maws of the sheep it out of
should kill them.—But I also find by my shepherd and others, new stub-
ble.
that sheep ought to be kept out of all sorts of stubble till the corn
is well eaten up by the hogs; because the wheat and oats they
leave will be apt to make the sheep scour, as this year (anno 1719)
wheat made many of my sheep scour.

§. 89. Tills are excellent good for ewes, to breed milk for their Tills
lamb, being given them instead of hay, and is the true use of good for
that grain: they will grow very well in strong clay-land, but are ewes.
rather reckoned an impoverisher than an improver of the ground, Why
contrary to what other kidded grains are. broad-
clover

§. 90. The reason why sheep are in less danger of being hurt more
by broad-clover than cows are, may be, because the sheep feed hurtful to
only on the very finest and tenderest part of it, nor can they easi- cows than
ly sheep.

ly, be brought to taste of the grossest part of it: this I plainly saw when I fattened sheep in the broad-clover this year (anno 1702).—It is however a luscious food, and apt to throw sheep into a scouring.

Broad-clover will not fat sheep fast, nor so well, as hop-clover will do.

Of putting sheep into woods after shearing.

§. 91. Farmer Elton advised me by all means, if the season proved dry after my sheep were sheared, to put them into my woods of four or five years growth, for a week or a fortnight: he assured me, if it were a dry time, they would do the woods no harm; for in that case the rowety grass in the woods would be sweet, and the sheep would not be tempted to crop the shoots; but in wet weather the rowet turns sour.—This, he said, would do them a great kindness in sheltering their coats from burning, and their bodies from damage thereby: and at the shepherd's whistle they would all come out of the woods to folding.—It may be serviceable to the sheep, but I doubt of the former part of his assertion, viz. that they will eat the rowet, and not crop the shoot. See my Observations on woods.

I had a few teg or hog-sheep of my own, and at Michaelmas I bought in some more, and put them then into the meadows, the hedge-rows of which being cut the year before put them upon browsing at that time of the year.—About the latter end of November, I put them into my young coppices, where they soon fell to browsing: we wondered at it, and were at a loss for the cause; till my shepherd remembered me what we had done, having enticed them into the fault at the first hand of the year.

Of leaves for sheep.

§. 92. Cato dicit, fol. 2. Autumnitate frondem populeam, ulmeam, querneamque cædito per tempus; eam condito non per aridam, pabulum ovibus.—So that they were not the dead worthless leaves they collected, but they stripped the branches of their leaves whilst growing, and made a kind of hay of them.

Swine's-grass bad for sheep.

§. 93. ¹Poligona, knot-grass, swine's-grass, or blood-wort, according to Columella, is very pernicious to sheep, occasioning violent distentions and contractions in their bellies, by which they bring up a thin, frothy, stinking matter.—The cure is to bleed them under the tail, close to the buttocks, and also in the upper lip.

§. 94.

² Est etiam ovibus gravis perniciosa herbæ sanguinaræ, quam si pasta est ovis, toto ventre distenditur, contrahiturque, et spumam quandam tenuem tetri odoris expuit, celeriter sanguinem mitti oportet sub cauda, in ea parte quæ proxima est clunibus, nec minus in labro superiore vena solvenda est. Colum. lib. 7. fol. 178.

§. 94. The *Maison rustique* speaking of sheep says, in winter, Sheep not autumn, and spring, you should keep them close in the morning, to be and not carry them to the fields until the day has taken away drove to the frost from off the ground : for at these times the frozen grafs the field begets a rheum and heaviness in their heads, and loosens their too early bellies, fol. 157. The same observation has been made by the in frosty antients, as I have noted before. weather.

Some say, that, in the open moist weather in the winter, the sheep have more need of hay than in the cold frosty weather, and it does them more good ; for it dries up the water, the grafs then making them sleek.

§. 95. In deep fat lands farmers may be in the right to hope Of fod- for, and to endeavour to preserve their sheep without hay in win- dering ter, or as long as they can, because their lands may be able to sheep in do it : yet, quære, in case they should buy in sheep to winter, winter. which have been used to hay, whether such sheep will not only expect it, but will not also pay for it, if it be given them. But for hill-country farmers, whose winter-grafs cannot be supposed to maintain their flocks, I say, they ought to fodder in good time ; otherwise their flocks will soon eat up all their grafs, and then they must, as they draw near to lambing-time, eat all hay, which is not so well as hay and grafs earlier in the winter would have been ; and then the grafs would have held out.

§. 96. Farmer Biggs, commending racks to fodder sheep in, Racks for said, it was a very wasteful, slovenly way to sling the hay loose foddering about the fold, as some would do ; for whatever hay the sheep sheep com- fat down on, neither they nor any other cattle will touch after, mended. for which reason no cattle care for feeding after sheep, their dung and piss being a great nuisance ; but cows, said he, had rather pick the dungy straw and litter on the dung-hills, which comes from the horses, than to have the sweet clean straw that comes out of the barn.

On my asking several good shepherds, why they set the hay-racks open to the sheep in each ground ; they assured me, that, in that country, Dorset, they had tried all ways of giving fodder to the sheep, and did find, that to let them go to the racks when they had a mind to it, was best ; for many sheep liked grafs, and would thrive better on it than on hay ; and others would eat hay better than grafs, and if the hay was very good, they would give as good milk for it ; and many sheep would eat it best, if you let them have their own time of eating it.

A very good shepherd near me approves very much of cribs Of cribs. for foddering sheep in : he says, in wet weather they save littering of the fodder, and trampling it under foot :—but he says, sometimes a cow or a sheep has hung it's horns in the bow, and broke it's neck, but this rarely happens : that the gentleman whom he

erves had only lost one heifer by such accident in twenty years time, and a sheep or two.—Another told me, his master never lost any cattle that way; but one morning, said he, I came in good time, and saved two that were hanging.

I told my shepherd what sort of racks I designed for my sheep, to be foddered in, which were according to the Dorsetshire fashion, as the shepherds there had advised me to make them; and he approved very well of it for the saving of hay: but, said he, the cow-cribs with bow partitions are very serviceable on one account; for when an ewe, by reason of a lusty lamb, has had a hard labour, whereby the lamb is stunned, or much weakened, such lamb will be able to get up and suck, by strengthening itself with leaning against such cribs as they lie in the fold.

What hay sheep will eat in a hard winter. §. 97. Farmer Biggs said, that he was confident, if it was a hard winter, 300 sheep would eat 25 if not 30 tons of hay.—Farmer Crapp said, he had often given above 25 tons to that number of sheep.

Mr. Slade of Tilshade tells me, that they allow a ton of hay for every score of sheep they winter on their downs, and provide for the winter accordingly.

I asked my shepherd, what quantity of hay would maintain a sheep at Easton in a hard winter. He gave me no ready answer; I told him, I looked on five todd and an half to be a noble provision: he could not rightly fall into a consideration of that proportion, but said, if it was a hard winter a score of sheep would eat a ton of hay.—Whereupon we computed the difference of our estimates, and found that mine held a fourth part greater than his: however he said, he thought his a great allowance.

Of providing coarse hay early for wintering sheep. §. 98. Farmer Elton told me, that his father and he had lost many a pound by not buying coarse or under-hill hay at the first hand of the year for their ewes; for, when a hard winter has come, they have been forced to give them a coarse hay at last, which has impoverished them, and made them pitch, and in the breed made them spoil the whole flock.

Vetches for sheep. §. 99. About Tilshade in Wiltshire there is little hay, and the chief support of the sheep during winter is vetches: Mr. Slade assures me, if vetches cut greenish for sheep should take a month's rain at first, if they can at last be housed dry, the sheep will eat them stalks and all, better than the best hay.

Housing sheep beneficial to their wool. §. 100. I have heard, that in Spain they house their sheep on nights, which I doubt not but contributes to the fineness of their wool.—And the warm fold, made warmer by the sheep than of itself it would be, is better for the wool of the sheep than for them to lie abroad.

§. 101. In fattening sheep, the barren ewes, and those which have lost their lambs, come first in order, and then old sheep that are to be fattened with grass.

§. 102. Sir Ambrose Phillipps's shepherd, being in discourse with me, I asked him, supposing one should fat sheep, whether the case was not the same with the ewes, as with cows to be fattened; that is, whether or not the ewes might not be first rammed; and whether they would not then fat the kindlier for it. He replied, the case was not the same with ewes as with cows; for the ewes would take ram but at one time of the year only, some earlier, others later: but besides, the ewes going but twenty weeks with lamb, they contrived they should not be with lamb, because they would be too forward with lamb before they could be fat.—I then asked him, if he ever knew an ewe bring a lamb twice in the same year. He said, never; but an ewe that had warped her lamb very early might sometimes have another within the year, though very rarely.—He says, the graziers contrive their cows should be bulled at such a time, as that they might be fat for the market by the time they are half gone with calf, for then their tallow best, and their meat is a great deal the firmer for it.

§. 103. The farmers in the Isle of Wight reckon an ewe that warps any time by or before the middle of February, so that she may make early mutton, while it yields a good price, is as good as * couples.

§. 104. It was the 25th of December (anno 1707) when I had at autumn fattened twenty weathers, which I designed to kill after Christmas: at this time my shepherd came to me, and said, he could not hold up the sheep in their fat, unless I could find them some grass to go with their hay: he told me they would waste the best hay he could give them, and eat but little of it.—Till now I thought one might have fattened sheep with hay alone, if it were very good: but on inquiring I have found, that such sheep as above said must have a little grass with their hay.—Therefore, if you would have fat sheep to kill from Christmas till spring, you ought to contrive to keep a reserve of grass for that purpose, or to sow turnips in autumn for the feed of their leaves.

§. 105. Mr. Slade of Tilshade, and Mr. Bissy of Holt in Wilts, made me a visit: and having often before complained to Mr. Bissy, that I could not fat lambs at Easton, Mr. Bissy said, he was the hill-country. I might fat lambs at Easton; only I must take this special care, to put the ewes and their lambs, within a fortnight after the falling of the lambs, into clover, and must keep them well, and not let them sink; for both Mr. Bissy and Mr. Slade said, if once I let them sink, there would be no raising them again: and Mr. Bissy said, I must take care not to let the clover be too high.

Of fattening
lambs in
the vale
on broad-
clover.

§. 106. I find by farmer Isles of Holt, that they can in that country fat lambs exceeding well on broad-clover; but, says he, we cannot afterwards fat the ewes so well, for they will rise but slowly in flesh: the reason that he gave for it was, because the lambs were fatted in the spring, while the broad-clover was young and sweet; for it will hold sweet and good till towards Midsummer, but then falls off, which is about the time the latter lambs are fatted, and then the ewes will not thrive so well with it as the lambs will do. He sold his lambs fat this year, 1716, by the 20th of May, and then by Midsummer the ewes were well in flesh, that is, half fat with the broad-clover; but then they got no farther by the broad-clover, only held their own till harvest, when they throve apace, and soon got fat in the stubble.

The same farmer, having been two or three times at Crux-Easton, and seen our broad-clover, admits that we cannot pretend to fat lambs with it near so well as they can at Holt; for the clover at Easton must be sourer and bitterer than theirs at Holt, both from the coldness of the ground, and the coldness of the air: for, said he, we at Holt, though we lie on a warm stone-brash, cannot pretend to fat lambs in a cold spring as we can in a warm one, for the said reason; and particularly this dry and cold spring, 1719, I observed, added he, when I brought my couples home from where I had wintered them, the ewes would keep walking much about the ground, and continue bleating, whereby I knew they disliked their clover, and I said, I shall have no good fat lambs this year, and so it proved.—I like not, said he, when the ends of the wool on the backs of the sheep twist, and stand spriggy, as they were apt to do this year.

If a lamb
once
pitches for
want of
milk, it
will never
recover it.

§. 107. If an ewe's milk, after she has lambed, dries away by reason of bad hay, or scarceness and poverty of grass, so that the lamb pitches, it will never be recovered, and lambs so pinched will never fetch it forward again, so as to be so well grown or so fat, or so soon fit for the market as otherwise they would have been; in all which respects there will be great loss, and this holds in some degree in other cattle.

Of fattening
lambs in
the hill-
country.

§. 108. On telling Mr. Bissy what encouragement I found for fattening lambs at Crux-Easton, I also added the difficulties I should meet with in that affair.—He said, if I thought my broad-clover would prove too sour, and be apt to scour my lambs, I must sow half broad-clover and half hop-clover seed mixed together; and he said, that he and several others had of late (anno 1720) done so, and found it very effectual.—And I am apt to fancy, if a sprinkling of rye-seed, it yielding a sweet grass, was mixed with the clovers, the variety would be grateful to the lambs, and make them fat the faster.—But it is my opinion, that if you reserve the fittest of your arable-land clovers, the land being in good heart,
such

such clovers will be fat, juicy, sweet, and nourishing; for I have observed, that when ground has been ploughed out of heart, though it was in it's own nature strong ground, yet the clovers it has produced have in their nature been weak, and their leaves thin and not sappy, nor of a deep verdure, but of a pale colour, and speckled on the back of the leaves as if fly-shitten, and consequently has no good nourishment in it; nor would hogs or other cattle abide in such clover any longer than they were forced to it; and the leaf of such clover has to my taste been an ungrateful bitter, whereas the fat sappy-leaved clover has been agreeable.

§. 109. When sheep are thriving, their wool is of a bright white colour.

§. 110. I find by Mr. Gerrish of Broughton in Wilts, the great A mark of grazier, that the rising up of the fat on the back of a sheep in a sheep's bladdermeats, or sort of froth and foam, is a very good sign of the having kindly fatness of that sheep; which, says he, the turnip-fatted sheep will do even in the winter time whereas the fat of our sheep, fed in winter on hay and good grass, will lie close and flat on their backs, and not rise in bladders when they are fleaed.—He assures me, that thirty acres of very good turnips will fat four hundred weathers.

I went to Sir Ambrose Phillipps's sheep-pen with the shepherd; in handling the sheep he shewed me the piece of fat by the brisket, before the shoulder, which is called the moufe-piece, which I handled in many of them, it being bigger or less according to the degree of fatness the sheep is in: the dent also on the rump I felt in many, which is occasioned from the rising pieces of fat on each side, where the sheep are fat.

I asked the shearers of Garenton, where a sheep was to be handled to know whether it was fat or not; they said, if a weather-sheep, or an ewe that never had had a lamb, it was to be handled at the dug, and at the rump of the tail, for those that are very fat will sometimes be as big there as one's wrist, and the same on the brisket and shoulders: an old ewe is to be judged of in the same manner, except in the first mentioned place.

An experienced butcher, who is to draw out a number of sheep at a certain price, will always choose for the fattest, though there are larger sheep in the flock, and in good case too; because the fatter the beast or sheep, the more juicy will his flesh be, and consequently weigh the heavier, which will make it most profitable to the butcher.—And a beast fatted by grass will weigh heavier than a beast fatted by hay, because the flesh will be more juicy.

§. 111. In discourse with several butchers, they agreed, especially if the winter proved wet, that turnip-mutton would be watherish, and not answer it's weight when killed, so well as other mutton, London.

Of fatted sheep, viz. on turnips and broad-clover, and of driving them to

mutton, for perfect water would run out between the skin and the flesh, it being withinside: and, said they, your mutton fed with broad-clover does not give that satisfaction that other mutton does; for the fat will be apt to look yellowish; yet in truth no mutton eats so sweet as that, the fat whereof has a yellowish cast, though people do not generally like it.—They said further, that a sheep or a lamb fatted would drive from Crux-Easton to London, with losing but a very little of it's weight; this they said, because I told them that in driving from Holt in Wiltshire to London, a weather of about seventeen shillings price would lose eight pounds of flesh; to which they replied, though cattle will not lose much flesh in driving fifty miles, yet if you drive them fifty more they will lose their flesh very considerably.—And, said they, a sheep barely mutton, such as we buy of you, will not bear driving to London, though it may be but fifty miles, because they would lose that little flesh they had got.—The hinder quarter of an ewe, that has had a lamb, is not profitable to us, nor acceptable, because the udder will waste, &c.—they owned, however, it was otherwise with a barren ewe; but, said they, there are few of those in this country.—If an ewe is going to ram when she is killed, the mutton will eat rank.

Of the northern and southern lambs, and why the Wiltshire lambs, &c. sell in a wet spring.

§. 112. I find by conversing with our Wiltshire graziers, that fat lambs come not to Smithfield from the North till after Whitsuntide, and then, though they are huge lambs, in comparison of the southerly and western, even as big again, yet they are very lean compared with ours of the southerly counties.—I find, one reason, why not only lamb, but mutton and beef also, out of Wiltshire and the southerly countries, sells dear in wet springs, is, because the roads from the North, and Somersetshire, &c. are bad to travel on, and the cattle cannot go into those deep leaves, they being under water, or so trodden and poached, that, by reason of the cold, the grass does not thrive for a bite for the beasts, nor improve them till towards the middle of summer.

Diseases in SHEEP and LAMBS.

Of young sheep that have their gums grown over their teeth.

§. 1. MY shepherd was talking in June (anno 1703) of drawing out my old ewes for the market; and said, in all likelihood there would be three or four of the younger sort drawn out with them; and for the most part it happened so every year; for now and then a young sheep, every one of two teeth, will have it's mouth hang over, that is, it's gums will be grown out so long as to shut over it's teeth; and such sheep must as much be disposed of as broken-mouthed sheep, for they cannot well get their living, but will always be out of case.

§. 2. Being

§. 2. Being at my fold, I saw my shepherd turn out a young sheep to be sold with the old ewes.—I asked him why he did so; he said, because it spewed up its grafs; and then he shewed me the outside of its mouth and nose bedaubed with the green juice; such sheep, he said, would never thrive.

§. 3. My shepherd says, that the cause of a lamb's being drowned in the ewe's belly, (the ewe's being under a scarcity of water, and having dry mow-burnt-hay) is, that by the greediness in the of the ewe's drinking when she gets to water, she gluts the lamb with the abundance of water she drinks.—Farmer Bachelour also believes it is so, yet says, that he has seen lambs with a watery humour, as if they had a dropsy.

§. 4. A sheep which is cored, after it has been so a year, (for which time it may very well live, if chiefly fed with hay) will have a water-bladder, as big as an egg, under its throat, its eyes likewise will be white, and so will its mouth and gums.

If any sheep in a flock core in the winter, it will be easily seen at shearing-time; for such sheep will be poorer than the rest, and shew it that way by that time; and their wool will run into threads, that is, their wool will twist together at the ends, and look somewhat like teats: yet I have known shepherds say, that sometimes the wool of very sound sheep will be apt to run together into threads, and the finer the wool the apter so to do.

Mr. Bishop's shepherd caught a sheep that was cored the last year, and shewed me how it might be seen by the eyes of the sheep, they being in the valves and veiny parts, (and the eyelids when turned up) milk white; whereas the other healthy sheep, he shewed me, had eyes as red as a cherry.—He told me, some would say, thiness of wool on the breast was a sign of a core; but he had had no regard to that saying;—that sheep that were so cored, being in a healthy country, and taking to eat hay, might live a year or two the longer for those reasons, but would never recover.—Note, this milkiness of the eyes shews that such sheep are far gone; they may be cored before they have that to shew: these cored sheep, have the fluck or plaice-worm in their livers, with which their gall is also full before they die: they call these worms a plaice-worms from their figure, which is like a plaice.—When they look on a sheep's eye to see whether a sheep be cored or not, their term is, they will see how the sheep tests.

§. 5. Mr.

* I am assured Dr. Nichols has lately communicated to the Royal Society several curious observations on the form and the nature of this animal, which will be published in the next volume of their transactions.

Of the
rot.

§. 5. Mr. Chestlin of Leicestershire says, that sheep when first touched with the rot will thrive mightily in fattening for ten weeks, but, if they are not disposed of when they are come up to a pitch, they will in seven or eight days time fall away to nothing but skin and bone; he has often had them die in the height of their pitch in half an hour's time with twenty-seven pound of tallow in their bellies.

Mr. Raymond, Mr. Bissy, and I being together, Mr. Raymond said, that if the summer did not rot the sheep, it was generally agreed that the winter would not.—Mr. Bissy replied, that he had often heard the same; and so they agreed, that there was no danger of the extreme wet winter this year (anno 1762) rotting the sheep, seeing the foregoing summer had been so hot and dry as it had been.—I asked Mr. Raymond what he thought might be the reason of such a saying; he said, that a gloomy wet summer gave an undigested quick growth to the grass of cold land, which occasioned a rot among the sheep; and the said grass was in danger of continuing on in that unwholesome way of growing all the following winter, till the month of March, and the next spring came to give it a check, and the spring brought forth a new grass; whereas the power of the winter alone was not strong enough to begin a rot.

Marsh-tre-
foil good
for the rot.

Mr. Ray speaking of marsh-trefoil, says, Sir Tancred Robinson commends it for dropical cases, and says, he has known sheep that have had the rot drove into marshes where this herb has grown plentifully, and cured by it.

Id. Spanish
salt.

Mr. Boyle says, on the beginning of a rot among sheep, where it appeared by the killing a sheep or two, that the whole flock were touched, a friend of his cured the rot by giving each sheep a handful of Spanish salt for five or six mornings together.

Mr. Raymond of Puck-Shipton in Wiltshire says, that, when the meadows are slabby and full of water, they are then safest, and less subject to bane than they are in a dry winter.

Id. broom.

John Earle, of Parks in Wiltshire, shewed me how the sheep had cropt and fed mightily on the broom: they will eat it heartily all the year, but especially in the spring, when it is in blossom: it stains their teeth as black as foot; we caught one, that I might be an eye-witness of it.—He says, he believes it will preserve sheep from the rot, and he shewed me twenty, that he had bought five or six months before, which, he said, were so rotten, that they would hardly drive home, but they were now recovered and

Domini Tancredus Robinson trifolium paludosum in hydropicis affectibus commendat, seque sæpius observasse, ait, oves tabidas in parvulus hæc herbâ abundantes compulsas, ejus esu restitutas sanitati. Ray, fol. 1099.

and grown fat, though the ground he had kept them in had hardly any pickings in it but what the broom afforded: he had another ground where the broom had been suffered to run to seed, and the sheep had not been in it above three weeks, before they had eaten all the kids up.—Broom, says Mortimer, in his book of husbandry, is one of the best preservatives against the rot in sheep: I have known sheep, when not too far gone in the rot, cured of it, only by being put into broom lands.

In Somersetshire they keep no flocks of sheep, for fear of a rot, it being a deep country; but are very glad of the opportunity of having the tails of the hill-country flocks: again, the hill-country farmers are glad to send their flocks thither for a month, after their corn is cut, to feed on the stubble-grass, there not being there any danger of a rot.

§. 6. As to the wood-evil in sheep, I find Leicestershire is the very subject to it: it is agreed that it is occasioned in May, and wood-evil about Michaelmas, by bleak cold easterly winds; it falls chiefly on the lambs: if an ewe be in good heart, she will overcome it very well; but when it falls into their bowels, it is held incurable, nor could I find they had any medicine for it when in the limbs, but only time would wear it off.—One may perceive the distemper in them by their going lame, their necks, or some of their limbs will be drawn up altogether by it.

§. 7. The sheep-land at Appleford, in the Isle of Wight, is subject to the staggers: the chief remedy they find is, to drive the sheep to change of grounds often, to keep the grounds from tainting.

I observe lambs that die of the staggers do not die of them so very young, as whilst they merely suck, suppose within the fortnight, but after they begin to eat grass, and of those the hopefullest and lustiest; by which I do conclude, that it is not the cold weather alone that brings the staggers, for then it would fall more on the lambs of a week or a fortnight old than on others, they being most unable to bear it: it arises therefore from their feeding on the cold watery grass in the months of March and April, which makes them abound with watery humours in their bodies, which the cold winds seize on and chill, and bring those cramps and aches into their limbs. It is observed, this disease is much prevented by early folding of the lambs, and with good reason, for thereby in the cold nights the lambs are kept warm, and also prevented from eating so much grass as otherwise they would, whereby such watery humours are fed.—Quære, whether our cold country may be proper for fattening of lambs till towards May, when the sun has got a full power.

§. 8. In opening the sheep's skull for the giddiness, it may be discovered where the bag of water lies, by the thinness and softness

The gid,
or giddi-
ness.

softness of the skull, and so to know in what place to open it, for it will bend under one's finger.—A farmer at Upcern told me, if the bladder lay under the horn, there was no coming at it.

I am informed also, that the bladder under the horn or skull, which makes beasts giddy, never falls upon any sheep above the age of a hog or a thief; nor upon any bullock after two years old.

Of the shaking.

§. 9. Some years the sheep will be apt to be taken with a disease they call the shaking; some farms are more subject to it than others: it is a weakness which seizes their hinder quarters, so that they cannot rise up when they are down: I know no cure for it.

This shaking, as I observed, is incident to some farms, inso-much as some years an hundred of a flock have died of it: neither Mr. Oxenbridge, Nat. Ryalls, nor Mr. Bishop's shepherd knew of any cure for it.—But they said, that horses going with sheep are apt to cause it, and so are briery hedge-rows growing out into the ground; but that milch-kine and goats going with the sheep were good against it.—Farmer Bartlet who rents 800l. per annum of Mr. Freek, whose farm was subject to it, would pick out a sheep presently that had it.

Of blindness, and of the green scouring.

§. 10. Mr. Lewis of Broughton informs me, the sheep of that side of Wiltshire are not subject to the shaking, nor to the white scouring: as for the green scouring, either in sheep or bullocks, he says, verjuice is beyond the oak-bark, and a more certain cure; a wine-glass full is enough for a sheep, and a pint for a bullock.—He says, that, about his part of Wiltshire, the sheep are troubled with a blindness; their cure is anointing their eyes with goose-dung.

The overflowing of the blood,

§. 11. Mr. Bishop's shepherd says, he can presently see if any of his sheep are sick by the dulness of their countenances, and their looking still forwards: but he knows of nothing to give them in such case, unless when they are sick with the overflowing of the blood, which is about Michaelmas; it comes from high feeding, and a quick shoot of the grass, and then he bleeds them either in the eye-vein or the tail-vein, and takes more or less blood from them, as they seem to be more or less infected.—When he bleeds them in the tail-vein, he lets it bleed till the blood stanches of itself: but when he has a mind to stop the eye-vein, it is only holding his thumb on it a little while.—He says, he approves of bleeding them in the eye-vein, but he never knew any body to do it but himself.

I asked him again about his bleeding his sheep in the eye-vein and the tail vein for the overflowing of the blood about Michaelmas; for another shepherd had said, he only knew the hog-sheep

to be subject to it: but the shepherd says, it is true, the hogs are most subject to it, and apt many times about Michaelmas to die of it; but yet, he says, the ewes and weathers will sometimes have it.

§. 12. The sheep in this country about Crux-Easton are little troubled with scourings.---I asked my shepherd how that distemper came; he said, by a quick shoot of the grass in the first hand of the spring; but it was easily cured; for, when they found it, they brought them to their hay again, and that stopped it: but he said, in the vallies, and some places where the weed grunsel grows, the sheep are much troubled with it.

I shewed an experienced farmer a lamb which scoured, having had no vent but what the shepherd cut.---He said, by all means, if it can live, fat it off; for he never knew such a lamb live to be a sheep; it would always need fresh cutting and opening.

Mr. Smith of Deadhouse, says, that broad-clover is more apt to scour sheep or other cattle than hop-clover is, and that they are both more apt to scour than natural grass, and consequently not so proper as other grass to raise a beast or a sheep in fat; that a beast, cow, or sheep, if they scour but one day, will lose more flesh than they can get again in a fortnight; that, when sheep or lambs scour, if you cut off the ends of their tails, it will stop the scouring, so that they will scour no more that season.

I told Mr. Bishop of Dorsetshire of the rind of the oak that Vide Dil- lay under the bark, to cure the scouring of sheep: he knew no-eases in thing of it, but said, the distemper came from a quick growing cows and of the grass in the spring, and that they looked on it that their calves, §. 9. sheep would not thrive in the fore hand of the year till they had had it; but that scouring at other times of the year was mortal, and that he knew of no cure for it; and that their scourings then would be of a nasty white sort of matter.

His shepherd says, all sheep will have the skenting in the spring; if they have it in the winter they look on it as unseasonable: the white skenting or scouring is very rare in sheep; it happens oftener to the lambs, and very seldom are they recovered of it: he knew a lamb of their flock, he says, recover of it last year, (anno 1696) but when they do, they will afterward peel all over.

When I told Sir Ambrose Phillipps's shepherd, that verjuice was good to give beasts for the scouring, he said, he did not think so well of that way, either for sheep or cows, as to give a purge: in such case, he says, he gives one goat's worth of cream of tartar, two penny-worth of aloes, a penny-worth of fennigreek-feed, a penny-worth of turmerick, or a farthing or half-penny-

penny-worth of long pepper in a quart of warm ale, for a cow; but of these ingredients, mixt together, and put into such a quantity of ale, he would not give a sheep above two spoonfuls.

Of the red-water. Vide red-water in cows and calves. §. 10.

§. 13. One of the chief distempers in sheep is the red-water, of which not one in a hundred ever recovers: it is thought to come by feeding on sour grass: if it seizes on a fat sheep it will be worth nothing but the skin; for, if you boil the flesh for the tallow, it will stink all over the house in a strange manner: this distemper is aptest to seize on those sheep and lambs that are best in proof.

I asked a farmer in my neighbourhood, who keeps a very large flock of sheep, and has had long experience in them, what he thought to be the occasion of the red-water; he answered, a quick growing of the grass in the spring, and a too quick thriving of the sheep upon it, but he admitted it not to be curable. An old and very understanding shepherd afterwards assured me, that it came only on the sheep when they were out of condition, and weak, and fell first on the spring-grass, especially if it were sour.—He said, before it is long gone they are easily cured, by giving them the inside rind of the bark of oak, but as for hay, when they are in that weak condition, they will not eat it.—Three or four little pieces will do, if one makes them chew and swallow it: he says, the chewing it has often stopped a looseness with him.

I had much discourse with an Irishman (anno 1700) who seemed very sensible in husbandry, and talking with him about the diseases in sheep, he asked me, if I knew any cure for the red-water; I said, no, I thought it incurable.—He said, in Ireland they had of late found out a remedy, which cured many, though not all; it is as follows; when you find the sheep's breath to stink, which will shew itself in the red-water, take two quarts of brandy, and two gallons of tanner's owze, that is, the liquor out of the tan-pit, with the lime-bark, and the washings of the skins in it, and mix the brandy and this liquor together; then take a hen's egg and blow it, and take off the top of the shell, and fill it with the liquor, and put it into the horn; this is the quantity to be given to each sheep, but if a sheep be very weak, then lessen the quantity; tho' the medicine be not infallible, he has cured, he says, many in his flock with it.

With us they usually give the sheep the following drench for the red-water, or rather to prevent it. If it be for a score of hog-sheep, then about this proportion, a spoonful of bole-armoniack, a spoonful of the powder of ginger, a handful of rue, a handful of red sage, and about a quart of water to be boiled to a pint, give three spoonfuls to each sheep.

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Sir Ambrose Phillipps's shepherd says, to prevent the red-water in sheep, he always bleeds them twice a year in the tail-vein, at Michaelmas, and in the spring, and two or three times in each season, bleeding them as he sees occasion, that is, as they seem more or less to rise in proof: he takes four or five spoonfuls of blood at a time, from his whole flock round: he prefers bleeding in the tail to the eye-vein, both for the red-water, and the shaking, which his sheep are subject to.—But he confesses, for the red-water, when it hath seized on the sheep, he knows no cure.—He says, garlick steeped in new milk is said to be extreme good to prevent the red-water, given twice or thrice, a spoonful at a time.—Sir Ambrose's sheep, he tells me, are troubled much with blindness, which begins after the shearing-time; they have a white film over their eyes: he cures them, he says, with eye-water made of allum and vinegar.

§. 14. Common dog-grass, quick-grass, or couch-grass, Mr. Of the Ray says, is a cure for sheep and black cattle when they are afflicted with the stone, which they are apt to be in the winter and spring. He quotes Fran. de la Boe, and Glisson for his authority; but I must enquire farther of this, for neither the Rusticæ scriptores, nor Worlidge, nor Markham, do observe in oxen or sheep such a distemper as the stone.—My shepherd says, he has known a white round stone in the neck of a sheep's bladder, of which it died.

§. 15. My shepherd came to me in July (anno 1701) and told me, I must get better grass for my sheep, for a great many of the lambs were blind or growing to be so: he said, a scum grew over their eyes, which, as he had observed, usually happened at this time of the year, in case they pitched, or sunk in flesh by short commons; and that my weather-lambs were most subject to it.—I told him that might be because they were but lately cut, so they must be subject to sink on that account.—He said, that might be something, but when the grief of that was over, it was the same as before; but ewe-lambs, and ewe-hog-lambs, and ewe-hog-sheep, and old ewes, were hardier than the weather-fort, and would bear the winter better.—I asked him, if there was not some other cause of their growing blind, for I had heard of others; he said yes, he knew of one more, and that was all; in wet and growing years, when the sheep fared so well that they could not keep the bennets down, they would be apt to get into their eyes, and blind them for some time.—Note, if the ewes be
the

• Oves et boves calculis vexati in hyeme et verno tempore liberantur a recenti gramine canino. Ex Observ. Fran. de la Boe, p. 300.—Idem jampridem observavit dominus Glissonius. Ray, lib. 2. fol. 1255.

the stronger and hardier constitutioned creatures than the weather-kind, this gives some account why the ewe-fold should be better than the weather-fold; that is, manure the land better.

Sheep's eyes will often run with water, and be blind by feeding too much in the wheat-stubble: the cause is, the wheat-stubble runs into their eyes.—This I have heard shepherds say before, and my shepherd assures me it is true.

Sir Ambrose Phillipps's shepherd agrees that goose-dung is good for blindness in sheep.

* Cattle-bone.

In the Isle of Harries, the natives pulverize the * sepia, which is found on the sand in great quantities, with which they take off film on the eyes of sheep. Martin of the Western Isles, fol. 38.

A quantity of wild sage being chewed between one's teeth, and put into the ears of cows or sheep that are blind, they are thereby cured, and their sight perfectly restored; of which there are many fresh instances, both in Skie, and Harries islands by persons of great integrity, Martin, fol. 181.—Wild sage chopped small, and given to horses with their oats, kills worms. ib. 182.

The loore, Vid. the loore in cows and calves, &c. §. 19.

§. 16. The sheep near Loughborough are mightily troubled with the loore or foreness of the claws, and so are the cows; sometimes an hundred sheep in a flock shall be down together, and so troubled with it that they will be forced to feed on their knees; and many times the cows, for want of good management, never recover it, but continue always lame, and grow club-footed: verdigrease and hog's-lard is a good medicine for it; and some use aqua-fortis for it.

For the fowle or loore in cattle, the best method is to take two penny-worth of allum, two penny-worth of arsenic, one pint of wine-vinegar, and two quarts of spring-water; boil the water till it is half gone, then pound the powders small, and boil altogether.—This distemper breaks out between the claws of a beast or a sheep, with rottenness and stink: before you dress the sore, you must pare the claw so far as it is hollow, then put so much of the liquor as will run all over the sore; the foot must be dry when it is dressed, and kept so an hour: in once or twice dressing you need not doubt of a cure.

The scab.

§. 17. I saw Sir Ambrose Phillipps's shepherd dress the scabs in his sheep, and he shewed me how to know where the scab was not killed after dressing; for where the scab was alive, there in the dressing and rubbing it would itch, which would make the sheep mump and nibble with their limbs: he said, it was not good to let the sheep-water be too strong, it was better to have it of a moderate strength, and to dress the same sheep twice, than to think to kill the scab at once, especially if the sheep be pretty far gone with it; for it will make them grievous sore: the sheep, he

he said, had the scab very much when he came first to Sir Ambrose's, and he thought to cure them the sooner by making the water strong, but he harmed them by it; for it made some of them so sore, that for three days and nights together they would lie down, and only feed round about them without rising. His sheep-water is made of tobacco, and the liquor of salt-beef, and sometimes he puts soap-suds to it.

I a told Leicestershire farmer, I observed two or three of his sheep to break out, and grow scabby on the back.—He said, it was true; but he dared not to meddle with them then, it being in January (anno 1698) because they were big with lamb, for fear of squatting their lambs.

An old shepherd of Derbyshire told me in September, 1697, there was lately discovered a better medicine for the scab in sheep, than tobacco, and salt, and the murrain-berry root, viz. ^d a quart of spring-water with about half an ounce of quick-silver in it boiled to a pint; and once anointing of the scab with it would cure it.

The gundy or foldness of the tail, shoulder, or breast in a sheep, is a sort of itch that comes with over-heating by over-driving, or double folding them, and to rams, by heating themselves with the ewes: it is cured by dressing with sheep-water, made of tobacco, salt, and murrain-berry root, boiled in human urine, or water three or four hours: half a peck of salt, and three pounds of tobacco, and a hatfull of roots to a barrel of water or urine.—If it runs on after Michaelmas, when wet weather comes, it is hardly to be cured all the year, nor is it to be washed in wet weather.—The good quality of a shepherd is, to discover this distemper ere the wool be broke by it.

Mr. Bishop's shepherd says, when the gundy or scab in sheep first appears, it is a boyl no bigger than the top of one's finger, and may be discovered in a sheep by it's standing still, and wriggling, as if feeling after the itch.

When my shepherd uses the sheep-water to kill the scab, he shears off the loose wool they have raised with rubbing, by clipping it as short as the other wool, that, by the breaking of it again, he may know whether the scab be cured or not.

He says, nothing will sooner give sheep the scab, or breaking out, than hunting them on nights, and heating them before they are folded; whereas, on the other hand, before the ewes are

^d A gentleman of Hertfordshire communicated to me the following remedy for the scab, which, he says, has been used with good success in that country. An ounce of white mercury, and two ounces of stone-vitriol; dissolve these in three quarts of water boiled in a glazed earthen pot, and wash the part affected with this liquor.

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half

half gone with lamb, or when they are not with lamb, nothing is better, when they are turned out of the fold in the morning, than to drive them a little; it will set them which have any stoppage on coughing, whereby they will force the phlegm through their nostrils.

The maggot. §. 18. Sir Ambrose Phillipps's shepherd, for the maggot, lays the juice of elder, and the juice of arse-smart to the fore.

In discoursing with an old shepherd about the maggots in sheep, it being in July (anno 1697) he said, if they fell upon the back, or woolly part of the sheep, a good shepherd would be careful of the wool, and not cut it off, but take the maggot out, and rub bruised hemlock, or bruised elder upon it, and all over the body upon the wool, which would keep off the flies.—An hour after discoursing farmer Elton's shepherd, he said the same, and farther, that, if the maggot was in the tail, he would cut it out, and rub hemlock and elder upon it, but not tar the tail.—I told him, I had seen the tail tarred: he said, then it was by a young shepherd that understood not his business; for it would not come out, but spoiled the sale of the wool.—He said, the plains were little troubled with the maggot, the flies seldom coming there.—Afterwards discoursing with a third shepherd, he said, at this time of the year, and after shearing-time, he used tar to the tails, for the maggot, but not before shearing-time, for, said he, it would now wash out again by the weather.

If a sheep has the maggot, it will be sick, and pine, and creep into the hedges: the cure is sallad-oil, or fresh butter mixed with tar, and made into an ointment.

My shepherd was saying, that an ewe-fold required more trouble and care to look after it than a weather-fold did.—I asked him, why; he said, ewes and lambs were much more subject to the flies and worms than weathers were; because ewes could not be sheared so close as weathers, on account of their teats: and ewes and lambs were more subject to scour than weathers.

Of lice. §. 19. Mr. Bishop's shepherd told me, that it was natural to some sheep to be lousy, let them be never so well kept, but poverty would greatly increase the lice: if a sheep was subject to be lousy, they usually put such away, though otherwise never such good sheep; for it was odds but their lambs would be subject to it too.

He added, it was easy to see whether sheep were either scabbed, or lousy, or not; for the scab, when it first appears, pitches in one single patch, from which the sheep will rub, or bite off the wool; but when they have lice, sheep will be raising and thinning their wool, by rubbing their horns on it, and biting it off in many places: the best thing he knows of to kill the lice, he says, is goose-

goose-grease; and to cure one sheep will take a quarter of a pound.

In shearing-time, I observed many lice in the sheep; and I was told, that, if those sheep were sheared, so that the crows and magpies could come at the lice, the sheep would in a week's time be rid of them.

It being an extreme wet winter (anno 1707) wherein we had scarce any frost; I observed to my shepherd, that the wool of my sheep staid very much.—He said, that was occasioned by their sucking their wool, by reason of their lice, with which this winter had filled them full; for, said he, it is wet that breeds lice, and makes them increase, nor is it to any purpose to search their fleeces, or to medicine them, to kill the lice, till dry weather comes, because the rains will continually wash away the medicine; whereas, when spring and dry weather comes, it will put a stop to the progress of the growth of the lice, and then the medicines will easily exert their virtue.—So that I perceive the winter months are the great breeders of lice in sheep.

§. 20. Riding in a furzy and ferny ground of farmer Stephens's, with him and farmer Sartain, I told farmer Stephens the ground was only fit for sheep.—He said, the grass was fit, but the ground did breed so many adders, that he did not care to venture sheep there in summer time, for one summer he lost a score out of threescore, by the adders biting them: he said, it was the udder-flank, or throat, that they usually bit the sheep in, and that the place would look black, but they could not recover them by any ointments.—Farmer Sartain said, they had such a ground by Broughton, which would do the same: they agreed that cow-cattle and horses were not so liable to this mischief as sheep were, because in hot weather it is the nature of sheep to rise up often, and then run a few yards and lie down again, as also to run with their noses low to the ground: it is probable the hides of the great cattle being thicker than the hides of the sheep, the teeth of these venomous creatures have seldom force enough to enter †.

§. 21. I had an ewe in June (anno 1701) that broke out most miserably about her eyes, and had a watery running, with a lark-swelling, with which she was blind, and continued so for six weeks: we could not imagine what was the matter with her.—My shepherd said, he believed she was lark-spurred.—I asked what that was; he said, at this time of the year, when the larks build their nests, if a sheep should come so near to a lark's nest as to tread

† Note,——to bath the part with salad oil is now a known cure for the bite of an adder.

on it, the lark will fly out, and spur at the sheep, and, if the spur made a scratch any where on the eye or nose, it was perfect poison, and would rankle in such a manner as this ewe's eye did: this, said he, is certainly true, and other shepherds would tell me the same ^b.

OF H O R S E S.

§. I. **T**HE Latin writers have given us some few rules concerning the breeding and choice of horses, but, the greater part of them relating to those that were designed for the war, or the chariot-race, such observations can afford but small instruction to the farmer, and I might, it will be said, have spared myself the trouble of translating or transcribing them. It may however be agreeable to many of my readers to be acquainted with what little they have told us of their method of treating these creatures, and with what were esteemed perfections among them; add, that some of these perfections may be required even in the draught-horse, and perhaps the more he partakes of them it may render him the more valuable.—Columella, in his rules for breeding horses, directs, that the stallion be pampered, and kept high with food; that he cover not less than fifteen, nor more than twenty mares in a season (but this, says Palladius, must be regulated by judgment, according to the strength of the stallion, who will last the longer in proportion as he is less drained:) a young stallion should not cover above twelve or fifteen mares at farthest; that he be not suffered to cover before he is three years old (not till he be compleat four, says Palladius) and he will last very well to his twentieth year.—If the mare cast her foal, or should foal with difficulty, he prescribes a drench of polypodium, bruised, and mixed with warm water; but, if she brings forth easily, he particularly cautions us by no means to assist the birth with our hands (nor handle the young for some time after they are brought forth, says Palladius) as the least touch may be an injury to the foal.

The mare should not take horse till she is two years old, nor after she is ten; for when past that age she will bring a weak and unprofitable breed: in this he agrees with Varro. She should not be suffered to breed oftener than every other year, that she may keep her milk the longer to bring up her foal, which should suck two years.—Colts ought not to be broke till they are two years old, according to Palladius (but Varro says, till they are turned of

^b See the author's Observations on wool.

of three ; if for domestic uses, says Columella, at two years old, if for the race, &c. not till after three.) He orders horses to be cut in the month of March, which he also says is the proper month for covering, but Varro, speaking of the latter, says, any time between the vernal equinox and the summer solstice. * According to these writers, if you intend your horse for a stallion, you should endeavour to procure one that is full sized, beautiful, and well proportioned. His nature and disposition, even when a foal, may be soon discovered, by his liveliness and intrepidity ; by his betraying no fear at the sight or sound of things he is unaccustomed to ; by his being the leader of his company, more wanton and playful than the rest, and sometimes making trial of his speed with them, and excelling them in the race ; by his leaping the ditch, passing the bridge, or plunging into the stream without hesitation : all these are presages of a generous and noble spirit.—His make and shape should be as follows ;—his head of the smaller size, and lean, the skin just covering the bone ; his ears little, picked, upright, and close to his head ; his eyes black and large ; his nostrils wide ; his neck deep, and not over-long, with a thick dark-coloured mane flowing on the right side ; his bosom deeply spreading, and very muscular ; his shoulders large and strait ; his sides rounding inward ; his back-bone broad, and, as it were, double, but at least not prominent ; his belly of a moderate size ; his

D d 3

loins

* Equos ad admissuram quos velis habere, legere oportet amplo corpore, formosos, nullâ parte corporis inter se non congruenti. Varro—Cum vero natus est pullus, confestim licet indolem aestimare, si hilaris, si intrepidus, si neque conspectu novæque rei auditu terretur, si ante gregem procurrat, si lasciviâ et alacritate, interdum et cursu certans æquales exsuperat ; si fossam sine cunctatione transilit, pontem flumeneque transcendit : hæc erunt honesti animi documenta.—In formâ hoc sequemur ; ut sit exiguum caput et siccum, pelle propemodum solis ossibus adhærente, Palladius ;—brevibus auriculis ; argutis, arrectis, applicatis ; Var. Columella, Pallad.—Nigris oculis, Col. et magnis, Pal. naribus apertis ; cervice latâ nec longâ ; densâ jubâ, (et fuscâ, Var.) et per dextram partem profusâ, (latè patenti, Pal.) et musculorum toris numerofo pectore ; grandibus armis et rectis ; lateribus inflexis ; spinâ duplici, (sin minus non extanti ; ventre modico, Var.) latis lumbis et subsidentibus, (deorsum versus pressis, Var.) rotundis clunibus ; feminibus torosis ac numerosis, Col. cruribus rectis et æqualibus ; genibus rotundis, ne magnis, nec introrsus spectantibus, Var. pede sicco et solido, et cornu concavo altius calceato, Pal. cui corona mediocris superposita sit ; caudâ longâ et fetosâ crispâque, Col. vastum corpus & solidum ; robori conveniens altitudo ; mores, ut vel ex summâ quiete facillè concitetur, vel ex incitatâ festinatione non difficilè teneatur. Pal. de stirpe magni interest quâ sit, Var.

loins broad, and sloping downward; his buttocks round; the muscles of his thighs visibly numerous and protuberant; his legs straight and equal; his knees round, not big, nor turning towards each other; his foot neat and firm, hollow hoofed, and not low heeled, with a small coronet on the top of it; his tail long, full, and wavy; his whole body large and compact; his height proportioned to his strength; of so manageable a temper, as to start forth at once on the least encouragement, and be stopped without much difficulty when at full speed.—Great regard must be had to the race he comes of.—Palladius has added also a list of the colours they most approved; but we choose, says he, a stallion of one true colour, and reject the rest, except a multitude of other perfections atone for this defect. ^b I have only one observation to add before I close this section, which is, that the characters of a fine horse given us by Virgil and Columella are in so many particulars the same, that the latter undoubtedly copied from the former.

§. 2.

- ^b ¹ Primus et ire viam, ² et fluviis tentare minaces
 Audet, ³ et ignoto sese committere ponti;
⁴ Nec vanos horret strepitus.—Illi ardua cervix,
⁵ Argutumque caput, ⁶ brevis alvus, ⁷ obesaque terga;
⁸ Luxuriatque toris animosum pectus.
⁹ Densa juba, ¹⁰ et dextro jactata recumbit in armo:
¹¹ At duplex agitur per lumbos spina.—

VIRGIL. Georg. lib. 3.

¹ Ante gregem procurrat, ² pontem ³ flumenque transcendit, ⁴ neque conspectu novæque rei auditu terretur.—⁵ Exiguum caput, ⁶ subfrictus venter, ⁷ lati lumbi, ⁸ musculorum toris numerosum pectus, ⁹ densa juba, ¹⁰ et per dextram partem profusa, ¹¹ spina duplex. Columella.

- ¹ The first to lead the way, ² to tempt the flood,
³ To pass the bridge unknown.—
⁴ Dauntless at empty noises; lofty-neck'd,
⁵ Sharp-headed, ⁶ barrel-bellied, ⁷ broadly-back'd;
⁸ Brawny his chest, and deep.
⁹ On his right shoulder his ¹⁰ thick main reclin'd
 Ruffles at speed, and dances in the wind.
¹¹ His chine is double.

Mr. Dryden's Translation of the third Geor.

The above characters given us by Varro, Columella, Palladius, and Virgil, according to our author's remark, seem principally to relate to those horses that were designed either for the manage or the chariot-race; observing however that these characters are not sufficiently distinguished,

§. 2. The tenth commandment forbids us, to covet our neighbour's ox or his ass : it is probable the horse is not mentioned, because there were but few horses among the Israelites till Solomon's time.—So also, Exod. xiii. ver. 8. it is appointed for every firstling of an ass to be redeemed ; Bp. Patrick says, there was the same reason for horses and camels, but an ass is mentioned, because there were plenty of them, though but few of the others.

§. 3. Mr. Clerk of Leicestershire assures me, that if I buy Of buy- colts of two years old, I may begin to work them gently in the ing colts plough, and at harrowing-time : and that, if I laid out twelve for the pounds, which he would advise me to do, rather than but ten plough. pounds on a colt, by the time he came three years old, he would very well earn his meat.—This, he said, was the practice of all Northamptonshire, viz. to buy their colts at that age, and by the time they came four to sell them off for the coach.—He assured me, they would be presently gentle, by being wrought two or three times with other horses ; and that their food should be oats in the straw, and barley in the straw.

He says, that colts of two years old will very well do two, or three days work in the week at the plough, and at harrowing ; but in Leicestershire they do not plough so hard as with us in Hampshire.

§. 4. Being at Appleford in the Isle of Wight (anno 1711) farm- Of keep- er Farthing was speaking of his mares, that he chose rather, ing mares for sake of breed, to keep them than geldings, and that he had a for breed.

D d 4

stallion

guished, but too much blended with each other, he has taken from all of them together what he thought made a proper and uniform portrait of a fine horse, in which, it appears to me, he has an eye to the war-horse only.—The like want of preciseness in distinguishing one kind from another was perhaps a fault not uncommon among the antient writers on husbandry, and may particularly be seen in Varro, who, under the article—de Bubus et Vaccis—has given us a description, that, taken in the whole, is suitable to neither ox, bull, or cow, but has somewhat that relates separately to every one of them, at least in the judgment of our present graziers, and dairy-men. I know no one that has distinctly characterized the various sorts of horses, excepting it be our countryman Mr. Dodsley, who, in his Poem on agriculture, having first spoken of those that are proper for the draught and the road, has so well described the hunter, and the war-horse, that, if Mr. Lisle's book were not intended merely for instruction, I should have been tempted to have inserted some lines of it in this note for the reader's entertainment ; I take the occasion however of recommending it to him, as, I think, it has been less taken notice of than it deserves, and as I wish the author may find encouragement to pursue his plan, and oblige the public with the two remaining books he at first proposed.

stallion for that purpose, which went in his team.—I asked him, how he could manage that matter so as to keep his stone-horse quiet, and free from unluckiness, and within inclosures; he said, he kept no geldings; for, whenever a gelding came into the field or the stable with the mares, the stone-horse would immediately be biting the mares, and kicking the geldings, but would go as gentle as possible with the mares by themselves: then, said he, that he may not break over hedges, we always fetter him with a mare, and so he will be easy.—I replied, if he went with the mares, he would be apt to spoil the mare he went with, by leaping the other mares, which would endanger the putting out the shoulder of the mare with which he was fettered.—He said, he made the links so long that there was no danger of that; for the stallion often leaped other mares in the field, whilst he was fettered to a mare, without any inconveniency.

It is profitable to keep mares for foaling: the only inconveniency in them is, that their foals must come in March or April, or be worth but little; and then such mares can do but little service in barley-seed-time: but afterwards you may work them as much as the other horses.

Of keep-
ing colts
in woods.

§. 5. I bought colts of two and three years old, and put them into the woods, from whence they broke out and strayed: the farmer said, I should have kept them in the meadows till they had been acquainted, before I had turned them into the woods.—I replied, it being then the beginning of December (anno 1700) that the meadows would have made them so sweet-mouthed, they would not have endured the woods.—The farmer said, the meadows at that time of the year would not make them fine-mouthed, but he granted the hop-clover grounds would.

Of keep-
ing mares
for breed:
and of
colts.

§. 6. I was saying to farmer Parsons of Northamptonshire, that I intended to keep mares, and to breed: this was anno 1701.—He cautioned me not to do as many did, viz. keep up the foals from the mares, and only let them suck morning and night, before the mares go to, and when they come from work: this will spoil both the mare and the foal; for the mare will fret, and her milk being pent up will over-heat, and that will surfeit her foal: whereas a mare should do very little work, but go with her foal at grass, till the foal is fit to go after the mare, and then it is best for the foal to follow the mare at work, and to suck a little at times. * Columella in part lays down the same rule.

§. 7.

* Columella, speaking of sucking colts, says, cum firmior erit, in eadem pascua, in quibus mater est, dimittendus, ne desiderio partus sui laboret equa; nam id præcipuè genus pecudis amore natorum, nisi fiat potestas, noxam trahit.—Therefore it seems farmers allow the sucking colts to follow the mare by their sides in carting.

§. 7. If your grounds are bounded with good hedges and ditches, it may be convenient to keep a few colts to eat up the offal hay, the waste and offal of the sheep.

§. 8. It would be no paradox to assert, that, whereas a brace of saddle-geldings at London cannot be kept for less than 50 l. per annum, yet the same geldings, in the country; may, by a gentleman, who keeps lands in his own hands, be kept in a manner for nothing: or, in other words, every horse in the country is worthy of his meat. Two geldings will give twenty-four load of dung in the year, which will nobly dung an acre of ground; this acre, modestly speaking, will bring four crops, equivalent to four quarters of oats per acre per annum, and a new acre is to be dunged yearly, so there will soon be the produce of four acres yearly, to be accounted for in the same proportion, for the maintenance of these two horses; and will also pay for the rent of the ground, seed, and ploughing, for three bushels per week will maintain them. And the like computation for the yearly produce of four acres of clover, enriched by the manure, shall nobly maintain your two horses in hay and grafs.—In the same manner may the bread-corn for a family be provided for almost nothing: for, in my family, that spends a bushel and a half of wheat in a day, and burns ten chaldron of coals per annum, besides wood, I have from thence at least twelve dung-pot loads of ashes in the year; and from garbage, and dust, and washing of the kitchen, brew-house, and milk-house, at least twelve loads more, which is yearly noble manure for one acre, each of which acres will, modestly computed, produce equivalent, for four years, to sixteen bushels of wheat per acre, and four times sixteen is sixty-four bushels.—Your grains also, and your pot-liquor devoured by the pigs, produce some loads of dung, nor ought the pigeon-dung to be slighted.—And the sown-grasses in each acre holding two years, eight acres of grass are yearly to be accounted for on the score of the manure arising from the two horses, and eight acres on the score of the house-manure, in all sixteen acres, four of which will provide hay for the two horses, another four acres will fat forty-eight sheep, that is, six sheep per acre, twice in the year, and the other eight acres will fat twelve cows for the house.

§. 9. In our cold hill-country we ought always to have a consideration to the pasture-grounds we reserve for our cart-horses in summer, so as to be able at least to allot pasturage for them under good shelter, in cold, windy, or rainy nights; for warmth at such times is of as much regard as their food.

§. 10. Speaking of the great expence of keeping stone-horses in the house, my bailiff assured me, that stone-horses kept in the house in barley-seed-time would not be kept up in flesh by oats, without

without peas or barley.—I replied, that I thought barley might give them the fret.—He said, if it did heat them, as it would be apt to do, the carters would, unknown to their masters, clap barley in an old sack into the pond for a night, and take it out early in the morning, and would give them of this half malted; and it would cool them again: he said, in seed-time, when the carters would be giving them barley, it would, as I said, heat them, and, when they had been heated, one might perceive it, by their gnawing and eating the earth when they could come at it.

A lean horse hard worked cannot thrive by corn. §. 11. I have heard many carters say, that when a horse is out of condition, and hard worked, no quantity of oats will make him thrive; for his work will lie so hard upon him, being out of case, that it will keep him low, give him what meat you will: but a horse in case may easily be kept up with less meat, notwithstanding he is worked.

Peas-halm for horses in Wiltshire. §. 12. Farmer Isles of Holt, Wilts, assures me, that peas-straw, or peas-halm, if well housed, is the best and heartiest fodder for cart-horses, beyond barley-straw, or middling hay, and the horses will eat it better, nor does it scour them, nor give them the fret.—I was surprised at this account, because in our hill-country we seldom give peas-halm to horses, nor do the cow-cattle much care for it, for they will but pick on it a little; which makes me suspect, that, as in other cases, so in this, the peas-halm in our cold hill-country is not so sweet as in the vale, but of a sour juice; and the cattle will pick but little of it, be it never so well housed.—William Sartain says the same, but adds, it will be apt to make horses, if they be held to it, piss high-coloured water.

In Leicestershire. I find the usual method in Leicestershire is to give their horses peas-straw, and they care not how little barley or oat-straw they give them: they think the peas-straw to be more cooling, and more heartening, and less binding than barley-straw.—They seldom give oats in provender, but peas or beans mixt with wheat-chaff, or barley-chaff.

In Hants. I was telling some of our Hampshire farmers, that in Leicestershire they gave their horses peas-straw, and thought there was more strength in it than in any straw-fodder, and valued it the most: whereas I observed, they in Hampshire made little esteem of it, and flung it to the dung-heap.—They replied, that they looked on it too as a very hearty straw, but it was likely that, when I observed they flung it away, the year must have been bad, and it had been ill housed; but, said they, the straw as well as the peas, if not well * hinted and dried, are dangerous to give to a horse, which is the reason we the seldomer give it them in this country,

* Well put up together.

§. 13.

§. 13. Take care to have a good store of winter-vetches between the latter end of August and the beginning of November; vetches for the old straw being then gone, and the new not ready, and the grass almost at an end, they will be a great support to your horses.

I observed in the Isle of Wight in May (anno 1699) that, after seed-time, the farmers baited their horses sometimes with grass; for it seems, the fodder by that time has but little goodness in it.—In our part of Hampshire, against that time, the farmers use to lay up some winter-vetches and peas for their horses, to help out with the dryness of the straw, and to give them a bundle after watering-time, morning and evening: but peas and vetches in the straw are by no means counted wholesome till after Candlemas, when they have sweated in the mow; for if they be given sooner, they often give the horses the fret; the drier the peas and vetches are in the straw it is counted the better.—They generally reserve the greatest part of the peas in the straw till seed-time, and then they give them the horses, to cool their bodies after hard working.

To have winter-vetches in reek against barley-feed-time, is as good husbandry as to have them against the beginning of winter, when there is no straw, and the grass is pretty near gone; for before barley-feed-time the straw is too dry for horses.

§. 14. This year, 1704, was a mighty dry year, and consequently gave our horses of them very freely, they being very dry and good, and I had six acres of them: but they filled my horses very full of blood, and one of my coach-horses fell down dead in his harness; his blood being a little heated by driving, and too thick to circulate, burst the vessels: therefore to drive them leisurely, if full of blood, is best, and, let the gore vetches be never so good, give the horses dry meat every third week.

§. 15. I asked Mr. Bachelour of Ashmonsworth, how it came to pass, that winter-vetches were not thought proper in the halm, unless the weather were very dry; seeing, if they were well hinted, as mine this year (1700) were, without taking wet, and had well sweated, I saw not how a wet day could affect them; he replied, that their halm was loose and spongy, and would give in damp weather, though in reek, which would be apt to give horses the fret.

§. 16. Farmer Knap of Burclear gave his horses hay and chaff, but no straw, and does assure me, that he allowed his horses winter and summer but one bushel of oats apiece per week, and one mixed bushel of beans per week amongst six of them. In the eight winter and spring months he saved six bushels of oats per week, which comes to twenty-four quarters, and at 14 s. per quarter, makes

makes 17 l.—but then for the four quarters of beans to be discounted for at 20 s. per quarter, the oats saved will be but 13 l. —The hay the six horses will eat in the eight months will be twelve loads, which cannot be valued at less than 18 l.—So that this way of farmer Knap's is worse by 5 l. per annum, than the common allowance of oats with straw, only he has saved all his straw, which cannot be worth much more than 5 l.—Therefore this way of farmer Knap's seems to be a proper sort of husbandry in the vale, where hay is plenty, and their land too good for oats; for farmers are very unwilling to buy oats, though they come cheaper than hay, but always make the product of their own farm serve all occasions: thus few farmers will buy beans for their horses at the same price they may sell oats: it is also a good way, where, in the hill-country, a farm grows more french-grass-hay than the farmer can get chapmen for.

Of feeding horses with barley.

§. 17. Oats being very dry in April (anno 1707), I thought it would be cheaper to feed my horses with barley, so I proposed it to my carters: but they were all against it, and said, the time of the year for that was over; for, if I gave them during the summer, it would heat them too much; the season for that was in the winter.—But quære why they give horses barley in the hot countries.

Of feeding horses with dry peas and vetches.

§. 18. In discourse about feeding of plough-horses, several farmers allowed dry peas or vetches to be very hearty and wholesome for them, provided they had sweat well in the mow, otherwise very improper.—And one of them asserted, that four bushels of peas, mixt with oats, would go as far as a quarter of oats.

With chaff and oats mixed.

§. 19. In Leicestershire they hold it very improper to give horses chaff and oats together; for with the chaff they will be apt to swallow the oats whole.

With beans and oat-hulls.

§. 20. The Loughborough carrier gives his horses no oats, and but very little hay: he gives them, when at Loughborough, oat-hulls and beans; viz. after the proportion of a peck of beans to a bushel of hulls: a quarter of a peck of beans to a peck of hulls he thinks enough for one horse at a time: he says, with this feed, when at Loughborough, seven or eight horses, from Friday-noon to Tuesday-noon will eat him up but three or four hundred pound weight of hay, which is at most but sixteen todd: his oat-hulls cost him 2d. per bushel: so then, if a plough-horse has two baits in the day, he will eat half a peck of beans, which at 6 s. per bushel, will come to 9d.—and the hulls a penny.

With beans and bran.

§. 21. At London the said carrier gives his horses only beans and bran; viz. a bushel of beans to two bushels of bran: but there

there he gives them hay, because he must pay for it, whether they eat any or not.

§. 22. In carting of peas in harvest, horses should be kept from eating them; they are apt to give them the fret.

I gave my horses peas-chaff in October, and it gave two of them the fret the second day. Note, this was too early in the year to give them peas-chaff, which, when given, ought to be the chaff of peas well houfed.

New peas gives horses the fret.
Id. peas-chaff.

§. 23. Mr. Bayly of Wick advises me by all means to prevent surfeiting my horses, and breeding distempers in them, to see my chaff well cleansed from the dust in the barn before it is brought into my chaff-bin in the stable; for, when the chaff is carried foul to the bin, the carters are many times careless, and in haste, so that they give it not proper, nor indeed any cleansing, which is very pernicious to a horse, and the dust and dirt binds up his body.

Of cleaning chaff.

§. 24. Mr. Edwards says, barley-chaff is accounted better than wheat-chaff, the common price of which is 2s. 6d. per quarter, and a bushel of oats per week to a cart-horse with this chaff is accounted a full allowance in the height of work.—But the farmers say, they allow eight bushels to six horses, and it scarcely does.—Chaff is accounted fouler feed than oats, and so not so good for saddle-horses as for cart-horses.—Now, supposing oats at 20s. per quarter, the above allowance comes but to 6l. 10s. per annum for oats.—Note, the farmers say, barley-chaff is too hot and binding for horses not used to it, and oat-chaff is little worth.

What chaff best, —also what allowance for a horse.

Farmer Lavington and Thomas Miles of Wiltshire say, that wheat and barley-chaff mingled together are best for horses.

Coming into my stable (and suspecting I had not the best chaff for my money, for I bought my chaff that year of the farmer) I found, as I thought, too much oat-chaff with the barley-chaff, and was angry: but my carter answered me, there was not oat-chaff enough; if there were more, he said, the horses would eat it the better: one part oat-chaff and two parts barley-chaff was the best proportion; for the barley-chaff, though the more heartening, yet was rough in the mouth, and very troublesome and unpleasant on that account, but the oat-chaff softened it: especially after watering, barley-chaff alone was very improper, but before the water washed it down.—Then, said I, wheat-chaff mixt with the barley-chaff seems to me to be best, because that is soft, and answers all the ends of oat-chaff, and is more heartening.—This he agreed to.

§. 25. Conformable to the opinion of the antients, viz. that those sorts of chaff were most nourishing which were smallest, as has been before hinted, is our practice amongst the farmers: for, nourishing.

The smaller the chaff when ing.

when fodder-straw is dear, we cut it, finding it thereby to be most nourishing; it seeming, that of the smaller parts any thing consists, it the more enables the juices of the stomach to digest it, and the juices of that thing are the easier extracted from it: thus we grind corn for poultry, hogs, &c. whereby we suppose it more nourishing than whole corn.

Of barley-chaff. §. 26. I thought my barley-hulls this year (anno 1718) would be very good, because my barley had taken no rain in harvest, and, the summer having been very hot and dry, they were the pure oils of the barley, without any mixture of leaves of weeds, &c. with them.—But my thresher told me, that my hulls, for that reason, were never worse; for they were so rough and coarse, and so harsh to the horses mouths and throats, that my carters complained of them, and said, their horses care not to eat my barley-hulls as usual; whereas, said he, in wet years, when the broad and hop-clover grow to a height in the corn, as also other weeds, their leaves soften the asperity of the barley-hulls.

I threshed hop-clover for seed (anno 1701) and saved the leaves, which we beat out, and gave to the horses, and they liked them much better than chaff.

To save barley-straw and summer; §. 27. It is good to save barley-straw and peas-halm, in the spring after threshing is over, for litter for horses throughout the hill-country, where there are many barns, and wheat-reeks, and for litter. less wheat sowed than in the vale, a greater occasion than for barley-straw, for thatching.

A S S E S and M U L E S.

§. 1. **W**ITHIN five days of a she-ass's foaling, she should be horfed again: a she-ass was horfed two seasons with a jack of her own foaling, and she went through both times.

Asses of great price in Spain. §. 2. I asked Mr. Garret, if he had not seen a jack-ass sell for 30 l.—he assured me, he had seen two in the king of Spain's stables at Madrid, which cost him 60 l. each; they were fourteen hands high, but were strange rough, dull looking creatures, especially about the head: the king had them to get mules.

Of mules. §. 3. He said, there was one thing very remarkable, when a mare takes a stone-ass, and has a mule-foal by him, such a mare will never bring a horse-foal after.

The mule begot between an he-ass and a mare is commonly livelier, and more like the nature of the mare than a mule begot between a stone-horse and a she-ass. Partus sequitur ventrem; says Mr. Mortimer.

§. 4. In the island of Malta, Ray first noted the custom of ^{Of} flitting up the nostrils of asses, because they being naturally straight ^{asses} noses, and small, are not sufficient to admit air enough to serve them, when they travel or labour hard in the hot countries : and thence he philosophically reasons, that the hotter the country is, the more air is necessary for respiration.

W O O D.

§. 1. **I**F your acorns, mast, and other seed be to be sowed in ^{Of} acorns, a place too cold for an autumnal semination, your seeds ^{mast, &c.} may be prepared for the vernal semination, by being barrell'd or potted up in moist sand or earth, stratum super stratum, during the winter, at the expiration whereof you will find them sprouted, and they will be apter to take then than if they had been sown in the winter, and will not be so much concerned at the heat of the season, as those which are crude and unfermented would, when newly sown in the spring, especially in hot and loose grounds. Evelyn's Sylva, fo. 7.

§. 2. I know it is a tradition, that the elm and fallow have no ^{Of} the seeds : but I have raised several of them from seeds. Cook, fo. 5. elm and

§. 3. Mr. Raymond put me very much upon sowing ash-keys ^{fallow.} up and down in my woods ; and setting plants in all vacancies.— ^{Of} ash-keys, I have known great improvements made in coppices by sowing ash-keys.

§. 4. The withy, fallow, ozier, and willow, may be raised ^{and} withy, from seeds, but, as they seldom come to be ripe in ^{&c.} England, the other ways of raising them are more practicable. Mortimer, fo. 364.

§. 5. The ash is one of the worst trees to take root by laying ; ^{Of} laying but yet it will take. Cook, c. 1. fo. 1.—The oak will grow ash, oak, of laying, and so will the elm very frequently. ib. Cook. and elm.

Those sorts of trees, which will grow by cuttings, are the easiest to raise by layings. Cook, fo. 9.

§. 6. Touching the best way for laying your layers of trees, ^{Of} laying observe, if they be trees that hold their leaf all winter, as firs, ^{trees.} pines, holly, yews, box, bayes, laurel, ilix, &c. let them be laid about the latter end of August. Ib. Cook.

But if they be such as shed their leaves in winter, as oak, elm, lime, sycamore, apple-trees, pear-trees, mulbery, &c. let such be laid about the middle of October. See the reasons, Cook, ib.

I know in small plants the spring or summer doth very well for laying them, for they, being short-lived, are the quicker in drawing roots, ib. fo. 10. The same rule holds for cuttings, as to the season, ib. fo. 12.

In

In laying, if you will, you may twist the end you lay in the ground like a with, *ib.*—As to laying, the harder the wood is, then the young wood will take best, laid in the ground, but, if a soft wood, then elder boughs will take root best. Cook, fo. 11.

I think Mr. Ray says, that the elder stick will put forth roots, if it be set in the ground, at any place between the knots, though there be no joint: however, if Mr. Ray has not said it, I am sure it is true.

Of raising trees by the roots. §. 7. In raising trees by the roots of a tree, let the tree be a thriving tree, neither too young nor too old; for, if it be too young, then the roots will be too small for this purpose, if too old, it is possible the roots may be decaying, and then not fit for this purpose. Cook, fo. 13, and 14.

Of raising suckers. §. 8. You may raise suckers from such trees as may be propagated by suckers, by digging about the roots early in the spring, and finding such as with a little cutting may be bent upwards; raise them above ground three or four inches, and in a short time they will send forth suckers fit for transplantation: or you may split some of the roots with wedges, or break them, covering them with fresh mould; they will quickly sprout out. Mortimer, fo. 323.

Of the time of planting. §. 9. Monsieur Quinteny, part 2d. fo. 180. saith, I affect to plant presently after Martinmas in dry and light grounds, but care not to plant till the end of February in cold and moist places, because the trees in this last can do nothing all the winter, but may more likely be spoiled than be able to preserve themselves; whereas in light grounds they may begin even that very same autumn to shoot out some small roots, which will be a great advance to them, and put them in the way of doing wonders in the following spring.—I recite my author, because I think it applicable to planting quick-set hedges; having in the year 1702 planted quick-set hedges in November, in very good, but strong cold clay-land, and the winter proved wet, whereby such land must be so much the colder; but the summer proved a very dry hot summer, which one might have thought more beneficial to such earth, but (according to Monsieur Quinteny's observation) the ground being chilled, the plants came not away all the summer following, making very poor shoots, and but just saved themselves from dying; and I believe their condition was so much the worse, because I ploughed up the trench wherein the sets were planted, before it was dug, whereby the earth laid some time a foddling: on the other hand, I planted a mead of cold clay-land the latter end of February, but the land was very good; and the plants made extraordinary shoots.

Legendre, the Frenchman, says, in such soils as are moist, and backward, it is best to stay till the end of February before you plant;

plant; because too much moisture corrupts and rots during winter, but the hot and early grounds must be planted in November, that the roots beginning before winter, whilst the warm weather lasts, to put forth some small filaments, may so unite themselves with the earth, that the trees at spring may grow and flourish so much the faster, fo. 19.—Trees are not fit to be replanted, till their sap be wholly spent, for, if there be any sap in them, when they are taken up, having now no more nourishment, they fade, and their bark, which is yet tender, will grow ravelled and dry, and so it is the less capable of receiving the new sap when it begins to ascend in the spring, fo. 93.—We see that, if trees grow yellow, and sick, having but a small store of sap, they presently cast their leaves, ib.—Now seeing that the sap falls sooner in dry grounds than in those which are moist, it is certain that in such grounds trees may be both taken up, and also replanted earlier, ib.—The small branches and buds of a tree new planted must be taken off, which open a passage in the bark, and come out of the body of the tree, for they always grow up with the greatest vigour, fo. 96.—In pruning, and stopping the growth of the boughs, care must be taken to cut one short one between two long ones, that being unequal when they come to spring, the middle of the tree may be the better furnished. In the same manner must the dwarf-standers be cut, because that each branch which is cut puts forth many more, and therefore being cut all of the same height, they cause confusion of branches in the top of the tree, and the midst of it in the mean while remains unfurnished, because the sap designs always to ascend, and runs more willingly into the high boughs than into those that are lower, fo. 124.

Lord Pembroke tells me, it was a common saying, that all trees were to be planted when their leaves were falling: and he looked upon it to be a good rule for such trees as were naturally of the growth of the same country where they were transplanted, or of a cold country, as the northern fir, which naturally grows in the north; if any of them are transplanted hither, or raised from seeds, they may be transplanted at the first fall of the leaf before winter: but it is otherwise with the southern fir, for you must stay till the warmth of the spring for the transplanting of that; and this distinction, said he, it was reasonable to think held good in all cases between northern and southern plants.

I observe fir and holly-leaves do not fall so often on our cold hills, as in the vale, nor do the spruce-fir in particular litter our walks so much as in warmer places: the reason why these ever-greens keep their leaves some years is from the viscidness of their juice, which is more so in our cold country, but in a

warmer soil or climate is so attenuated, that the leaves must fall oftener.

The manner.

Langford of planting says, that when the seedlings are grown up a foot high, fit to be removed into the nursery for inoculating, &c.—the tap or heart-root ought to be cut off, that it may not run directly downward beyond the good soil, but may spread its roots abroad in breadth.

Strong and well-grown trees may prosper as well or better than small ones, especially in uncultivated or stiff land by nature, where young trees cannot so well put forth roots. And, if you should have a tree between ten and thirty years old that you have a mind to remove, you must about November, the year before you transplant it, dig a trench as narrow as you please, but so deep as to meet with most of the spreading roots, at such distance round about the body of the tree as you would cut the roots off at when you remove it; about half a yard distance from the body of the tree may do very well, except the tree be very large, but, if you have not far to carry it, leave the roots the longer; as you make the trench, cut the roots you meet with clear off, and smooth without splitting them, or bruising the bark; then fill up the trench again, and by the next October, when you take up the tree, you will find those great roots will have put forth many fibrous roots, and made preparation for more, which fresh and tender roots upon removal will enable the tree to draw more nourishment than otherwise it would be able to do. Langford, fol. 81.

Of cutting off the tap-root.

§. 10. Before I had read Quinteny, and found by him, how necessary it was to spread the uppermost range of roots flat down, so as to run between two earths, I knew not the reason for cutting off the tap-root; but now it is plain the uppermost range of roots could not be so spread unless the tap-root were cut off.—There is also a farther reason for cutting off the tap-root, because, being a stronger root than the rest, it draws the nourishment from them, and shooting downwards, after some time dies in the poor clay, and the other spreading roots, being cramped and stunted at first, never after make good roots, or recover it.

Rules for planting.

§. 11. * Columella advises, to set trees removed towards the same aspect they grew in before. lib. 5. fol. 150.

In transplanting omit not your placing trees towards their accustomed aspect, ib. and, if you have leisure, make the holes the autumn before.—Plant deeper in light, than in strong ground, and shallowest in the clay: five inches is sufficient for the driest, and two for the moist land, provided you establish your plants against the wind. Evelyn, fol. 224.

On

* Mr. Miller concludes this rule to be of no consequence, from several trials he has made.

^b On a rocky, chalky, or gravelly soil, if you cannot conveniently raise a hillock, and plant on the surface, dig the holes shelving inward, that the roots may find their way upwards, and run between the turf and the rock.

Plant forth in warm and moist seasons, the air serene, the wind westward; but never while it actually freezes or rains, nor in misty weather, for it moulds and infects the root. Evelyn.

^c I was discoursing with Lord Pembroke on his plantation of elms at Wilton, which were of the largest magnitude any had been known to be planted: he said, of those, the heads of which he had lopped when he planted them, not one in twenty lived, but of those he had planted with their heads unlopped, not one in twenty died.

Trees produced from seeds must have the tap-roots abated, the walnut-tree, and some others excepted; and yet, if planted merely for the fruit, some affirm it may be adventured on with good success: you must spare the fibrous parts of the root, those who cleanse them too much are punished for their mistake. Evelyn. fol. 224.

§. 12. If you are to plant a coppice, it is a good way to set your plants in trenches, as one raises quickset-hedges, and not to sow seeds, for they are tedious in coming forward, and will tire one's patience in weeding them.—I would not set above four plants in twelve feet square, and at regular distances, so that the benefit of ploughing might not be lost, and then at six or seven years growth I would plash, by laying the whole shoot end and all under the earth in the trenches, which would not therefore be

^b Mr. Miller advises, if the trees have been long out of the ground, so that their fibres are dried, to place their roots in water eight or ten hours before they are planted; observing to plant them in such manner, that their heads may remain erect, and their roots only immersed therein; which will swell the dried vessels of the roots, and prepare them to imbibe nourishment from the earth.

^c Mr. Miller greatly disapproves the modern practice of removing large trees. If planters, says he, instead of removing these trees, would begin by making a nursery, and raising their trees from seeds, they would set out in a right method, and save a great expence, and much time; and they would have the constant pleasure of seeing their trees annually advance in their growth, instead of their growing worse, as will always be the case where old trees are removed.—For of all the plantations which I have yet seen, let the trees be of any sort, there is not one which has ever succeeded.—New-planted trees, says he, should be watered with great moderation, and he proves, from an experiment made by the reverend Dr. Hales, that it is impossible such trees can thrive, where the moisture is too great about their roots.

choaked, but shoot forth innumerable issues: this by great experience, oak, ash, hazle, and withy, will do.

In our parts we never set less than an hundred plants in a double chafed lugg; and, if the earth turned up such rubbish and stony stuff that the edge of earth on which they are to plant is too narrow for a double chafe, then they always set eighty plants on a single chafe in a lugg.

Of young
ashes
taken
from
woods.

§. 13. Young ashes taken out of the wood to be planted will neither be well rooted nor taper, but top-heavy; therefore you will be obliged to take off the heads before you replant them; and then, at best, expect but a good pollard, and it is possible you may wait long before you can get it to thrive; for the head being taken off leaves such a wound as will be long in curing, and yet you were obliged to do it, or else the roots could not have maintained that head: it is the same with a walnut, therefore be sparing of taking off the topmost of them. Cook, fol. 2.

Id. and of
walnuts.

If you have a little ash-shoot of about one foot in stature, you must not by any means take off its top, which being young is pithy, nor by any means cut off the fibrous parts of the roots, only that downright or tap-root is totally to be abated: this work ought to be done in the latter end of October or the beginning of November, and not in the spring, Evelyn's Sylva, fol. 41. The side branches of such a shoot may be cut off, ib. Being once well fixed, you may cut it close to the ground, as you please, it will cause it to shoot prodigiously, ib.—Never let your walnut-tree, when transplanted, be above four years old, and then by no means touch the head with your knife, nor cut away so much as the tap-root, if you can conveniently dispose of it, since being of a pithy and hollow substance, the least diminution or bruise will greatly endanger the killing it. Ev. ib.

Walnut, ash, and pithy trees are safer pruned in summer than in winter, in the warm weather than in spring, whatever the vulgar may fancy^d. Ev. fol. 223.

Of timber

§. 14. The feedingest ground makes the toughest timber, for where an oak grows most in a year, that oak will make the toughest timber; but in dry grounds oaks grow slow, and the annual circles being close together, the timber must then be the finer grained. Cook, fol. 37.

Growth
of timber.

The inside rings, says Evelyn, are more large and gross, and distinct in trees, which grow to a great bulk in a short time, as fir, ash, &c. smaller or less distinct in those that either not at all,
or

^d Mr. Miller advises, by no means to cut off the main leading shoots when you transplant, for, by several experiments he has made, he has found, that the shortening of the branches is a great injury to all new-planted trees.—See his Dictionary—article—Planting.

or in a longer time grow great, as quince, holly, box, lignum vitæ, ebony; so that by the largeness and smallness of the rings the quickness or slowness of the growth of any tree may perhaps at certainty be estimated. These spaces are manifestly broader on the one side than on the other, especially the more outer, to a double proportion or more, the inner being near to an equality. It is asserted, that the larger parts of these rings are on the south and sunny side of the tree, which is very rational and probable; and this seems to be the reason for setting a tree, you remove, in the same position, because of maintaining the same parts in as good a manner as before. Wafer, in his book of the isthmus of Darien, says, the Indians know not, when the sun is obscured by clouds, how the points of the heavens lie, but by cutting round the bark of a tree, and on that side the bark is thickest they know to be south.—It must be much more so in our northern climates than under or near the tropic.

§. 15. There is a dispute among the learned enquirers whether Of the there is a uniform circulation of sap in plants, or not. * The circulator author of the Burgundian philosophy assures us, that, if some of on of sap. the roots of a plant be put into water, and other roots of the same plant be kept out of water, yet these latter will increase, and shoot forth fibres as well as the former; again, if a plant, that has two branches, be taken up by the roots, and the extreme part of one of these branches be put in water, this whole plant shall remain a long time without any decay, and even sometimes put forth leaves on the other branch, when another plant of the same kind, taken up in the same manner, and none of the roots or branches put in water, shall soon wither and die. From these two experiments he infers, there is a reciprocal circulation of sap from the trunk to the roots.—We are told by Ray, fol. 128. (Malpigijs and others concurring) that one of the main uses of the leaves in trees and plants is to prepare and concoct the nourishment of the fruit, and the whole plant, not only that which ascends from the root, but what they take in from without, from the dew, moist air, and rain. As a proof of this, it is asserted, that if many sorts of trees be despoiled of their leaves, they will die, as it happens in mulberry trees, when the

* Si ejusdem plantæ quædam radices aquâ sunt immerfæ, reliquæ extra aquam extarent, eæ tamen, ut radices intra aquam demerfæ, incrementa visæ sunt, et novas fibras emittere; quod demonstrat quod reciproca circulatio est à trunco in radices. Phil. Burgund. fol. 1149. Eadem est ratio plantæ à terra cum radicibus avulsæ, et in duos ramos divisæ; nam si unius rami extremum aquâ immerfum fuerit, planta diu integra et viridis permanet, et interdum folia in racemo altero germinat, cum alia planta ejusdem generis tunc avulsa statim marcescat.

E e 3

leaves

leaves are plucked off to feed silk-worms ; and if in the summer season you denude a vine branch of it's leaves, the grapes will never come to maturity, because the juice returns from the leaves that served to nourish the fruit : hence also they infer a circulation of the juice in plants.—That there is a regress of the juice in plants from above downwards, and that this descendant juice is what principally nourishes both fruit and plant, is well proved from the experiments Mr. Brotherton has made. Phil. Transact. No. 187.

Mr. Bobart assures me, that in a nursery he has bent the top of a young grafted plum-tree to a plum-stock, and grafted it ; and that, when the graft took, he cut off the young tree from the root ; which tree notwithstanding flourished, and bore fruit by the retrograde sap, which shews the sap descends as well as ascends^f.

Wind makes the sap rise.

§. 16. My woodward assures me, that windy weather makes the sap rise much sooner in trees than it would otherwise do, though not attended with rain, especially if the wind be southerly or westerly.

A branch that blights one year apt to blight the next, and why.

§. 17. It is very generally to be observed, that where a whole tree, or arm of a tree, is much blighted one year, it is very apt in such case to blight again in following years, especially if the season of the year should not be kindly : for which this reason may be given ; there are particular roots which for the most part feed particular branches, though there may be also a considerable nutriment from the general circulation of sap ; now, if any such root fails, as by many causes it may, no wonder if the branch so depending on it should yearly blight, and yet it may at spring put forth leaves, &c. by reason of the great redundancy of sap, by participating of the supposed common circulation ; but when the sap grows less vigorous, then the failure will appear. Again, in all blights you must suppose a shrinking, and contraction of the fibres, and vessels of the branch that blights : no wonder then, if on such withering, contraction, and closure, they never again receive

^f In opposition to the notion of the circulation of the sap in trees, says Mr. Miller, the reverend Dr. Hales has presented us with many experiments, and thinks upon the whole, from these experiments and observations, we have sufficient ground to believe, that there is no circulation of the sap in vegetables ; notwithstanding many ingenious persons have been induced to think there was, from several curious observations and experiments, which evidently prove, that the sap does, in some measure, recede from the top toward the lower parts of the plants ; whence they were, with good probability of reason, induced to think, that the sap circulated. — Vid. these experiments in Miller's Dictionary, article, Sap, or in Dr. Hales's Treatise on vegetable statics.

receive the sap so kindly as before, especially after the run of the spring-sap is over, which may for a time produce leaves and blossoms, but will by Midsummer, when that plenty abates, be deserted.

§. 18. I observe the sedgey grass comes not up in felled coppices Not to the first summer; consequently the young shoots have a year's put cattle start of that grass; the next summer the sedgey grass comes up, into and grows ankle-high, equal with the two-year's shoots; but woods to what harm can it then do the wood? the third year the sedgey eat up the grass dies, and you see no more of it. I speak this, in answer to the country-man's objection, who pleads for putting some sort of sedgey grass. cattle into coppices to keep down the sedge, which he pretends otherwise will choke and damage the plants.—I have experienced this to my cost.

§. 19. It was May the 6th (anno 1701) that I bought some Oak-buds yearlings; and I asked the farmer, if I might not put them in the poison to coppice till midsummer; the farmer said, not yet, by any means; cattle. for fear they should be oakered, that is, lest they should bite off the oak-bud before it came into leaf, which might bake in their maws and kill them, but after the oak-bud was in leaf it would be safe enough.—The higher coppices are fit for yearlings, and the coppices of the last year's growth for hog-sheep in winter.—My shepherd said, what the farmer observed as to the oak-bud was true; but he thought that the year was so backward that they were not yet come out, and so there could be no danger at present.—Farmer Elton said, his father had lost abundance of yearlings by the oak-bud, by putting them into the coppices while that was out.—I have since experienced the same, and have remarked it, when I treated of black cattle. See Grazing, §. 17.

§. 20. It is a common saying, that calves will not crop in woods: but I put six calves into my woods, in November, which Of calves cropping woods. very much cropped the yearling-shoots. All husbandmen I told of it very much wondered at it; but the reason to me was clear, viz. on first putting them in there came three or four days hard frost, with a shallow snow, and a rime that laid on the bennetty grass, so that they could not come at the ground, but could only meet with brier-leaves, of which, though I had plenty, they were but thin diet to depend on altogether, yet together with other pickings would have been a noble maintenance for them, if they could have come at the rowet: this straightness of commons brought them to the necessity of cropping the young shoots, which they afterwards continued to do, having got the habit of it, and finding, when the open weather came, the shoots to be toothsome, though the rowet in the coppices would have been sufficient.

For a general rule, newly weaned calves are less hurtful to newly cut spring-woods than any other cattle, especially, if there be abundance of grafs; and some say, colts of a year will do no harm; but the calves must be permitted to stay a while longer, and surely the later you admit beasts to graze the better. Evelyn, fol. 147.

Of wood
hurt by
cattle.

§. 21. I was at my coppice where my labourers were felling, and observed to them with some wonder, that, though the coppice then felling was of my own preserving, ever since it was last felled, yet the growth seemed not more than it was, when in the farmer's hand's, who abused it with cattle, nor did I sell it for more than when I last felled it.—The reason they judged was, because the biting it in the farmer's time had brought it to a small stem, and, said they, wood of a small stem or stock will not bring a large shoot; for it requires two or three fellings to pass, though preserved, before wood abused can recover to a stem, so as to send forth a good strong shoot.—Note, from hence arises a corollary, as a farther inducement to let coppice-wood grow to fourteen years growth, if the land will so long maintain it, because the circle of the annual growth is not only thereby much increased, but also from a larger stock or trunk stronger shoots will put forth, and carry a proportionable annual increase to the fourteen years end.

I carried two experienced woodmen into my woods, they having bought some lops of me, and shewing them the damage the farmer had done me, they observed it, and said, it was much to be lamented; because those shoots, which were cropped, would grow forked, and never be fit for rods.—I asked my woodman what price my rods yielded; he said, the last year 12d. per hundred, but this year, 1699, wood being dearer, 14d. per hundred, and, in case they were not bit by cattle, they would fetch 15d. or 16d. per hundred.—The above two men advised me to cut this coppice at seven or eight years growth; for, said they, the roots are so much damaged by the feeding of cattle, that they will be apt to die away, and not maintain their burden to ten years growth.

I was seeing my woodman make his fold-hurdles: he was very uneasy about the splitting them and working them; he shewed me two or three knots in most of the rods where they had been bit in the growing by the cattle; where the rods had been so browsed that they would hardly split through those knots, at least not by an equal division without snapping off, and many of them did snap off, and such split rods, if they would split, and the whole rods, when they come to work and wind, would in twisting often break at those knots.—From all which I do conclude, that it is of a very ill consequence to put cattle into coppices, for
which

which the treading down the briers and sedge is but of a small equivalent.—And if hog-sheep are put in, and at seasonable times, it is endless watching them; for when they begin to fall on the wood, they will all fall on together, and bite every stem in two days time:—and it may be concluded from that brittle knot-tiness, which the working those rods discover, how ill the sap can pass upwards, to feed the top-shoots, through the whole compass of years they have to grow, to the growth of which the obstruction the sedges give for one year can be but little: admitting which, I would then advise the shepherd, at a proper time, to go with his whole flock, and tread down, and eat up such rowet in one day's time, taking such a time or times for it as may be most seasonable, as suppose frosty weather, the rowet being then the sweetest.

The 17th of January (anno 1702) I ordered my hog-sheep to be turned into the coppice, intending they should eat up the rowet for some time.—My shepherd immediately drove them thither, but, as he observed, the sheep, instead of eating the rowet, fell on the young shoots, and eat them with that greediness, that he called the labourer, who was felling in a neighbouring coppice, to observe it also: and he told me of it afterwards, and said, he stood by and saw them bite off shoots at half a foot in length.—The reason of this, said he, must be from their sweet feed on your clover, for which cause they will not, like other sheep, touch your four rowet.

The reason why shoots bit off by the cattle perish farther downwards than the same branch would do, if cut with a knife, is, because the top of the shoot being bit is rugged, whereby the water runs not off, but keeps soaking down; whereas, had it been cut with a tool, it's smooth and sloped edge, like a hind's foot, would cast the water off.

It is generally said, that sheep going in woods, and rubbing against the trees, or the young shoots, do by their wool poison the very bark, so that it shall in that place canker, or at least the tree in that place shall visibly grow hide-bound, and bend in, and grow gouty above such rubbing-place.—This I suppose must arise from the abundance of oil in the wool, which, the sun and wind drying it in, enters the bark, and chokes up the pores, where the passage of the sap is: in the same manner ointments laid on swellings are repellers, inasmuch as they stop the pores of perspiration; and linseed-oil laid on bricks keeps out weather.

§. 22. Farmer Ruty told me, he had once heard say, that hogs ^{Damage} would do as much harm in a young coppice as any other cattle; but he did not believe it, till fetching away some wood he had ^{in woods.} bought of me in July (anno 1701) he found a farmer's pigs broke into

into my coppices, and he observed them to fall on the shoots, and eat them up as fast as other cattle. * I wonder the antients, who preferred wood to pasture, should not consider the damage that cattle did them.

Of letting coppices grow to fourteen years.

§. 23. My woodward assures me, that if I would let my coppices run to fourteen years growth, instead of ten, which I might do by dividing them accordingly, they would yield a fourth part more profit, because a coppice at fourteen years growth will yield double the value of a coppice at ten, the increase of wood when it comes to be eight or nine years old does so much advance.— But here it is to be noted, that there are some parts of my coppices which grow on very barren land, that is out of proof, and the wood will be scrubbed, and grow rotten, and dead on the tops before it is ten years old; it cannot be profitable to let such wood grow to fourteen years of age.—He also assures me, that my hazle at fourteen years age, which runs up without knots, is as fit for hurdles, being split, as any other.

I was speaking to my labourers of the advantages of letting my coppice-woods run to fourteen or fifteen years growth, where the land was in condition good enough to support the wood to that growth.—They added to what I had said, that, by letting the coppices stand so long, the wood would be run to so large a stature as to over-shadow the grass, whereby the roots of the sedge-grass, which so much over-run the young coppices, to the prejudice of the young wood, would thereby in a great measure be killed.

Letting coppice-wood grow to sixteen or seventeen years growth is of great service to young heirs, because by so many years growth their barks are case-hardened, and able to withstand the cold, when the coppice is cut, and they must stand naked, whereas, when coppices are cut at ten and eleven years growth, the barks of the young heirs are so tender, that they are starved with the cold air and winds. Ivy itself, says Evelyn (the destruction of many a fair tree) if very old, and taken off, does frequently kill the trees by a too sudden exposure to the unaccustomed cold.

When coppice-wood is of fourteen or fifteen years growth, it will fetch a better price in proportion than younger wood, because it will be applicable to more uses, and particularly in the cooper's business; for he will use the withy and some of the ash for hoops for wine-hogheads; another part of the ash may serve for prong-staves, rake-staves, and rath-pins for waggons, and the rest may be parcelled out for hurdle and flake-rods.

Oaken

* Pascuntur armenta commodissime in nemoribus, ubi virgulta et frons multa. Varro, fol. 56.

Oaken stems of fourteen years growth are (in my woods, which in a great measure consist of them) as high as the ash or withy, and measure more in the diameter; for oaken stems are stronger at root, and will hold growing longer than ash, withy, or hazle. When hazle grows spriggy in the body, and shoots forth from the sides of the bark, it is a sign that it has given out, and done growing at the top.

§. 24. Coppice-wood, in hedging and hurdling, wears much better and longer, if cut between Michaelmas and Christmas, time of but sells best in faggots, if cut between Christmas and Lady-day, cutting because it shrinks less, and is most swelled, and looks best to the coppices-buyer; the method at Crux-Easton, and the hill-country thereabouts, is only to oblige the buyers to rid the coppice by Midsummer; they think the coppices are not harmed, if rid by the time the Midsummer-shoots spring up: they had not rid this year (anno 1697) by the latter end of July.

It was the first of May (anno 1701) and I proposed to cut coppice-wood for the fire: my woodward said, it would not hurt the stools to cut it so late, but it would never wear well in hedging nor burn well; for, after the first blaze was out, the coals would burn as dead as if water had been flung on them.

I had a doubt how I should fence-in my corn and hay-reek I was going to make, August the 27th, (anno 1701) having no wood cut fit for the purpose, and supposing it too early then to cut for it.—But my woodward assured me, it was very safe to cut coppice-wood at Bartholomew-tide, and it did the mores no damage; and, said he, all the farmers in the country, in the last year of their lease make a felling between Bartholomew-tide and Michaelmas, of all the underwood their lease will justify them in.

It is observed, that coppice-wood, cut for hedging at the latter end of winter, will not endure so long by a year as that which is cut at the beginning of winter: which, as I believe, may not only be because the wood late cut is cut after the sap is risen, or attenuated by the sun, but also oftentimes because it is not cut long enough before such rarefaction is made; for, if a tree, or a cyon cut to be grafted, as Quinteny affirms, will endure many weeks of the winter out of the ground, or without being grafted, and, when spring shall come, it will by virtue of the sap inherent in it, when attenuated, put forth buds for some time, till it dries away; so it follows, that the sap inherent always in the stem of the wood, if not cut so early as to have long time to dry, may be put into motion at spring, so as to effect the above-mentioned inconvenience; therefore I hold hedging-wood and fire-faggots should be cut in October.

Mr.

My woodward says, he thinks it is best for coppice-woods to be felled the latter part of the year, about February or March; for, says he, if they be felled early in the winter, the frosts falls on their stools, and dries, parches, and shrinks them at the top, and obliges the bud at spring to shoot forth three or four inches lower than else it would do; whereas, if they be cut late, the bud will break forth at the top.—A short time after, I asked Harding of Holt the wood-merchant about it, and he agreed to the same.

It is a common practice of husbandmen to fell their hedge-rows, and small brakes within the grounds, those years they sow the grounds with wheat; but such persons ought well to consider, first, whether such land, after the wheat is off, will not bear a rowet too long for sheep to eat, and, if so, great cattle must be put in to eat up the long rowet, and the sooner the better for their tooth, and then attendance must be given by a cow-keeper by day, before the harvest is in, and consequently the wages the dearer, and when you may have many other offices to employ such a person in: therefore, in such case, my advice is to let the hedge-rows stand till after the wheat-crop be got in, when great cattle may be suffered to feed down the rowet without prejudice to the hedge-rows, and at that time of the year such grass is wanted by night, and, during the future three crops, it is to be supposed the rowet will not be so large, but sheep may overcome it, nor will they very much prejudice the young wood.

Of the manner of cutting coppices. §. 25. In your coppices, says Evelyn, cut not above half a foot from the ground; nay the closer the better, but slope-wise to the south, fo. 149.

Of pollarding oak, elm, and beech. §. 26. The oak will suffer itself to be made a pollard, that is, to have it's head quite cut off; but the elm so treated will perish to the foot, and certainly become hollow at last, if it escape with life. Evelyn, fo. 151.

The beech is very tender of losing it's head. Evelyn, fo. 152.

Of stripping of the bark. §. 27. ^a The bark in the hill-country will not strip so soon by a month as in the vale: again, in the same wood on the hill, there will be a fortnight or longer difference between the stripping of a tree

^a Mr. Miller observes, that the time for felling timber is from November to February, at which time the sap in the trees is hardened; for when the sap is flowing in the trees, if they are cut down, the worm will take the timber, and cause it to decay very soon, rendering it unfit for building either ships or houses. He thinks therefore it would be more for the public benefit, if (instead of the statute now in force for felling trees during the spring season, when the bark will easily strip) a law were enacted to oblige every person to strip off the bark of such trees, as were designed to be cut down in the spring, leaving the trees with their branches standing till the following winter; which will be found to answer both purposes well.

tree, that is in proof, and one that is not: the sap runs fastest up a tree in proof.

After stripping, when the bark is dry, it is high time to rid the wood of it, for, if a quantity of rain should come, it would do it much hurt, and take off it's strength, and then it would grow * finnowy: therefore the tanners, when they buy bark, * Moldy. hurry it away with all the carriages they can get, as they would to save corn from damage.

The sap after open winters never runs well in barking-time at spring; for it spends itself gradually before-hand, and forwards some part of the branches of a tree when other parts stir not, and so all the branches will not bark equally alike: again, a hard frost at the entrance of the spring, as this year (anno 1708) so as to check the rising sap, and disturb it while it is rising and spending itself, is a great hindrance to the kindly barking for that season, and makes the sap do it's business by halves; but a frost some time before the spring does a kindness, in short, the greater the flush of sap (coming all at once) it makes the better bark, and is better both for the tanner and the stripper.

As I have observed before, the sap in oak rises slower at spring, and the bark strips worse, and the tree that year makes worse shoots, when in a lingering manner lucid days too early in the spring have often invited forth the sap from the roots, which hath as often received sudden checks by cold, than when the beginning of the spring of the year continues cold, whereby the sap in the roots continues filling and is kept from spending itself in the trunk and branches, till the uninterrupted heat breaks forth, and the flush of the sap ascends with continual sollicitations by the heat: in like manner it is, I suppose, with less and tenderer plants; their shoots are stronger, the grassy part more tender and gross, when the backward spring carries afterwards an uninterrupted heat, than when the buds and shoots are earlier invited forth, and, then stopped by the cold. We find all garden-herbs in like manner, which have slowly kept growing on all the winter, not so toothsome to the insects as those, the seeds whereof are not committed to the ground till spring.

§. 28. Between the annual circles doth some sap arise, as is Of trees plain in a tree barked round, which yet will live; and the more living porous this tree is between these annual circles, the longer that when tree will live; as I have experienced in walnut, and ash; but barked. holly and box have died in less than a year; for trees that hold their leaves, their wood is close and compact between the annual circles, and that is the reason they die soon after being barked round, Cook, fo. 48.

§. 29.

Time of
faggott-
ing.

§. 29. I asked my woodward the 13th of March. (anno 1704) if it was not time to faggot; he replied, the wood-chapmen did not care to have their wood faggotted so early, till it had shrunk, else, after it was faggotted, it would be apt to shrink and fall to pieces: therefore, said he, we faggot that wood first which was first cut.

Of pitch-
ing and
stowing
wood on
the cart.

§. 30. In loading wood one man on the cart can stow to two men that pitch it up: therefore, where you cart wood by change of waggons, you do not find your horses full employ, where but one man pitches.

Of drying
laths be-
fore using.

§. 31. I cut down green timber in August (anno 1707) to set my lath-maker to work to make laths for immediate use: he desired me to let him set them out a sunning for four or five days before he buadled them up, or that I used them, that they might be dry; for, said he, the timber being green the nails will rust, and so rot, and then break off, unless the laths were first dried. And so said the carpenter.

Of grub-
bing.

§. 32. Oak-underwood, and white-thorn are the worst of any to grub; because they both shoot their roots more downwards than any other.

It was the beginning of March (anno 1701) I agreed with two labourers to grub a hedge-row: they desired they might go upon it presently, before the sap was got plentifully into the roots; for such roots, if they were full of sap, as well as their branches, would, they assured me, if cut then, though never so dry afterwards, burn dead, and make but a forry fire.

F E N C E S.

Maple
bad for
hedges.

§. 1. **M**APLE, if it grows in hedges, will destroy the wood under it; for it receives a clammy honey-dew on it's leaves, and, when it is washed off by rain, and falls upon the buds of those trees under it, it's clamminess keeps those buds from opening, and so by degrees kills all the wood under it. Cook, p. 72.

Advice to
sow haws.

§. 2. I would advise the country-gentlemen to sow many haws, &c. in his nursery, that, where they grow thin in his hedges, and there are vacancies, he may dig up those plants, earth and all, and carry them to fill up such empty spaces. It will be good however to sow these haws in poor ground, for, if transplanted from a rich soil to a poor one, they will not thrive well.

Of cut-
ting
black-
thorn.

§. 3. The slow, or hedge-peak-bush is apt to die in the hill-country, where the land is poor, and they are let to grow in the hedges till seventeen or eighteen years growth, before they are cut: therefore the best way of preserving such hedges is to cut them

them at eight or nine years growth. The stones of these also should be sown in nurseries.—Mr. Evelyn excepts against black-thorn being mixed with the white, because of their unequal progress^a.

§. 4

^a Mr. Miller gives the following directions for raising quick-hedges.—The sets ought to be about the bigness of one's little finger, and cut within about four or five inches of the ground; they ought to be fresh taken up, strait, smooth, and well rooted. Those plants which are raised in a nursery are to be preferred.

Secondly, If the hedge has a ditch, it should be made six feet wide at top and one and half at bottom, and three feet deep, that each may have a slope; but if the ditch be but four feet wide, it ought to be only two feet and an half deep; and if it be five feet wide, it should be three feet; and so in proportion.

Thirdly, If the bank be without a ditch, the sets should be set in two rows, almost perpendicular, at the distance of a foot from each other.

Fourthly, The turf is to be laid with the grass-side downwards, on that side of the ditch the bank is designed to be made; and some of the best mold to be laid upon it to bed the quick; then the quick is to be laid upon it, a foot asunder; so that the end of it may be inclining upwards.

Fifthly, When the first row of quick is laid, it must be covered with mold, and the turf laid upon it, as before, and some mold upon it; so that when the bank is a foot high, you may lay another row of sets against the spaces of the lower quick, and cover them as the former was done; and the bank is to be topped with the bottom of the ditch, and a dry or dead hedge laid to shade and defend the under plantation.

Sixthly, There should be stakes driven in the loose earth, at about two feet and an half distance, so low as to reach the firm ground. Oak stakes are accounted the best, and black-thorn and fallow the next: let the small bushes be laid below, but not too thick, only a little to cover the quick from being bit by cattle, when it springs; and also lay long bushes at the top to bind the stakes in with, by interweaving them. And, in order to render the hedge yet stronger, you may edder it, as it is called, i. e. bind the top of the stakes in with some small long poles or sticks on each side; and, when the eddering is finished, drive the stakes anew; because the waving of the hedge and eddering is apt to loosen the stakes.—The quick must be kept constantly weeded, and secured from being cropped by cattle; and in February it will be proper to cut it within an inch of the ground, which will cause it to strike root afresh, and help it much in the growth.

The following is Mr. Franclin's method of planting quick-hedges, as given us by Mr. Miller.

He first set out the ground for ditches and quick ten feet in breadth; he subdivided that by marking out two feet and an half on each side (more or less at pleasure) for the ditches, leaving five in the middle between them; then, digging up two feet in the midst of those five feet, he planted the sets in; which, although it required more labour and charge.

Of dead
hedges
near
quick-
sets.

§. 4. By all means set your dead hedges at a good distance from your quick-set plants, not only on account of preserving your plants, but your dead hedges also: for, if great cattle have any likelihood of reaching your plants, in reaching after them, and

charge, he says, he found it repay the cost. This done, he began to dig the ditches; and to set up one row of turfs on the outside of the said five feet; namely, one row on each side hereof, the green side outmost, a little reclining, so as the grass might grow.

After this, returning to the place he began at, he ordered one of the men to dig a pit of the underturf mold, and lay it between the turfs placed edgewise, as before described, upon the two feet, which was purposely dug in the middle, and prepared for the sets, which the planter set with two quicks upon the surface of the earth, almost upright, whilst another workman laid the mold forwards about twelve inches, and then set two more, and so continued.

This being finished, he ordered another row of turfs to be placed on each side upon the top of the former, and filled the vacancy between the sets and turfs as high as their tops, always leaving the middle, when the sets were planted, hollow and somewhat lower than the sides of the banks by eight or ten inches, that the rain might descend to their roots; which is of great advantage to their growth, and by far better than by the old ways, where the banks are too much sloping, and the roots of the sets are seldom wetted, even in a moist season, the summer following; but if it prove dry, many of the sets, especially the late planted, will perish, and even few of those that had been planted in the latter end of April (the summer happening to be somewhat dry) escaped.

The planting being thus advanced, the next care is fencing, by setting an hedge of about twenty inches high upon the top of the bank on each side thereof, leaning a little outward from the sets, which will protect them as well, if not better, than an hedge of three feet, or more, standing on the surface of the ground; for, as these are raised with the turfs and sods about twenty inches, and the hedge about twenty inches more, it will make three feet four inches; so as no cattle can approach the hedge to prejudice it, unless they set their feet in the ditch itself, which will be at least a foot deep; and from the bottom of the ditch to the top of the hedge about four feet and an half, which they can hardly reach over to crop the quick, as they might in the old way; and besides, such an hedge will endure a year longer.—Where the ground is but indifferent, it is better to take twelve feet, for both ditches and banks, than nine or ten; for this will allow of a bank at least six feet broad, and gives more scope to place the dead hedges farther from the sets; and the ditches, being shallow, will in two years time graze.

As to the objection, that taking twelve feet wastes too much ground, he affirms, that, if twelve feet in breadth be taken for a ditch and bank, there will no more ground be wasted than by the common way; for in that a quick is rarely set, but there are nine feet between the dead hedges, which is intirely lost all the time of fencing; whereas, with double ditches, there remain at least eighteen inches on each side where the
turfs

and pressing upon the dead hedge they will break it down a year sooner than ordinary, and learning such a habit, and finding the success, they will not afterwards be broke of it.

For the two first years, says Mr. Evelyn, to diligently weed is as necessary as fencing and guarding from cattle.

§. 5. To steep cow-dung and lime in water, and to sprinkle young hedges with it, is supposed to prevent cows and sheep from browsing them: and it is good to serve hedges the same with horse-dung, where the horses feed, and when it is washed off by the rain to renew it.—The end of mingling lime seems to be, to make the liquid stick, and to bind it.

Of sprinkling young hedges with cow-dung and lime-water. Of thickening a hedge.

§. 6. If an hedge by ill usage, or by age, be grown thin, the best way is to cut it close to the ground the year you sow it with wheat, and to sling earth to it, to refresh it, and to make a dead hedge without it; by this means the old stems will tillow afresh and thicken; whereas by plashing, unless a hedge be thick enough to afford the loss of young shoots, by dropping on them, they will be killed. But in doing this you must not cover the stems with the earth you sling up, lest you choke and kill them; if you intend therefore to lay a great quantity of earth to the roots you must leave the stems somewhat the longer.

The digging a trench or ditch by slinging fresh mold to the stools of an old hedge is of special use, forasmuch as the trench, laying many of the roots of the old hedge bare, makes them send forth shoots, whereby the hedge is thickened; for roots turn to branches when exposed to the air.

Take a well-rooted set of holly, of a yard long, and strip off the leaves and branches, and cover them with a competent depth of earth, and they will send forth innumerable quantities of suckers, and quickly make a hedge.—Mortimer, fol. 4.—A holly or other ever-green, if striped or blanched in the middle of the leaf, will in time lose it's stripes, and the natural green will overcome; but, if the edges of the leaves are white, they will always so continue; therefore the latter is three times more valuable than the former, and this is the difference the gardeners make.

§. 7^b In plashing a hedge, round a hedge-row or coppice, leave the plashers of the hedge withinside the coppice, and turn the hedge.

Of plashing a hedge.

turfs were set on edge, that bear more grass than when it lay on the flat; but admitting three feet of ground were wasted, he shews the damage to be inconsiderable. He then compares the charges, and asserts, that forty poles planted in the old way will cost seven pounds, and the same measure in the new way but three pounds.

^b In plashing quicks, says Mr. Miller, there are two extremes to be avoided; the first is laying it too low, and too thick; because it makes the sap run all into the shoots, and leaves the plashes without

F f

nourish-

the brushy part to the close, that it may not injure the young shoots by dropping on them, and that the cattle may not come at the shoots of the plashers, and browse them, and kill them.—Take care also to set the stakes outwardly, and off the shoots, whereas the hedgers for riddance, and for sake of making stakes of the live standards, work the plashed hedge strait on, most likely through the middle-most part of the hedge, which must drop over your young shoots arising from the stools, and leave many without, exposed to the ground, to be fed; though by this means you make the more luggs of hedge, yet the good husbandry of it will repay you.—Plashing work for the most part ought to be ended early in April; because, as soon as the bark loosens by the sap, when the plash is bent back in the cut, it hollows, and gapes from the wood, and so is apt to die, because the sap cannot be conveyed to it. Withy and ash will first take damage by late plashing, because the sap first rises in those kinds of wood. But as to the cutting down a quick-hedge, if it be the latter end of April, it will shoot as soon, if not sooner than that cut in the winter.—It is too common to see withy and ash-plashes dead in hedges, which comes from their being plashed too late.

It being frosty weather in November (anno 1700) yet my woodward was for going on with a dead hedge I was making: I said, surely it would be very improper, and that the wood would not work, but would snap by means of the frost.—But he answered, no, that was a mistake, it was plashing that was improper in hard frosts.

The white-thorn in hard frosts will be so brittle as in bending to break like a rotten stick; but the black-thorn, withy, and crab-tree will endure bending in the hardest of weather.

As I was riding with Stephens, he went to pull up a large brier, which by it's length had bent downwards to the ground, and had at the end struck forth plenty of new roots; from whence it may be observed how apt they are to propagate: I also conclude any other part of a brier that touches the earth will be apt to strike new roots, and so it may be useful in some vacant places by plashing to encourage them.—In wet summers, when the ground is open and moist, as this year (anno 1703) they propagate abundantly; but in dry summers they are not so plentiful.

§. 8.

nourishment; which, with the thickness of the hedge, kill them.—Secondly, it must not be laid too high; because this draws all the sap into the plashes, and so causes but small shoots at the bottom, and makes the hedge so thin, that it will neither hinder the cattle from going through, nor from cropping it.

§. 8. If an hedge has been in ill hands, and often bit, and abused by cattle, and is an old hedge; if you cut down this hedge, that it may thicken, and grow better, remember not to cut it down too low, not so low as the old stem, but leave some little length, about three or four inches of the thriving and younger wood standing on the old stem, for if you cut below that, the old stem often happens to be near rotten, and the tubes that convey it's juices to the young roots are but few, and their springs are easily lost, if you divert them from their common current and channel, and the coat and bark of the stem is commonly so case-hardened, that no bud can break through; whereas by leaving a little part of the young wood on the old stem you preserve the old channels of the tree, and they carry a bark with them fappy and easily perforable by a bud.—N. B. I once lost a hedge by cutting it down too low.

§. 9. Oak-lops and hollow pollards cleaved make excellent stakes for fences, and, considering their lastingness are the best for fences. husbandry, or if two of these stakes are placed in each lugg, they will greatly preserve the rest of the hedge. Withy will rot the soonest of all wood, and a small hazle-stake will last longer in a hedge than a great withy: but an ash-stake, next to oak, will last longest.

§. 10. I was walking between the coppices with my woodward, and he bid me take notice of a hedge on one side of the way, and said, he had advised the making it so thin as it was, and it was now five years since it was made, and yet it stood well; whereas, said he, by and by you will come to a fence-hedge of the coppice, not made longer ago, which is rotten and down; for your labourer would make it too thick, and cram in abundance of wood, whereby the wet lodged in it, and made it rot much the sooner.

§. 11. Hedging ought not to be done in frosty weather, for with the bar they cannot make holes for the stakes to go into, but what stakes must be less than the bar, nor can they be drove farther than the pick of the bar; and upon the first thaw the hedge will sink away and fall.

§. 12. When you make a hedge, it is adviseable to split the rods, for you may observe the unsplit rods in a hedge grow speckled by the sap oozing through in spots, which opens and loosens the pores of the wood, and prevents it from clinging, and binding, as it does when split; for then the sun dries it up with all it's sap, and is next of kin to burning the post-ends of gates; which dries the inmost sap out of the posts, that would rot them, and gives a cole of that depth to the outside, through which the moisture of the earth does not soak.

Time of mending hedges.

§. 13. In the spring, during March and good part of April, I find it very useful to view carefully all over those sort of hedges which may need repair, and not only mend where there is an immediate necessity, but wheresoever also they may decay before harvest; as also all such hedges, where though you can receive no trespass till harvest, by reason they border on other corn, or mowing-ground, yet are liable to it in harvest, when grounds must lie open; these you ought to mend, for men cannot be then spared, nor can you then get wood.

Caution —not to let hedging-wood lie long in heaps on the ground.

§. 14. It is a common practice in the hill-country to cart hedging-wood, and fling it down in great heaps, perhaps half a load in a heap, and to suffer it to lie, perhaps a month or two, before it is hedged up, to the great detriment of the wood; which by so lying on the ground and receiving the rain and rime, which commonly fall there, and being imperviable to the wind and sun to dry it, soon rots, and suffers more by so lying in thick wads a month or two in the field, than it would have done in three times the time in the coppice, where it lies on the roots, and is thereby kept hollow from the ground, and lies thinner, whereby the wind can soon dry it after rain.

Rod-hurdles not so good as those of cleft timber.

§. 15. Farmer Farthing of the Isle of Wight exceedingly commends the cleft timber-hurdles for a fold, and that they are beyond rod-hurdles; he says, he has had the experience of them both, and the former go much beyond the latter in cheapness, though at the first hand they are dearer: besides, he says, with the rod-hurdles he has had a sheep spoiled and staked by leaping over the fold, and this he has known pretty often.

Of rods.

§. 16. The goodness of rods depends greatly on their straitness without knots; such will last half a year the longer for being so, besides, the more knotty rods are, the more will the sheep rub off their wool against them.

My labourers were twisting some hazle-rods, which were apt to break, of which they complained: they were red hazle, not white; I asked them the difference, they replied, it was very great; for the white hazle might be seen by the white bark, and the red by the red bark: the white hazle will twist ten times better than the red, being tougher, and consequently abundantly better for all sorts of hurdling work, and for the winding of a hedge, and for spars for thatching; nay, said they, the white will last near a year longer in hedging. To this my woodman seemed to agree, and so did another experienced woodman, whom I talked with the next day; only the latter said, he did not know that the white had any advantage of the red in hedging, but only in hurdling, where the rods were to be twisted.

§. 17. Where great cattle pasture never trust to a patched, or a half made hedge, you will continually be making good the trespasses, and the cattle will get a vicious habit, of which you will never after break them. Of hedges.

If a hedge needs patching, and is to be a fence against hogs or great cattle, especially where water and shade are wanting, it is much the best husbandry to make it all new, though the rest may be tolerable, and some of it seemingly sufficient for another year, for a declining hedge will decay more in a year than one can easily imagine; and if such cattle find any one place of it weak enough to be forced, the strongest part will never stand against them; so that you will be daily patching such an hedge, and at times when you can ill spare a servant, suppose in hay-making or harvest-time: and at last you shall have a continual patched hedge from year to year, wherein there will be some parts you will think too good to pull down, and yet no part of it good; whereas in mendings wood cannot be so well joined as when it is worked into an intire hedge at once.

Dividing open fields into inclosures by quick-set fences, where ten acres of strong land is divided from thirty acres of light land, and the like, is a real improvement, in respect that a tenant will give much more for the lands so divided: whereas before the good land was swallowed up by the poor land; nor could the light and poor land be ploughed as often as the strong land, nor the strong land so seldom as the poor land, without reciprocal inconvenience.

If your corn-grounds, that lie contiguous, are well fenced against each other, you will have thereby the advantage, as soon as the corn of one field is rid away, to put in cattle, or hogs, to eat up both the grass and loose corn; whereas otherwise your cattle may be kept out a great while, when they need it, till other ground be rid.

ORCHARD or FRUIT-GARDEN.

§. 1. **D**O not steep seeds of trees in water, as some may advise you; for it is not good to steep any sort of seed, unless some annuals, and to steep them is good, especially if late sown: but to steep stones, nuts, or seeds, that are not of quick growth in water, may kill them, by making the kernel swell too hastily, and so crack it before the spear can do it, or it may mould or stupify the spear. Cook, fol. 63. Not to steep seeds. some annuals.

§. 2. The antients always preferred orchards to pastures, and pastures to arable. See Varro, fol. 32.

Of planting apple-trees in the hill-country.

§. 3. In our hill-country, where we are on cold clays, or else the earth is so poor that it's vegetable particles are not copious, nor very active, it has been observed that apple-trees are very hard to be raised, unless the crab-stocks be planted where they must remain two years before they are grafted, or rather unless the crab-kernels be sowed where they are to continue unremoved, and so grafted.—Probably the reason for this may be, because there is a considerable knot of transverse fibres where the graft is jointed, through which the juices and vegetable particles find it a very hard task to pass, where the juices of the ground are cold, as in clay-lands, or the particles of vegetation less copious and active, as in poor lands, especially when the stock itself being planted after it's being grafted must be supposed to receive a check, and it's tubes some straightness by closure, and therefore cannot admit a free passage of juices upwards to the graft: whereas when the stock has been planted two years, and it's roots settled, the juices may have a vigorous passage, and so can easily force their way through the fibres where the graft knits: yet where there is a mellow ground, or a rich fat sand, there the vegetable corpuscles rise so strongly and plentifully, and the juices of the earth are so thin, that they can easily pass upward to the graft through the knot, and in such a happy soil a tree planted after being grafted may do well.

Of transplanting crab-stocks.

§. 4. I by no means think well of removing crab-stocks out of the woods and transplanting them; because such stocks, when they come to be exposed to the open air, and taken out of their shelter in the warm woods, do not bear the cold winters well, nor even the summer suns.

Of cuttings for planting.

§. 5. Your cuttings for planting should be from half an inch to a whole inch diameter; for, if they be less than half an inch, they will be weak and have a great pith, which will take wet and be likely to kill your cutting; and besides, when your cuttings are too small, they are not prepared with those pores, that is, little black specks on the bark, where the roots break out, if set in the ground; a sign that those that have that mark on them will grow, as elder, alder, fallow, water-poplar, &c. and if they be too young they will not have that burry knot which is very apt to take root: and if they are above an inch diameter the tops of your cuttings will be long in covering over, and so may decay by the wet. Cook, fol. 12.

Of grafts.

§. 6. The French gardener translated by Evelyn, fol. 54. says, the best grafts are those which grow on the strongest and master-branch of a tree, and which are wont to be good bearers, and such as promise a plentiful burden that year, being thick of buds; for hence it is that your young grafted trees bear fruit from the second

cond or third year, and sometimes from the very first; whereas, on the contrary, if you take a graft from a young tree, which has not as yet born fruit, that, which you shall propagate from such a cyon, will not come to perfection a long time after.

I went with my gardener into my crab-stock nursery, to choose some stocks for grafting on: I had some that came from another nursery, and others that I had raised from crab-kirnels, but had never been removed; these seemed to be the most flourishing, and on these I would have had him grafted; but he refused, saying, that they had only a tap, but no fibrous or bushy roots, and therefore, when removed, would not be able to feed their stock and graft.—Note, such stocks removed may be well able to maintain themselves, but it is a different thing to maintain their grafts, and forcibly transmit juices enough thro' the knot of the graft, where the fibres run transverse.

Cyons grafted upon suckers are more disposed to produce suckers than grafts on the main stocks do. Ev. 140.

In January or February, as you find the weather grow warm, the wind neither being north nor north-east, you may graft cherries or plums, but not apples till the bark of the stock will rise or peel from the wood, which is seldom before the middle of March, and often not till April: this is the best way of grafting them, but if you will graft apples in the cleft, you may do it sooner. Lang. fol. 46.

The great use of grafting by approach is, where trees (such as the vine, or ever-greens) run so much to juice, that the graft cannot easily consolidate to the stock by reason of the great fluidity of the sap; there by length of time and patience it will consolidate by approach.

§. 7. I gathered withy-shoots over which the cart-wheel had Of bud-run, and pressed them flat, in which shape they continued to ding. grow, and the sap swelled through their fibres, and rising higher there than in other places of the bark plainly shewed, that the sap is conveyed by those fibres, to each of which in their progress broke forth a bud sooner or later, and it was to be observed that the fibre lessened extremely as it passed on, after it's having sent out it's bud, not being able farther in it's whole progress to send out another; for all buds that appeared above being well observed could be perceived to be collateral, and to belong to some parallel fibre, though sometimes the bud above might seem to turn athwart the fibre of the lower bud, and hang perpendicularly over it.—From hence may appear the reason why an inoculated bud may not take, viz. because it is not placed on a fibre; therefore care is to be taken to place the inoculated bud perpendicularly under another bud, that it may be fed, and not over, lest the under

der bud weaken the fibre that passes from it, and it should not be able to feed the inoculated bud.

Mr. Bobart of Oxford tells me, he once inoculated a blossom-bud of an apricock, and the blossom grew to be a ripe apricock.

To bud a walnut-tree, when five or six feet high, doth not alter the property of the wild kind, but makes the tree more naturally bear fruit, both sooner and better too. Cook, fol. 61.

I know Lord Bacon tells you, that peaches come best of stones unbudded; but I advise you to bud all you raise of stones, seeds, &c. though it be to take a bud off from the same stock, and to bud it on that, as I have often done. Cook, fol. 61.

Currants and gooseberries may be inoculated on their own kind. Mortimer, fol. 455.

Of prune-
ing.

§. 8. As good pruning helps the growth of trees, so also doth it prolong their lives: for it is well known that the pruning some annual plants will make them last more than one year. Cook, fol. 1.

Le Gendre says, a gardener ought not to prune the large shoots of some trees, such where the sap is very plentiful by being in good ground; for, if the sap be stopped ever so little, it will cast itself into the buds, which would have born fruit, and make them grow into wood; therefore he ought to manage it so as to leave neither the foot nor body of the trees too much unfurnished; for this reason he must rather cut the tall-shooting branches, unless in the case above, too short than leave them too long, taking most from the highest branches, and such as are towards the top of the wall, because these draw all the sap to themselves, and leave the bottom of the tree unfurnished: this is the cause that peach-trees are so difficult to be kept, experience teaching us, that, if the gardener does not perfectly understand the way of cutting them, and taking their sprouts away as they ought to be, they will be ruined in six or seven years. fol. 127.—Trees, to be well pruned, must have their boughs every year refreshed more or less, according to their force, by cutting away the wood that springs in the month of August, which, being the shoot of the latter sap, cannot be ripened, unless it be necessary to preserve it for want of better, or that it be found to be strong and well nourished. fol. 127.—Those boughs also that shoot too fast must be stopped and kept shorter than the others, for they draw all the sap to them, and wrong the rest that are weaker: but the master-bough must always be preserved, being that which grows strait upwards, so stopping it from year to year that it may always be the strongest, and maintain the shape of the tree: those boughs also, which are weak and small, must be shortened, and those, which are disposed to bear fruit the following year, to the end that they may grow strong, and that their buds may be well nourished. Ib.—It is farther necessary to prune those branches that are full of fruit-

buds,

buds, for too great a quantity of blossoms consumes the tree, besides that from thence the fruit comes less fair; but in the pruning of these it must be observed to cut them above a leaf-bud, and as near to it as may be, for two reasons, the first is, because by that means the fruit will profit most, for, when it is not covered with leaves, it dries, and seldom arrives at its natural perfection: the second reason is, because so the branch will recover itself that very year; whereas, if it be cut higher, and far from a leaf-bud, there will remain a little stub at the end of the twig, which dries up, and cannot recover itself in two or three years: as for such boughs as are taken wholly off, they must be cut as near the stem as may be, for so they will recover the sooner, and that without making any knot. fol. 129.—The pruning of peach-trees must be the last of all, and then, when they begin to spring, and are ready to flower; because their young wood is so tender, that, if it be cut, it will be dried and spoiled upon the least frost, from whence a great many of the smaller twigs die, and must oftentimes be cut again. *ib.*—Plum-trees and cherry-trees must not be cut, or stopped on the sap, but only cleared and discharged of their useless wood within the tree: and for this reason they are not proper to be kept as bushes or dwarfs. fol. 131.

Some trees are so apt to run to bearing, that thereby they will ruin themselves in a very few years; to distinguish this, their heads must be cut off, or their boughs shortened to the half, and for two or three years all their buds taken off, for by this means, provided their roots be lively, they will grow much into wood. *Le Gendre*, fol. 149.

§. 9. It will be necessary every year to prune and nail wall-fruit Of nail- to the wall twice or thrice, according as they grow more or less, ing. in doing which you must observe, to bend down the strongest shoots that would grow upwards, towards the sides, otherwise they will be apt to run straight upwards, and not cover the space you design for them, and by their luxurious growth will extremely rob the side-branches of their nourishment; there will branches enough spring out fresh to run upwards out of them when they are so bowed. *Langford*, fol. 54.

§. 10. A tree, says *Le Gendre*, draws its nourishment only Of dung- from the small roots. fol. 136.—When it is necessary to dung ing apple, apple trees, peach-trees, or apricock-trees inoculated on a plum-peach, stock, or pear-trees grafted on a quince-stock, it is enough to and apris- spread the dung upon the ground six feet about the stem, and so cock-trees to dig and work the earth and it well together, for these spread- ing near the surface of the earth are easily sensible of the amend- ment. fol. 138.

Many farmers in the Isle of Wight thresh winter-vetches for their breeding-pigs, and give them to them in the winter; and one

one that I know in particular gives them the vetches round about his apple-trees, and says, their foiling, or nusling, and keeping the grafs and weeds down, or digging and hollowing the ground, is the reason why his orchard brings apples every year when others fail.

§. 11. In cold countries both the bark of trees, and the rind of fruit is thickest : so it is plain of latter peaches, &c.

Eaves ser-
viceable in
blossom-
ing-time.

§. 12. * This spring (anno 1708) was very wet and cold, with frosty mornings, especially at apricock and peach-blossoming time,

* This observation is agreeable to the instructions given by Mr. Miller, under the article Blight.—“ There is a sort of blight, says he, against which it is very difficult to guard our fruit trees ; this is sharp pinching frosty mornings, which often happen at the time when the trees are in flower, or while the fruit is very young, and occasion the blossoms or fruit to drop off ; and sometimes the tender parts of the shoots and leaves are greatly injured thereby. The only method yet found out to prevent this mischief is, by carefully covering the walls, either with mats, canvas, reeds, &c. which being fastened so as not to be disturbed by the wind, and suffered to remain on during the night, by taking them off every day, if the weather permits, is the best and surest method that hath yet been used in this case ; which, although it has been slighted and thought of little service by some, yet the reason of their being not so serviceable as has been expected was, because they have not been rightly used, by suffering the trees to remain too long covered ; by which means the younger branches and leaves have been rendered too weak to endure the open air, when they are exposed to it ; which has often proved of worse consequence to trees than if they had remained intirely uncovered. Whereas, when the covering before mentioned has been performed as it ought to be, it has proved very serviceable to fruits ; and many times, when there has been almost a general destruction of fruits in the neighbouring gardens, there has been a plenty of them in such places, where they have been covered : and though the trouble may seem to some to be very great, yet, if these coverings are fixed near the upper part of the wall, and are fastened to pullies, so as to be drawn up, or let down, it will be soon and easily done ; and the success will sufficiently repay the trouble.”

The latter part of Mr. Lisle's observation may seem favourable to horizontal shelters, but, if rightly considered, it implies no more than Mr. Miller has allowed ; for it is far from concluding that they ought to be fixed and constant, or that walls should be built in that manner, nor does it assert any thing of the goodness of the fruit, but only of the quantity. He brings these instances of the projecting eaves to confirm the opinion he had delivered before, viz. that the plenty of fruit that year on some trees was owing to their having been protected from cold winds, rain, and frosts, in the time of their blossoming ; but, notwithstanding this, fixed horizontal shelters may, at other times, and in other respects, be very prejudicial both to the fruit and the trees, as Mr. Miller has shewn both from reason and experience.

time, infomuch that rain would fall in the night and freeze in the morning ; the consequence of which was, that apricocks were six and eight shillings a dozen : but an ordinary neighbouring-man to me, who had an apricock-tree next his house, being watchful of most contrary seasons, and finding the benefit of nursing his tree under difficulties, did by night cover it with rugs and blankets from the rain, the consequence whereof was, he had thirty dozen of apricocks on his tree : his name was Timothy Skrine of Broughton near me in Wiltshire.—I also observed that year in some few places some thatched eaves, which hung a foot and an half over some garden-mud-walls, where were good store of apricocks and peaches ; and I judged they owed their fruitfulness to these causes, for they were thus shaded from the rain, which falling at night into the blossoms of others, and congealing, burned them up and mortified them ; and how they piecemeal mortified, the morning after was very visible.—The 17th of August I was at Oxford in Mr. Bobart's physic-garden : I related the matter to him with my reflections on it.—He was pleased with the relation, and said, he would carry me to an object which should confirm my opinion : he shewed me the house he lives in, planted on the walls of the physic-garden, on which walls, as far as his house goes, is a large eaving to his house, which saved his peaches from the north wind and the rain, so far as his house went, and so far he had good stock of peaches on several trees, but no farther ; and the end of his house reaching to the middle of a tree, the fruit ended there.

§. 13. This year (anno 1720) the spring and summer to August the 13th (when this was wrote) was often very rainy, and the days for the season of the year very cold, it was observable, that in my kitchen-garden, where the land was very good, the plums which were standards, and did cleave from the stone, such as the Orleans, the Damascenes, the Queen-mother, &c. did all chop in several places, not, as I believe, one plum on a tree excepted, and gum issued out of the chops : but a violet-plum, a standard there, which is a plum that does not cleave from the stone, did not in the least chop : it was farther observable that such plums as grew against the walls, and did cleave from the stone, though they grew against a north-west wall, did none of them chop.—And the same observation I have made other years, in cold and wet summers : it may also be added, that the soil in my kitchen-garden was full as good, and as well maintained as the borders of my plum-trees against the north-west walls : from this experiment I draw the two following conclusions, viz. that the reason why the plum that did cleave from the stone in my kitchen-garden did chop was, because such plums, which cleave from the stone, are of a drier pulp and do not overflow so much in juice as the violet-plums do,

do, and those which do not cleave from the stone; and therefore, through the wet and cold seasons of the year, the spirituous juices, which can only strain through the stalk of the plum, being not rarified, through want of heat, could not ascend, and so those plums, dry in their nature, being now made more so, for want of moisture chopped: but moisture enough ascended the violet-plum, though less than in other years, which by nature overflowed with juice, to preserve that from chopping.

The second conclusion is, that the much rainy and cold weather, to both which the standard-trees were exposed, was the only reason and cause of this circumstance of the chop in the aforesaid plums, and made the difference between the standard-plums and the plums against the north-west wall; for though the situation against such exposition one may think very cold, as not having so much benefit of the sun from all quarters, especially from the east and south aspect, as the garden-standards had, by which means the garden-standards were on as good, if not better footing in hot and dry summers, yet in such a cold and wet summer as this was, the cloudy weather which intercepted the sun, and the cold windy and rainy weather, from which the plums under the north-west wall were very much defended, so chilled the juices, as to produce the ill effects above-mentioned.

I have seen fruit-trees standing in hedges pallisade-wise, in some particular part of which hedges, possibly for a lug or two, the trees every year blighted: I have known new earth to be laid to the roots, and the old to be removed without effect; then I have known new trees to be planted in their room, yet still the evil has continued. In such cases I have always observed the position of the place to be the disease, either that there has been a repercussion of an easterly wind from a piece of wall on the place, or some angle which had turned the strength of a malignant wind on it, which cause being removed the effect ceased.—I was speaking to Mr. Bobart of this, and he said, that London the king's gardener had told him, that he was at Versailles, and observed that the king of France for this reason could have no fruit [▷].

G A R D E N.

§. 1. **T**HE common damask-rose is the antient inhabitant of England, Mortimer, fol. 477.

Of the
rose.

I was telling my gardener how much fruit depended on the leaves of the tree, &c.—he added, that in the monthly
rose

▷ See the article, Water and Watering, from §. 5. to the end.

rose he could stop the progress of it's blossom a month by pulling off the leaves of the tree; for it would not blow again till it had put forth fresh leaves.

§. 2. The woodbines or honey-suckles in my borders have not thriven, but for the most part died yearly, and I have been forced to renew them; I first thought our country was too cold for them, but at length I was rather inclined to think our soil was too dry and too hot, our garden being much exposed to the south sun; so I laid heaps of grafs to the roots, and quickly found it to have success.—Agreeable to this seems Mr. Ray, *Historia plantarum*, vol. 2. fol. 1490. *Hæc species in septentrionalibus regionibus, Germaniâ, Angliâ, Belgio, &c. in sepibus frequens.*

§. 3. I would have those that lay salt on their gravel-walks, to kill the weeds, to observe, if in a few years they do not produce more weeds than those gravel-walks that had had no salt laid on them did. For the salt at first stupifies the roots, as being more than they can digest, till washed in by the rain and qualified. Cook, fol. 18.

K I T C H E N - G A R D E N.

§. 4. Worlidge, fol. 257. says, removing of plants, and alteration of the soil is a good way to improve them; several esculents grow the fairer for it, as cabbages will not leaf well in the young plants be not three or four times removed before the spring, the same is observed in lettuce, onions, and several others, if they are removed into improved earth every time, they will eat the tenderer and finer.

§. 5. Columella recommends ashes to be laid on artichoke beds, which he says is extremely beneficial to that plant. But Mr. Powel the gardener was a stranger to the agreeableness of that manure to them.

§. 6. The latter artichokes will keep to autumn, if you cut them before they are ripe or going to blow, but it must be in a dry season, and when they are very dry, and hang them up in a cellar; for they will keep growing on, and blow, and seed: I have known them kept so two months; or you may cut the artichokes when half ripe, and then they will bear again at autumn.

§. 7. Carrots and parsnips are said to delight in different soils; viz. carrots, in sandy and the lightest ground, parsnips, in the strongest land.—Mr. Ray agrees to this, for he says, the carrot delights

* *Cinara multo cinere stercorandum, id enim stercoreis huic oleri videri aptissimum. Columella.*

delights in gracili solo, but the wild parsnip in solo pingui et opulento. It is a good property in a carrot to be thick and short.

If carrots and parsnips are not gathered as soon as they come to their perfection in growing, which is to be known by the withering of their leaves, the worm will eat them, which will cause a canker.

Of cabbage-plants. §. 8. One of my labourers put me in mind of earthing up my cabbage-plants; I knew they would thrive the better for it; but he said, it would make them take fresh roots, whereby they would better in their stem support their cabbage-heads, which otherwise would be flung by the wind.

Of transplanting herbs. §. 9. Markham in his book of husbandry, and skill in cookery, p. 51. says, that herbs growing of seeds may be transplanted at all times, except chervil, orage, spinage, and parsley, which are not good after being transplanted; but observe to transplant them in moist and rainy weather.

Of liquorice. §. 10. Glycirriza, or liquorice, Mr. Ray says, rarius autem in Germaniâ aut Angliâ floret, ideoque sterilis a nonnullis sed temerè credita. Now English liquorice being the best shews plainly the perfection of the root has no affinity with the perfection of its taste; for no doubt but the root of liquorice grows more perfect, that is, larger, in those countries where the plants flower and bear fruit, though there it may eat more sticky and stringy, and be less pleasant in taste: so that the perfection in the taste of the root may be a defect in it.

Of onions. §. 11. Sharrock in his book of vegetation says, that English seed of onions brings but scallions or small onions. I find this to be true, and that they will not keep long, but grow soft, and rot in three weeks time after they are taken up.

W E E D S.

Of foddering with weedy straw. §. 1. FARMER Chivers of Gausuns in Wilts says, the thistles came at first there, as in other rich pastures, from the ill husbandry of the farmers, who in hard winters foddered with thisty straw, or thisty coarse hay, and from thenceforward they have increased to a great degree.—I remember that by foddering in my meads, in a very dry summer, with goarvetches, I filled my meads with morgan and other trumpery.

Of poppy or red-weed. §. 2. Poppy or red-weed seldom grows in the deep and wet lands of Hants, nor in the deep lands in Leicestershire, nor indeed do the plants which come up from the smallest seeds, such as rue, whitlow-grass, &c. grow in strong lands, but in the lightest lands, which are consequently the barrenest; because those small seeds

are

are easily oppressed in strong or wet lands, nor are the vegetative particles heated, and thereby refined enough to penetrate the pores of their seeds.

§. 3. The farmers do not in the last crops lay down their lands Of kill- to clover in the strong and deep soils of Northamptonshire, being weeds. cause they would then be prevented (if they made any benefit of their clover the next summer) of taking so effectual a remedy by an early summer-fallow, and after that of giving their lands a second tillage, perhaps to destroy the withwind (which I have often observed to trouble them) and other such ill weeds as are apt to grow up with their wheat, if not subdued by an early summer-fallow. After all it must be confessed, that nothing is better husbandry in our strong clay-grounds in the hill-country than to keep them in tillage, and not to suffer them to run to a sward of natural grass, which is prevented by ploughing up the first summer's clover to a wheat-crop, about the beginning or middle of August, after you have in a manner had the benefit of the summer-crop; and yet this practice is subject to the inconveniency of cultivating the weeds such sort of land is subject to, especially when it shall be folded or dunged, as wheat-land ought to be. Therefore it seems a medium ought be taken in this case, and you ought to observe carefully what sort of ground is subject to what sort of weeds; for some of my clay-grounds are not subject to withwind, and some of my light and white grounds are not subject to morgan or red-weed as others are, and yet I can see little difference in the grain of the land; accordingly you may suit your husbandry, in humouring your grounds, and venturing the afore-said method in one ground, which for the foregoing reasons you ought not to risque in another: again, it often happens in our hill-country-land, we have several sorts of earth in the same field, as strong red clay, some mixed earth, and some white; in such case, when in the course of husbandry you should lay down your last crop of corn to clover, you may forbear sowing that part of the field which is of strong clay to clover, that you may not be hindered from doing that which perhaps may be most for your benefit; viz. of giving it an early summer-fallow in order for a wheat-crop. Again you must be nicely careful of giving such lands as are subject to weeds the first frosty fallows of the winter ploughings every year that they are sown to barley, oats, or peas, in case you fallow for peas: by this method you will in time gain in a great measure a dominion over those sorts of weeds, which otherwise would eat out and overtop your corn.

Sowing clean seed, and laying grounds down to grass-feed, will at length overcome all manner of weeds, whereby the heart of the ground is eaten out, and the more in heart you accustom to lay

lay down your grounds to grass-feed, the thicker the grass or clover will grow, and the better effect it will have.

Mr. Ray speaking of ludweed (with which the field at Crux-Easton are very much troubled) says, it grows chiefly on dry, barren, and gravelly ground.—If so, it seems to be extirpated by improving the land by good husbandry: and it seems to be the same with all other plants that affect the barren and poor ground; the juices being poor and sour that they feed on, they go off of course by making the land generous: and indeed good healthy land seems much easier to be cured of the weeds incident to it than poor land, without altering the condition and property of each sort, because colt's-foot, docks, wild carrot, parsnip, &c. excepting the thistle and knapweed, may easily be destroyed by being prevented from feeding; whereas the plants of barren grounds being both small and infinite, the labour of destroying them would be also infinite without altering the property of the ground. Therefore the consequence of ploughing lands hard is very discernable, as also of how great consequence it is sometimes to feed meadow-lands for a year or two, thereby to destroy those weeds which are annual, by preventing them from feeding.

Sharrock however in his book of vegetation, fo. 141. says, that the plants which annually die, if they are disappointed of running to seed, will continue and survive many years, even till they are permitted to run to seed.—If so, the feeding of meads, and cutting thistles, &c. in order to destroy annual weeds, may not be so effectual as above proposed.

The measures to be taken in the three seasons of the summer for cutting of weeds seems best to be taken when they are fullest of sap, which we may judge of by the stripping of oak, which is most in sap in the breaking out of the bud into a leaf, before the leaf be full grown: and such half-grown leaves, by reason of their fullness of sap, the frost seizes sooner than the others: so that the weeds ought to be cut down when the sap is most in the root, viz. at spring, Midsummer, and Michaelmas-shoot, which is on the full swelling of the bud.

Our farmers say, one need not regard what weeds come up in the summer-fallows, or when one sows wheat; for those weeds and May-weed will all be killed by the winter, but it is the weeds that come up in the spring that do the harm.

Why wet §. 4. If much wet brings up weeds, how comes not the corn brings up also to thrive in wet weather? The reason is, because many weeds and weeds are natural to wet ground, such as colt's-foot, docks, thistles, &c. and to cold clay; the wetter therefore the year proves, the more such plants will grow to the mastery of the corn: but wet seasons agree with no sort of corn: God having ordered that man should live by the sweat of his brow, has given that general defect

defect to land, as to stand in need of being laid dry by art and tillage.—According to what has been said, lands lying alope to the north from the sun will be the more subject to weeds.

§. 5. It is the observation of country-farmers, that, if the Why season of sowing wheat be dry, it brings many weeds into the corn; wheat —because the seeds of weeds have a moisture in them by lying so long in the ground as easily makes them grow when the ground is made fine for them; whereas the corn, being put into the ground as dry as may be, cannot by that little moisture of the ground grow, and so the weeds first set out ahead of the corn: besides the seeds of many weeds by much wet may burst, as it is in many garden-seeds. becomes weedy.

§. 6. It is commonly said, by those who forbear to weed their wheat till it is quite, or almost in ear, that what is trod down or bent will rise again: but I weeded my wheat in the beginning of May, at least three weeks before it was in ear, and on the 23d of May I walked by the sides of the corn, and saw many of the bent and trodden down blades, which it was impossible should rise: I found in the bending of all of them, where they had been broken down, the juices in that bending turned black, and became an iron-mould, which in all probability before harvest might rot them off: I found all such blades mounted upwards from the first joint above the bending, making directly upwards to the sun, as the young shoots of trees fallen down will do, and the bended head of a pea, as it shoots out of the ground, which rises upright in the blade, making a right angle in that joint; and so it is to be observed that barley blighted by being * more-loose does, which * Loose at falling down at the root, the blade in like manner bends inwards root. at the first joint above the root: undoubtedly therefore such weeding corn so high does it harm; it would be worth the observing at harvest what ears such corn produce, as also whether the blades trod down to the north and facing the south do not rise more upright to meet the sun, than those trod down towards the south do in rising towards the north, and so from other points of the compass: as we tread down onion, turnip, and carrot-tops to strengthen the roots, and to weaken the heads, think you not it does the same to wheat? and consequently the bruising and treading it down must be prejudicial to the corn. § 10. 12.

§. 7. There is not always the same reason for weeding corn, Some corn though the weeds may be as full set at one time as at another: does not for sometimes one is sure the ground is in very good heart, and want the weeds, by coming up late, are not so; it often happens that weeding the corn starves the weeds and overcomes them; but, if the land like other is poor, so that the corn shall be in danger of falling off, the danger will be of the weeds starving that. corn.

§. 8. Special regard ought to be had to the weeding of such chiefly to Whatcorn
corn, be weeded

G g

corn, which ought not to lie long abroad in the field after it is cut, such as white oats, barley, and wheat; because they will not bear to lie out so long, as that the weeds cut with them may dry, without damage; whereas black oats and peas, the first may lie out without damage till the weeds are dry, and peas must, to be dry themselves, lie out as long as the weeds may be dry also: however, it is best to weed oats.

Of weed-
ing a se-
cond time.

§. 9. If you know a ground in it's own nature subject to poppies, thistles, morgan, &c. it is good, if the summer prove cold and wet, to look over it a second time, though you had weeded the wheat in the spring; for it is incredible how a second crop of these weeds will flourish in such years, (though they were out of proof at the first early weeding) and keep on growing till harvest, so as to burn the corn and eat out the heart of it.

Not to
weed
wheat
near in ear
See §. 6.
12.

§. 10. My wheat was putting out into ear when I sent weeders to it, but found at the day's end, that their stooping to pull up the may-weed and red-weed had bent many of the reeds under the ear, for the wheat was tall, and not likely to look up again, it being thick; therefore much of it was trodden down, or rather broke off near the root, the reed being grown stiff: I sent my bailiff and others to view it, and they reported, that the weeders had done a great deal of injury to the corn.—So for the future I hope I shall be wiser, and see my wheat weeded earlier: but, had my wheat been shorter and thinner, and a poor crop, it is probable to such wheat very little damage might have been done: certainly it is best to weed wheat as early in the spring as the weeds are all come up, and, if it must be weeded a second time, ten acres will be weeded in the time of one. I see quick-set plants and garden-stuff thrive so exceedingly the more for being weeded, that I cannot believe but that early weeding the corn will have the same good effect.

Not to
weed im-
mediately
after rain.

§. 11. I asked my bailiff, it having rained the day before, why he did not go to thistling my barley; he said by no means, he should do more harm than good, whilst the top of the earth was clammy; for it would clod to their shoes, and in treading on such barley as was shallow-mored it would stick to their shoes, and they should pull it up after them, as well as tread other ears into the ground which would never rise again.

Of weed-
ing early,
See §. 6.
10.

§. 12. I began weeding my barley early this year (anno 1703) and my oats sooner by a fortnight than others thought of it: I had about ten weeders in my corn, and yet found by the latter end of the weeding-season, by the damage they began to do in treading down the corn, that I had great reason to rejoice for so doing: I had my weeders all ready against hay-making-time, which was then at hand: but when I had done weeding, the farmers had scarce begun, rain coming and preventing them, as they,

they had missed making use of the season when they might: he that thinks he shall have a good crop of any sort of corn had best weed it early, because his corn, running thick and gross, will receive the more damage by late weeding.

Weeds cut late, when gross, and the barley gross, it is likely the corn must have been much kept down by the weeds falling on it, so that it can never rise again.

§. 13. * Mr. Ray speaks of wild oats as a weed difficult to be got rid of; for ripening before harvest, and shedding it's seed in the ground, it will remain there till the ground be ploughed up again, though it be for a whole year, and then come up with the corn. Of wild
oats.

The Isle of Wight is extremely apt to run to wild oats, which, major Urry says, will lie four or five years in the ground, and come up when it is ploughed: his way to kill them is, to lay the ground down to clover, and to mow the oats and clover together before the oats are ripe, and then their roots will never grow again.

§. 14. Mr. Carry's woodman walking with me upon Winterhay's farm in Dorsetshire, I observed the grounds to be much over-run with furze; he said, they were the worst sort of furze, they were French furze, which run up higher than the English furze does, but would not be so easily killed with chalk, nor were they tender enough for the cattle to eat them: they begin to blow in the middle of January, and last all the summer; the English furze begin to blow the latter part of the spring, and hold it all the summer.—I could see little difference between them, only the English was of a closer thicker prickle, and the smaller prickles tenderer. Of furze;

§. 15. Mr. Ray, speaking of the fern, says, it is killed by cutting it two years together. Of fern;

The destruction and killing of fern by cutting it seems to me to depend on the judicious time of doing it, viz. at the three proper seasons, the Spring, Midsummer, and Michaelmas, when and just after the respective buds are shot forth, to which nature has designed the current of the sap, which, having no vent, must cause a plethora at the root and body of the plant, and turn to corruption; for the sap must break all the capillaries, of which there are a multitude.

* *Inter segetes nimis frequens est, nec agri, qui ea semel infecti sunt, facile hac peste liberantur; etenim ante messem maturefcens, semen in terram effundit, quod per hyemem ibidem reptans, aut per integrum annum, si satio intermittatur, cum segete denuo succrescit. fo. 1254.*

Of thistling.

§. 16. Taking a view of my corn about three weeks after it had been thistled, I could not find that any of the stems of the thistles, which had been cut off, shot upwards since the thistling-hook had taken hold of them, nor did they anywise tillow out, or shoot up suckers; but I found three or four of the serpentine leaves to every thistle (which crept so low it was impossible the hook should take hold of them) to have spread themselves out pretty largely, yet not so considerably as might have been expected, the sap feeding them plentifully; nor could I find the roots of those thistles, which had been cut off, thrive beyond their fellows afterwards: it may be worth the inquiry whether those lower creeping leaves would not rise much higher, if one had patience to stay, so as the hook might cut below them: but the best way of all, both for dispatch and profit, I conclude to be, to draw the thistle before it be grown to that bigness that they usually cut them, and when the ground is reasonably moist: when they are pretty big they will easily draw by the thumb and two fingers, but false fingers of hard leather may easily be had.

About a month after I had thistled oats and barley, I observed the barley-ground to be full of thistles again, whereof many stood so near to the old stems, viz. within six inches, that I supposed they had tillowed from them; therefore I dug down carefully half a foot in the ground, but could not find the roots of the young thistles inclined towards the old stem: I tore up the young thistles with roots of nine inches long, broken off and very taper and slender at bottom, with small fibres belonging to them, as other maiden-thistles had: nor is it to be conceived that nature, which is ordered to go the nearest way, should from the slenderest and lowest part of the old root send forth its sucker, but from the upper part and strongest of the whole root, nearest to the surface; so I observed some small tillows or issues from the old stem, which did not advance to any great height: they issued out between earth and air, and, as if maintained by the old stem, they carried a shrivelled dwarfish look with them: they issued out more freely and longer here than in the white soil though thistled a fortnight before this ground; for either the stems here carried no suckers, or very dwindling ones: therefore there is less danger of the thistles growing again by tillowing, in this thistling white land early than stiff clay: nor did the under-leaves of the old stems shoot out to any length in the white ground in comparison to what they did in the clay: the wet year was the occasion of these tillows.

August 24th (anno 1711) I dragged a nine acre-piece of wheat, sowed on one earth, which was very thick, and full of thistles that had tillowed out from old stems, which I had cut about a month or six weeks before, lest they should run to seed; I was a little apprehensive, though I knew the thistle to be but an annual plant, whether

whether the tillowing thistles from the old roots might not strike fresh roots to the great prejudice of my wheat; there were also many thistles which were seedlings.—November 17th I visited my wheat, and though the forehand of the winter-season had been very mild, yet I found all the thistles dead and rotten in the roots: it may be the drags battering them might hasten the effect, but I believe they had been dead some time before.

If wheat be not well thistled, the reapers take up the grips so tenderly, lest they should prick their hands, that by their loose handling them many ears are left behind, and such foul work is made, that the wheat left behind might sow the ground.

Though barley and oats should both be thistled, yet, if it is impracticable to accomplish both, the oats should be left unthistled rather than the barley, not only because the oat-straw is generally less proper for fodder than the barley-straw, but also because oats may lie longer in swarth and in cock than the barley, and so the thistles may have a reasonable time for drying: it is further also to be noted in thistling spring-corn, that, if the thistles be once grown tall, strong, and prickly, as they commonly are before the barley be out in ear, and about five weeks before it is cut, then I think, though the barley be not so high nor thick as to take harm in thistling by treading, yet the thistling in such case does more harm than good; first, because the thistles being grown so sticky will not thoroughly wither, nor shrink and waste away, as it were to nothing, by harvest, but will be raked up with the corn; secondly, by harvest such great thistles will turn black, and spoil the fodder (being raked up with the swarths) a great deal more than if they had stood till harvest; for then, being cut green with the corn, they will hold a good colour, and drying they will eat tolerably well, nor will the cattle refuse them in the straw. Chalking land is an excellent way to destroy the thistles.

It need not be wondered at, that in borders, alleys, grass-plots, gravel-walks, &c. weeds, grasses, and trumpery should so increase as they do, if we observe that such weeds and grasses, however low they seem to be kept, run to seed when they are so small as to escape our observation, and before they seem to be worth weeding up.

I was weeding my barley (anno 1701) so long before it was in ear that one could not know it from oats; the thistles were then pretty high and strong; but a farmer in my neighbourhood said, he never weeded so early, because the thistles would grow up again.—Upon which I talked with all the weeders, and with other husbandmen, and I found by them plainly, that, notwithstanding what the farmer had said, it was good husbandry to thistle as I did; for otherwise the thistles would grow so big as to eat up the heart of the corn, which it would not recover; and

though the thistles might grow again, yet they would not seed nor be rank, but still be over-topt and kept under by the corn; whereas by going into the corn when in ear damage was done, and then the thistles were so big, that being cut down they would fall on the barley, and sink it down, so that it might some of it never rise again, and that more especially, if they cut down the thistles in rainy weather; for thereby they would be gross and heavy, and not apt to wither so soon as otherwise they would do, and so the corn might be in danger of being ever held under: but when the corn was as young as misc, thistling when wet did it no harm: and, if by thistling so early you were forced to thistle again, it was no more than the best husbandmen often do.

This day, being June 25th, (anno 1703) I conceived a fancy for reasons before hinted at, that a better method might be found out for destroying of thistles than cutting them; so I went into a ground with a pair of tongs (which also might be improved) and with them I took hold of the lower stem of the thistle, and draw it up with all it's roots nine inches in length, the stems of the thistles being nine inches or a foot long, and that with greater expedition by much than the labourer could cut them, as he, being eye-witness of it, was satisfied. This instrument may not, it is possible, do so well in wheat, because the ground may be too hard to draw the root; the practice must only be in barley, where the ground is loose: if the ground be somewhat moist, it will be the better.

It is good to thistle broad-clover, and to cut out the docks, and scabuses, &c. as well as corn; for thereby the broad-clover (I know it by experience) may be made a day the sooner.

Of charlock, and how known from turnip.

§. 17. All this spring (anno 1708) being wet, and lands being generally obliged to be sowed wet, it was observed there was an infinite quantity of charlock in cold red clays, both peas-land and barley-land; but in white or lighter land the charlock did not so much over-run it: therefore it seems one should avoid ploughing and sowing cold clays wet, if only on the account of charlock; the reason for this seems to be, because charlock-seed is very oily and hot in taste, as has been before noted, and therefore resists putrefaction, and consequently the fibres of the seed are not easily opened, and loosened, nor penetrated but by a great deal of moisture; whereas white and light earth is soon dry after rain, and so the water does not continue long enough on it to set such seed on growing: therefore cold wet lands are always more subject to charlock than white land. In this the turnip-feed is of a direct contrary nature to charlock-feed, which latter to the taste conveys in a very apparent manner a much tarter, stronger oil; for though the turnip-feed requires a speedy shower of rain to bring it up, yet much rain, when it is first sown, makes it drunk, and it's parts

parts being loose and uncompact imbibe the rain so freely, that if they continue in it they are converted to mucilage : I have often sowed charlock-seed and turnip-seed in flower-pots at the same time, and watered them, and found that whereas turnip-seed will shew itself in three days, charlock would not appear under ten days : the seed-leaves and roots of the last are much hotter and more peppery than the plant of the turnip ; therefore none who sow turnip-seed need be at a loss, on the first appearance of the plant, to know whether it be turnip or charlock ; for, if the seed-leaves appear within a week's time, it cannot be charlock ; again, if leaf or root tastes hot, it cannot be turnip, which tastes mild ; the advantage of knowing which is, that one may lose no opportunity to sow turnip-seed again in a very few days, and consequently lose not the season, if it comes not up, which by the aforesaid signs one may know ; whereas, if one must learn the difference from the leaves they put out after the seed-leaves, that must take up at least three weeks, and thereby the season of sowing again may be lost ; for, if we have not showers or moisture for the sowing of turnips, it will be to little purpose.

On observation past on my corn of all sorts June 8th (anno 1715) my wheat, which was sown on one earth, worked fine and pretty dry, i. e. a little drier than we commonly desire it to do for wheat, and which was sown pretty early, ran very much to charlock : I also observed that my blue peas which were sowed in March, and the ground ploughed fine and dry, brought up abundance of charlock : whereas the wheat-ground which ploughed up as heavy, and wet, and cold as we commonly desire it, and the grey-partridge-peas, which were sown from the beginning of February to the 20th, when the ground and the weather were colder, produced very little or no charlock : all this seems to depend on one and the same reason in relation to the sowing, whether at spring or autumn ; viz. the charlock-seed being close in it's tubes and vessels, and full of oily parts, which resist putrefaction, as aforesaid, the juices of the earth (which cold and wet, and the season so also) could not insinuate into the charlock-seed, it not being attenuated enough by heat : whereas, when the season of the autumn and spring, and the ground was warmer, and turned up fine, the juices easily penetrated the vessels of the charlock-seed, and set them on growing ; that afterwards, when both the weather, and the ground grew warmer, the charlock-seed did not grow up, is not to be wondered at, since the good disposition of the bed seeds are at first committed to is of the greatest moment, and the earth soon settles, and hardens, and falls close, and becomes unfit to make the seeds grow.

This spring (anno 1701) I sowed gore-vetches on a stale fallow of a head-land, and sowed another piece of gore-vetches the same year on a second stale earth of a month turned up; at the same time we gave a second earth for barley; and I had nothing but charlock on the latter, and nothing but thistles came up in the former; from whence I collect, that harrowing on a stale spring-fallow tends to nothing but producing such weeds the ground is inclined to: therefore I had better have given another earth upon the sowing of my vetches, which would have buried the charlock that had took root, which the harrows alone could not do.

I winter-fallowed two grounds (anno 1702) when in very good temper and dry: the latter end of February or beginning of March, I ploughed one again and sowed it to peas, the ground working dry: I likewise ploughed the other again, and sowed it to peas and gore-vetches at the same time; in both these grounds, and all over them came up abundance of charlock, so that they were perfect yellow with it; only about two acres of the latter was reserved till the latter end of April, and then had a second earth, and was sown to more gore-vetches; but then rain had fallen and the ground worked pretty lumpish, and therein I had not a stem of charlock came up.

Id. and of
thistles. We had a very showery wet spring all March, April, and May, and the first week of June, and my lands, being in very good tillage, worked exceeding fine at sowing-time for peas, oats, and barley, as also had my wheat-land and vetches, and I never knew fewer thistles in all sorts of my corn, but there was abundance of charlock, which I have often observed to be the consequence of land's working fine and dry. Charlock therefore is more the produce of poor ground, because that generally works finer and drier than that which is strong; but thistles are more commonly the produce of strong land, because that generally works colder, wetter, and rougher, which properties bring thistles; consequently in those years, wherein the ground works worst, the thistles come up thickest. Perhaps the reason of this may be, because the seed of the thistle may have taken root before the spring corn is sown, and, when the ground works rough, it may not be torn from many clods of earth, and so dies not, but abundance of the roots, having a fastening to the earth, still live; whereas, when the ground works fine, the roots of the young tender thistles may be torn away from the earth, and so wither and die; and that this may be the reason I am apter to believe, because, when ground works rough, a crop of thistles soon appears, and tops the corn, which could not be, except the thistles had had some rooting before the ploughing for sowing; for where the ground ploughs fine, as the thistles are few, the corn tops

tops them, till it leans down it's head before the harvest, and then the thistles, which were not weeded up, may shew their heads above the corn; and in this case the thistles are generally weak, as having no root but what might grow from the seed after the corn was sown; for, as was said before, where the ground works fine, what tender young thistles had taken root, which are the thistles supposed most to annoy corn, are, by the fine working of the ground, conceived to be torn up by the roots: thus the fine tillage of the ground prepares a bed for the seeds of weeds, but tears up root and branch those weeds, which had before taken root, which, generally speaking, are the most hurtful weeds; fine tillage of the ground therefore, in the general, is a quality of good husbandry.

What may be the cause of producing charlock I cannot tell, but it seems, it must be either the sowing ground early, or dry; for that part sown late and wet had none: nor did my barley that year sowed late and almost in the dust produce but very little charlock: but after sowing the barley in April and May, there was no rain for a long time, yet the barley came up well, but the charlock came up very thin.——From hence I cannot but conclude, that, though a dry summer, and a dry winter-fallowing tend much to the killing of the weeds, which arise from roots of their fibres, as also from seeds, by laying open the ground to the frosts in winter, and to the scorching heat of the sun in summer; yet that, when such earth comes to be sown either to winter or summer-corn, the finer and drier it works, and the better for bringing up the corn, the better and kindlier in proportion the seeds of weeds, by reason the seeds of weeds are of less pith than the corn, consequently more apt to be choked when the ground works stiff: but when it works well for the corn, it does so also to bring up the weeds, which arise from seeds, or for the bringing up such weeds as arise naturally from the ground, the body of the ground being more opened to the sun and rain's visiting all it's pores and impregnating it: for I cannot see why earth best prepared to bring up the seed-corn is not also best prepared to bring up the seeds of weeds, and such weeds as are natural to the ground. But the seasonable winter and summer-fallowing, as before hinted, may reasonably prevent and cut off such weeds as arise from roots or seeds.——And as to such weeds as arise by roots or fibres of roots, the drier and dustier corn is laid into the ground, the more must such roots be separated from the earth, and be exposed to wither by the heat of the sun: but, as was said before, I think it holds quite contrary in weeds arising from seed, and that the good disposition and mellowness of the ground is fittest to produce weeds either from seed or naturally; the garden-mold being so fine is for the same reason so subject to
weeds.

weeds. I see quick-set plants and garden-stuff thrive so exceedingly the more for being weeded, that I cannot but believe early weeding the corn will do the same good to the ground; and this may appear from mellow earth flung up in digging a pond or other hole, which earth is generally of a mellow, hollow sort, whereon thistles, and other weeds will grow abundantly, whether they come up naturally or by seeds sown; this seems to shew how much fitter the better tempered mold is for weeds as well as for seed-corn: but when a mere and perfect strong clay is flung out in a heap in digging such a pond or hole as aforesaid, then, as I have observed, such mere clay has produced no weeds, the earth wanting that hollowness and fit mellowness, till by lying two or three years the upper crust is hollowed by the sun, or by the treading both of men and cattle.

Of couch-grafs. §. 18. Mr. Raymond says, the most destructive grass to corn is the knot or couch-grass, it being of that increasing nature, that, if but a piece of a root were left, it would in one season spread over a patch of ground as big as a small casting-net.

Of great and small bind-weed or withwind. §. 19. Mr. Ray, speaking of great bindweed, says, it is frequent in hedges in watery places, it's root is perennial, but it's stalk annual: I suppose the small bindweed is of the same nature, as to the soil it desites, and the perennial root it carries; it grows in my clay-land, to the corn's great prejudice: therefore land may be presumed cold that runs to it, and must be treated accordingly: I am apt to believe it propagates itself by seeding in pasture-ground, for it seems to flower too late, in corn, to seed before the corn is cut.

In both barley and wheat, in the deep rich land, near Illey, in Oxfordshire, I observed, withwind with mighty grossness climbed up most of the halm to the top, no doubt, but to the prejudice of the corn in many respects, which must be eat up before harvest.

I have known withwind or bindweed multiplied and propagated both in barley and wheat, where the land has been strong, and therefore most subject to that weed; for, when such ground has been ploughed for some crops, to peas, barley, or oats, for which corn the land is only ploughed in the winter months, or for winter-vetches, for which end it is not tilled till about September, there is no killing thereby the roots or seeds of weeds as by summer-fallows for wheat, but the weeds, which multiply from the off-sets or joints of roots, or from seeds, do increase thereby; in such case I have known clay-land folded for barley (and particularly that part of the ground, which waiting for the folds going over at last was latest fallowed) bring up a great increase of withwind, though the spring and summer has been very dry, inso-much that every blade of barley had a withwind round it; so that,

as the fold has brought up a crop of barley, so it has, with it, to every blade of corn brought up it's enemy to eat it out, and pull it down before it is ripe, and prevent the filling of the grain, whereby the crop of barley is greatly hazarded after it is cut also, by the danger it must run by laying in swarth till that weed is withered, before it can be carted.—Again, near the end of the first summer, after the first year of a hop-clover crop, which I fed, that is, about the beginning of August, I fallowed a ground for wheat, and then dunged the fallows, and sowed my wheat before Michaelmas: I had a very good crop of wheat, but withwind came up to every blade, so that, had it been a wet and cold summer (whereas it was a hot and dry one) my wheat had been pulled down and lodged while green in ear, and in the milk, and then could not have filled in body and flour, and so had been of the nature of blighted corn: the increase of this withwind was, without doubt, occasioned by the laying down this ground only to one summer-feed after the hop-clover was sown, when the ground had born three or four crops of summer-corn after it's wheat crop, whereby, by the winter ploughings, as I intimated before, the off-sets of the roots of weeds, and their seeds were propagated; and I could not properly by a seasonable summer-fallow destroy these roots or seeds, by giving the ground a summer-fallow the beginning of June; for then I had lost the fruits of my hop-clover crop by ploughing it in at the beginning of the first summer, which would have contributed much to the killing of the withwind; and by delaying the fallowing three months longer, viz. to the beginning of August, the sun had both so lost it's strength to burn up the roots, and malt the seed, and the ground the opportunity of lying long to a fallow, that the dung laid on the fallows gave new life to the roots and seeds, which was very apparent by this one experiment: there had been a great deal of hop-clover seed shed that year, because I could not feed the hop-clover down low enough (I had so great a burden on the ground) and this shattered seed, being on the beginning of August fallowed in, laid under the fallows alive till about the 10th of September, when I turned up the ground again for sowing wheat; then the hop-clover seed was turned up again, and grew mightily by virtue of the dung, and at harvest produced, with my wheat, so fine a crop of clover, that I thought it would better pay the feeding it a year, than to proceed on in the usual course of husbandry, viz. to winter-fallow after wheat, for peas, oats, &c.

§. 20. Every one agrees the lighter one makes ground subject Poppy or to red-weed, and may-weed, by giving it more earths, the more red-weed, of those weeds it will bring, and those are some of the worst weeds and may in corn; for I have known as good a crop of wheat as one weed would desire all the winter-time, and by those two weeds coming
up

up in the spring and summer, it has been eaten out so, that there has not been the seed.

I find all agree, that in weeding the morgan or may-weed, and the red-weed, they should be drawn up by the root rather than cut up with the hook; because they have a slender tap-root, which draws easily, without loosening the ground, and mores of the corn, whereas, if they be cut, they will tillow and come again; but the thistle has too great a root to be drawn, and when cut comes not again.

Seeing poppy requires a winter and summer for growing, to make it's seeds grow, in order to fallow them up the summer after, and destroy them, it seems the summer-fallowing the year before, or the October before, is much conducing towards a wheaten-crop.

The poppy is a winter and not a summer weed, the seed requiring to have root very early in the spring; therefore I never could observe it grow in barley or oats, unless it was barley and oats sowed on one earth, which is very early sown; the rooted seed, possibly, in such case, being not pulled up by the harrows, grows, tho' in very little quantity.

It is usually observed, that the white land in our hill country is very subject to poppy, if ploughed with two or three earths, and made thereby light, but clay-lands are not so subject to be reduced:—the reason of which seems to be this; because the poppy-seed is a most small seed (for Mr. Ray computes many thousands to lie in a pod) which seed, by reason of it's smallness, is easily buried in clay-land, and less able to shoot it's seed-leaves through, because it sooner settles and binds than in light land through which it's seed-leaves easily pass: it is very likely therefore, the evil of red-weed being so great, it may be better to sow white land on one earth.

The poppy is much hardier than the wheat, for that blossomed exceeding thick in the grounds where the wheat was almost all killed, exposed to the cold winds of this winter 1709.

It is very plain that braishier shallower ground in the hill-country is very subject to red-weed or poppy, and the strong clay-ground not so; therefore, where-ever in a clayey piece of ground there is a sinking or fall, or the grete runs shallower (as in some places of most of my clay-fields it does) as also in the lighter fields, there I ought to give the weeders stricter orders to be cautious and circumspect to pull the poppy-weed up:—but, as to the strong deep clay-land, even the poppy, though it does not appear there thick, need not be much regarded; for it will there every day dwindle, and the cold clay will starve it; whereas, on the contrary, what poppy appears in spring in the light shallow stone-

stone-braishey land, though the root and stalk seems poor, will spring forward, and thrive apace all the summer till it blows and feeds.

When the farmer says, red-weed, morgan, &c. burns up corn, it is only meant that, when that gets ahead, it sucks up the moisture from the corn, and then indeed it's lamentable effects are as if the corn was scorched up.

§. 21. Being with farmer Lake of Faccomb, we fell into dis-
course on husbandry, and I told him I was gathering the cockle in the field out of the winter-vetches, lest I should bring them into the dung of the back-side: he said, he saw not how that profited much, unless I designed them for seed, and then it might be inconvenient, but, if they were for horses meat, if the cockle with the vetches came into the dung, it would be heated thereby, and never grow again; the same he said of charlock: I asked him then if he never thought abundance of trumpery was carried into the field with the dung, which grew again; he said it was so in case green new dung was carried forth, but in case the dung was first flung up in heaps to rot, the seeds in it of weeds did not grow: he said, if his seed-wheat was clean, he never observed he had cockle.

§. 22. Mr. Ray says of the corn-marygold, it has a woody
root, and strikes deep, therefore must eat out the heart of the rygold.
ground, and must be a great harm to corn; if it's seed ploughed-in will grow, as the garden-marygold will being dug in, it is hard to overcome the increase of it.

§. 23. Farmer Biggs told me, that a field of his was all over-
run with colts-foot, and that he sowed it to vetches, and that those vetches britted or scattered, so that he put in his pigs to fattening in it, which nuzzled about as much as they thought good, whereby, as he thinks, they trod and nuzzled in many of the vetches, for they came up very thick, and he preserved them, and had a very good second crop; which two years crop of vetches killed almost all the colts-foot, so that there has been but little there since.

Colts-foot is seldom known to grow in the common arable fields, for the sheep fare so hard there, that they eat up all the roots on the fallows, but, unless one was to bring such sheep on our fallows, they will not be eaten, for our sheep will not destroy them.

The reason why laying a ground down long to grass is said to kill the colts-foot and other perennial weeds is, I suppose, because the roots of the natural grass, matting more and more every year, do in four or five years time so fill the ground and fasten it, that the colts-foot cannot come through at spring; they may also hap-
pily

pily to bind the surface of the earth together, as to hinder the root from that communication with the air at other times as all plants may require; to hasten therefore the destruction of colts-foot, I apprehend that plat of the ground, where it abounds, should be laid down to rye-grass, to continue so till it is destroyed; though the other part of the ground be sowed to clover, and ploughed up again, yet the colts-foot should continue lay, and be dunged well, and mowed, and sowed very thick to rye-grass; these means may effectually destroy the colts-foot, as it is manifest dunging land does destroy clover and French-grass.

I this day (July the 3d) ploughed up broad-clover, and turned up the roots of colts-foot. I observed between earth and air many little buds shoot forth of the bigness of the Midsummer buds in fruit-trees (in all probability to be the ensuing leaves or flowers of the next year) from the root; at five, six, or seven inches depth I observed here and there a shoot, of a callous body, like the root, one, two, three, or four inches long. Whether the first or second sort of shoots were to be leaves or flowers of the next spring will be fit to be enquired into at spring, but what is to be observed, is, that in my fallow I turned up the colts-foot roots of a foot long; therefore in a winter-fallow I had undoubtedly turned up the same roots, at least of the same length, and one would think to better effect, nature being to begin again all the progress she had been going on till that time; but it is manifest a summer-fallow is of much greater consequence to destroy the colts-foot, than a winter: how comes this then to pass? the only reason I can give is, that the nature of colts-foot is to thrive and improve in cold wet ground; the winter-fallow therefore does not destroy these roots, which are ploughed up, but they live still by reason of the coldness of the ground at that season, and strike fresh roots; whereas the colts-foot lies so dry in the summer-fallows, turned up to the sun, as to die, nothing being more contrary to their nature than a healthy dry soil. ——— This ground being ploughed dry, and a rain following, whereby the ground was mellowed, I found these roots easy to be pulled up, at a considerable length, with their soboles or bud of the next year, above taken notice of; from which I do infer, that in hiring people to pull up such colts-foot roots, if a remainder does break off, and is left behind, which may grow, yet for the next year it cannot, because, the soboles being lost, it is too late in the year to provide another; and though it may be thought that such roots as are turned up in a summer fallow, will wither of themselves, yet it is to be considered, that such soboles as are buried, if the season be wet, will spring again.

Being

Being at Oxford, I visited Mr. Bobart of the physick-garden, and I told him of the method I took to destroy the colts-foot: he said, if I cut the colts-foot often in a summer, or whipped it, it would, he believed, kill it; I said I had so heard of fern; he agreed it to be true, and said all plants were easily killed by keeping them under ground in that manner.

§. 24. Common ragwort, Mr. Ray says, grows in pastures and lay-grounds, and about path-ways the root dies; therefore it propagates by seed, and is to be extirpated before it seeds by cutting it up. Ragwort.

Hoary perennial ragwort, Mr. Ray says, has a perennial root, and throws out new soboles, or buds, at autumn: if so, different methods are to be taken with it to extirpate it.

§. 25. Mr. Ray tells us, that the common stinging nettle is of a lasting nature,——but the lesser stinging nettle is annual. Nettle.

§. 26. Dyer's-weed makes the milk of the cows that feed on it bitter, as it also does the butter and cheese made of it. Dyer's-weed.

§. 27. Ray and other herbalists say, that mullein grows on cliffs and banks, and say nothing of it's growing in warm sunny fields, which it does at Crux-Easton, particularly in one of my fields, where not above thirty roots of it came up in a scattering manner at first, which seeded, and the winds blew it about the ground, and the next year came up thousands; but I observed those that seeded the year before died, and therefore that it is a weed easily destroyed by cutting off the stem when it is in flower, and prevent it's increase by thousands. Mullein.

§. 28. Groundsel and savine are good against the worms, commonly called the bots in horses. Groundsel good against the worms.

§. 29. In our meads at Easton, on our hills, and hedges, and lanes, we have great plenty of pilewort growing, which is an argument, that such of our lands are moist and strong where it grows. Pilewort.

§. 30. I find by Mr. Ray, fol. 868 and 869, that both the tithymalli or corn-spurges, which grow up in corn-fields, are but annual. Spurge.

§. 31. In the common corn-fields, about Lutterworth, inclinable to a heavy fat sand, I observed spurry to grow wild very plentifully; I gathered of it, and shewed it to Mr. Bobart of Oxford; we both wondered so contemptible a plant should be sown in the Low Countries, where Mr. Worlidge, fol. 31. says, they sow it twice a year; once in May, to be in flower in June and July, and the second time after rye-harvest is in, to serve their cattle in November and December; he says, hens will eat the herb greedily, and it makes them lay eggs the faster. Spurry.

§. 32.

Knapweed, scabius, &c. §. 32. The knapweed, or matfellow, is chiefly natural to corn-land, in a gravelly soil, and is of a perennial root, as Mr. Ray observes: devil's-bit is also perennial in it's root; it is probable blue-bottles are the same, and all of the scabius sort, seeing they emit new soboles every summer at the root for the fruit of the next year, and seem not to seed early enough, before the corn is cut, to propagate themselves in corn-lands by seed, in which ground they most abound.

It seems plain to me that both knapweed, scabius, and spatling-poppy roots are perennial, as also millefoyle (which infests some pastures) by the many buds or soboles they emit at their roots at this time of year.

Yellow rattle grass §. 33. It's seed ripens very soon, and as soon sheds, after which it dies away root and all before hay-harvest: the ready way to destroy it is to well-dung the meadows.

Eyebright §. 34. Eye-bright flourishes chiefly in upland barren pasture ground.

Lady's-finger. §. 35. Mr. Ray says, lady's finger grows, for the most part, in dry, chalky, or gravelly soils, and in all barren ground.

Yellow lady's bed-straw. §. 36. Yellow lady's bed-straw, or cheesereneing, over-runs almost two of my meads, which have been mowed and not well supported with manure; but my other meads, parted only by a hedge, the soil and situation the same, being fed for two years have very little of it; it grows chiefly in warm places, and in dry pastures, and on hillocks, and balks.—Therefore where this grows you may conclude your meadows want soil to fatten them.

Silver weed, or wild tanfy §. 37. Mr. Ray says, the root of wild-tansey is good to eat, and somewhat of the parsnip kind, and that hogs are very fond of it.

Common chick-weed. §. 38. On the 23d of October I observed a great deal of chick-weed, the branches of which carried many buds in order to blossom, many full blossoms, many seed-pods with white seeds almost ripe, and many pods with red seeds full and kindly ripe; so it seems it is in the nature of this plant to be always feeding, and so the less fence against it by any sort of husbandry.

Crow-foot or ranunculus. §. 39. There are several ranunculusses common in our meadows, which, when green, blister the flesh: these are not touched by cattle, but left standing in the fields, and yet, as I am told, are fed on greedily by all sorts of cattle, when only dried into hay: Dr. Sloan mentions this to account for the cassavis root, which, being strong poison, by being baked is wholesome bread. fol. 25.

Red-rot, or flower-sun-dew. §. 40. Red-rot (or flower-sun-dew) is said to take the name of red-rot from it's being so pernicious to sheep.

Ground-ivy. §. 41. I observed abundance of ground-ivy trailing on the ground, and, in gathering it up, I found the trailing joints, being in abundance,

ance, had struck fresh roots, from whence new leaves came up as in strawberries,

§. 42. Mr. Biffy of Wiltshire had abundance of mallows that Mallows, came up in a broad-clover ground, so as to overshadow the broad-clover; he was satisfied mallow was in the clover-seed, because his brother sowed the same seed, and had the same increase of mallows; Biffy says, every bit of the root of a mallow will grow. Note, this 23d of October I observed plentiful soboles or spring-issues from the old roots.

§. 43. *Cicutaria tenui folio*, or fool's parsley, which grows in Fool's-rich land, and in grounds that are cultivated, is an annual, and parsley. therefore may be destroyed before it has seeded.

§. 44. In Sheephead and Hawthorn-fields in Leicestershire, I Hare's-observed some ridges so pestered with hares-foot trefoil growing foot amongst the corn, that it seemed as bad a weed in the corn as any trefoil. I had seen that year; both grounds seemed to be of a clayey sand.

§. 45. Being at Mr. Raymond's, he assured me, that cow-gar-Cow-gar-lick was a great whore in corn, a little way from his place in the lick. dry sandy grounds; and yet it is no whore to them who sow it in the clays; for there it will not grow; but in his neighbourhood it comes up in the corn in great abundance; Stevens of Pomeroy says, it grows in some places in such abundance, that the wheat tastes strong of it, and is thereby damaged 6d. and 12d. in the bushel.

§. 46. As rye-grass and natural grass eat out the clovers, so I Moss: observe in the third year of rye-grass moss begins to grow on the land, and eat out the rye-grass and natural grass, and is the great impoverisher of meadows; it is very probable it's seeds are carried to far distant grounds, being so imperceptible (as Mr. Ray makes it) to the eye: it is very probable also, it, being so small, is buried in arable, which may be the reason it comes not up but in land lying to rest, where the seed cannot be covered or bound; it is possible also it comes not up in arable with the corn, because (as many seeds do) it may not grow under two, three, or four years time; Mr. Ray observes, they are apt to grow either in too cold lands, or too scorched-up lands: he says, on house-tops they seldom increase on the south side of the tiling, as on the easterly exposition, and northerly, which the sun goes off from betimes, and on which the first dews of the night fall: from whence it may be concluded, land is so much the more or less liable to it as it faces those expositions: but seeing it is so great an enemy to meadow, and other grasses, the nature of it ought well to be observed, and it's seeds planted in pots to see their nature, that thereby one may know how to destroy it:—our experience seems to agree with what Mr. Ray says as to it's inclination to thrive in cold land, it being manifest that, when such cold clay is rectified by ashes or

H h

lime,

WATER and WATERING.

lime, or, as he says, ^b ashes of which lye has been made, which he advises to be laid on the ground in the month of March, the moss forsakes the ground for some time.

It is no such great wonder that mosses should grow on stones and walls, if we consider how many thousand times less their seeds are than the seeds of most herbs, whereby they have as fit a matrix to cover themselves in; in the crevices of the stones, where usually dust gathers, and are as well buried, in proportion to their bodies, as the seeds of other plants are in earth-mold; nor are we more to wonder, that the mosses from the said seed should thrive and flourish as well as their seeds germinate, if we consider how their bodies drink not only the dews, but are fitted, by the innumerable angles their branches and close-knit fibres make, to be a long receptacle of water, and at the same time to break all the rays of the sun, and how fit for gathering the dust to their roots, as by experience may be seen.

Why
dung and
ashes kill
moss.

§. 47. That dung, ashes, &c, should kill moss, is, I suppose, from this reason; because the moss having a most wonderful small root, which grows only to the ground by adhesion, is easily suffocated with too much goodness of the dung, and overcome by the strong penetrating quality of the ashes, as being no ways qualified by rain on the surface of the ground. For these reasons the most diminutive plants will not grow on rich ground, such as rue, whitlow-grass, moss, and a great many more, because they, being very small, and of slow growth, are easily overcharged with a plenty, from whence the fibres of the plant, nay even of it's very seeds whilst in the ground, must burst.

WATER and WATERING.

Of making §. 1. **I**T is of but little purpose to depend on a pond's holding, a pond. because it is dug in a strong clay, if there be no great shade over it: for the sun and frost will quickly open it, and the water will run away: but such pond must be made with four square slopes, and covered with gravel, or a mortar-earth, four or five inches on the tops, which, cattle treading it in, will cement with the clay, and bind, and will not crack with the sun and frost; but nothing suffers more by either than mere clay.

Water
proper for
cattle.

§. 2. I begin to suspect (in my hill-country-farm, where I have no ponds but what are pitched, and where I have my backside-pond

^b Mucus, qui hortos & prata humida obsidet, ita ut gramen supprimat, Martio mense cinere aboletur, sed eo quo lixivium fuerit confectum. Ray, Hist. Plant. fol. 122.

pond and the freet-pond, which both must necessarily be sometimes stained with dung) that, of your great cattle especially, it is of consequence to buy those that have been bred in the hill-countries, where they have been used to want water more than they will with me, and have been used to drink our pond and cistern water; for I find cattle that have been used to spring or river water, do drink very sparingly of our water; and then I am sure they cannot thrive or fat well.

§. 3. Foul water, as Grew observes, will breed the pip in hens, Foulwater and nastyness, lice, and scabs in kine; and all creatures, swine themselves, which love dirt, yet thrive best when kept clean. Foulwater pernicious to cattle, &c.

§. 4. Farmer Elton, late of Crux-Easton, extolled the convenience of the pond I made in my field to a high degree; he said, that by means of that pond I need not fear the driest year, for, if I had no grás, and did put a hayreek in the field, my sheep would be all the summer mutton, when others would be carrion. Watering cattle.

Farmer Collins (in the Isle of Wight) was speaking of the great necessity of having convenient water for cattle at all times, both for their health and increase of their milk, and how insufficient it was for cattle to be drove to water but twice a day, whereas the cattle would possibly drink five times a day: and he said, that hard weather came one winter when he had lambs, and was forced to fodder his ewes with hay, and the water where they drank was frozen hard over; three or four lambs of a day died away, and the ewes had not milk for them; at last he bethought him to break the ice of the pond, which when he had done the sheep came to the water with great eagerness, and went in above their bellies and drank, and he had no more lambs died.

§. 5. Worlidge, fo. 248. speaking of different waters, says, Water it is a very great injury to most tender plants to be diluted with cold water from the well or spring; it checks their growth exceedingly, as may be seen by a bleeding vine, to the naked roots of which if you pour store of spring or cold water, it suddenly checks the ascending of the sap, by means whereof the bleeding ceases, and the wound consolidates again, before the more liberal ascent of the sap: much more then will it check the growth of a weak herb or flower. Watering plants.

§. 6. Rain-water seldom sinks above a foot deep, but water of snow two or three foot deep, as being much heavier than rain-water; and as it melts slowly and by degrees, from the undermost part of the mass of snow, so it soaks with more ease, not being hindered by the wind or sun.—Therefore (says Monsieur de Quinteny) I dread much snow upon moist strong grounds, and order it to be removed from about the fruit trees, so in dry earth I gather it as a magazine of moisture to the southern expositions. fo. 29. Rain and snow water.

Watering feeds.

§. 7. Worlidge, fo. 248. says, it is observed to be best to sow in the dusts, whereby the seeds gradually swell, from the cold dews of the night and from the air, and are made ready to sprout with the next rains.—So it is not good to water new-sown feeds, till the long defect of showers invite you to it; some seeds, as radish, lettuce, gilliflower-seeds, &c. remain not long in the earth, and therefore may in two or three days, for want of rain, be watered; but tulips, auricula, parsley, carrot-feed, &c. lie long in the ground, and require not so speedy an irrigation.

Of watering plants.

§. 8. It is better to water a plant seldom and thoroughly, than often and slenderly, for shallow watering is but a delusion to a plant, and provokes it to root shallower than it otherwise would, and so make it more obnoxious to the extremity of the weather. Mortimer, fol. 455.

Of watering trees.

§. 9. The reason, I conceive, why plants or trees once begun to be watered in the heat of the summer must be continued on, otherwise it is worse than if they had not been watered at all, is not because a tree once watered needs it the rather, but because watering in the heat of summer makes the ground subject to chop the more when dry, and therefore such ground must be kept moist.

Mr. Bobart, of the physick-garden in Oxford, says, that it would be a very good way, in dry summers, (where water can be had) to water all sorts of fruit-trees, for sake of the fruit-buds and bearing shoots, and shoots of the wood for the following year, which are all formed in the August before; which do miserably fail by reason of the drought.

I have heard it reported more than once, how constant and great burthens of fruit orchards have had, where the owners had power of throwing the water over them; of this it seems the antients, particularly Cato had a great opinion, when (in book 1st. de Re rustica) next to the vineyard, he gave the preference to hortus irriguus; it is no wonder if they soon found out the benefit of the command of water to trees in hot countries; it seems to be expressed by Cato, as if an orchard was no orchard without it; and though our clime stands not so absolutely in need of watering, yet by this hint we may conclude how, in some hot summers, and dry grounds, an orchard is of little value without such convenience.

Of watering fruit-trees in bloom.

§. 10. Want of rain at blossoming-time often makes the blossoms drop; by watering these trees have bore abundantly when none others did. Mortimer, fol. 529.

Of watering apples when the fruit is small.

§. 11. This exceeding dry summer I observed apples were rather smaller than usual, which Stevens of Pomeroy, my tenant, perceiving, and that his trees were well loaden, he in good time began watering his trees often, pouring down leisurely two or three buckets full of water to each tree; which bounty his trees soon

soon began to be sensible of; for whereas before his and his neighbours leaves of their apple-trees were pale and shrivelled, his soon recovered a strong deep colour, and he was very sensible his apples looked of a livelier fairer colour, and grew larger.

WORKMEN and WORK.

§. 1. TAKE care to man the hay-harvest with enough people, Man well for I find, by understanding farmers, that it helps to the harvest dispatch mightily, if it be any thing of a good hay-making day, to turn even the grass swarths that same day.

The not well manning a harvest has either of these three effects, viz. that corn is over-ripe, or, being cut down, is not carried in without damage, or is cut down too soon, for fear least it should all ripen together on you; the disadvantages of the two first are very apparent; and for the disadvantage of the latter, your corn shall yield two shillings in the quarter less than if it had been properly ripe; and two men extraordinary are many ways needed, both to carry on sowing, dung-carting, thatching reeks, or odd necessary things.

§. 2. Whereas men's hands are not only wanted in harvest-time Proper times for different works. but in feed-time also, therefore great care ought to be taken by forecasting to do all works before those times, which otherwise must of necessity be done then; therefore let no thatching, carpentry work, mending of hedges, or other work, whereby the labourer may be called off, be delayed till then; which will not only put you in a hurry for want of men, some of whom may be such indifferent workmen as you would not employ but on necessity, but hereby you are obliged to be often calling off the labourers from the works they should stick close to, whereby you cannot so easily take an account of their works.

Take care how you bring yourself under two dilemmas at the same time in your husbandry: as for example, to be under equal inconveniencies if wood-carting is not performed to-morrow, and ploughing or sowing, when you have but one team to supply these double duties: or again, to be obliged to keep folding your whole flock, because you cannot otherwise manage the corn you have undertaken, when another way you sustain as great a loss by the not having the liberty of making the best of your lambs and old sheep, by fatting them to a good advantage: if you run yourself into such inconveniences daily, it will daily take off a considerable part of your profits; and though you take the best care to free, and make yourself easy from such incumbrances, the nature of husbandry will unavoidably force such difficulties too often upon you; for there are critical seasons offering themselves for some

things to be done, in which one would be glad to have three times the number of men and horses, that are requisite in course, to carry on the business of the farm.

Leave nothing for winter that may be done in summer.

§. 3. Avoid all manner of winter work as much as possible (except the direct husbandry of ploughing) all cartings wear out your plough-timber abundantly, foul and wear out your lanes, unless frosty; and so many lets happen by bad weather, that man and horse often, for a long time, earn not half their pay: bring not yourself therefore under necessities of winter work, by picking up stones for highways, which you must be necessitated to remove because of your ploughing up the ground; by leaving any ways undone in summer, that must be repaired in winter, one load of stones in summer going farther than two in winter, and then carting to that end hurts the ways as much as mends them: let your hedges, where damage may arise, be therefore well in repair before winter, that there be no works of necessity in wood-carting; let all carpenters work, bricklayers work, pitching or paving work, be foreseen in summer, that by bad weather and short days they may not lose half their time in winter: bad wet weather in the winter is not fit for any sort of carting, such as wood, dung, chalk, &c. (but to plough white land in the hill-country, and in moderate frosts you ought to be fallowing) and if you leave such work undone, depending on the winter, you will be at a much greater loss to finish it, on account of unseasonable weather, than you will be at a loss how to employ yourself in case the hardest snow and frosts come: for then there may be dung and chalk-carting, carting stones in heaps, which may be took up by the shovel: going to the best markets that are farthest; and no ingenious contriver, be the frost never so long, can be at a loss to invent work for that season fully to employ him.

When workmen do least work.

§. 4. The labourer's lazy time for work, when they want the master's eye most over them, is about three weeks or a month before harvest, when work of all sorts grows scarce, hay-making, and faggotting, and dung-carting being over, and most other works out of season; then they are apt to spin out their time, and linger it on to harvest, that they may not want employ.

Of jobs.

§. 5. I advise every farmer to employ a nimble, active, and free-labouring man, in such business as consists in jobs and fractions, and employ the dull heavy man, if such he employs, to single works, such as threshing, &c. whereof an account can be kept; for a lazy lubbard will lose half his time in the vacancies between one work and another, if you employ him in many in the day.

Of

Of the FARM-YARD, &c.

§. 1. **M**R. Raymond advised me to fence about my backside ^{Of a mud-} with a mud-wall; he said, it was not only ornament-wall. al, but the cheapest and most serviceable of any; he gave but sixpence per lugg or pole of a foot high, and two feet and half broad: but indeed, if he made it nine feet high, he gave five shillings and six pence for nine lugg of that height: he added, that in keeping my cattle warmer by such a wall I might save half my fodder.

§. 2. When I shewed several understanding farmers my stables ^{Of the sta-} that were building, and told them I propos'd but four horses on a ^{ble.} side, whereas in my farmer's stables they allowed six horses to those dimensions, and would reason it to be sufficient, by saying the horses would not lie down all together, and it was sufficient for their standing; they all replied, they hoped I was wiser than to regard them; that too narrow room might be the spoiling of a horse, whose value might pay for the enlargement.

H O G S.

§. 1. **T**HE marks of a good hog among the antients, accord- ^{Marks of a} ing to Varro and Columella, were a small head, short ^{good hog.} legs, long bodies, large thighs and neck, and the bristles on the last mentioned part thick set, erect, and strong. In Wiltshire they look on huge heavy lop-ears in a pig as a very good sign of his making a great hog.

§. 2. I asked Sir Ambrose Phillipps's shepherd, whether the ^{Spayed} country people made any difference in the price between spayed and gelt ^{and gelt} and gelt shutes, provided, in other respects, they were equally ^{shutes.} good; he said, they would not draw out the gelt shoots unless they had a better price, though he knew no other difference, but that the gelt pigs would be the masters over the spayed, and so fare better, and consequently thrive better.

§. 3. A gentleman in my neighbourhood bought half a dozen ^{Signs of} young hogshutes (of about nine shillings value); when they were ^{an un-} bought I thought them big enough for the money, but did not ^{thriving} like their shapes, being not long and strait, but their rump bones ^{shute.} rising a little; but what was the worst sight and omen, these hogs, though of little bodies, had long hairs and bristles; he kept them three months, gave them four bushels of vetches, and very good keeping; then put them up for porkers, and gave each a sack of peas, and would then be glad to sell them for the prime cost, and

the price of the peas they had eat, so little did they thrive: the length of their hair I take to be an ill sign, when their bodies are not proportionable, for it shews the hogs have had some check, which notwithstanding hinders not the bristles from growing, no more than sickness does a man's hair or nails; and one had better buy hogs in a backside than in a market; for one cannot see so well what is a proveable hog in a market as one can in the backside, when he is among those of the same litter, and the most proveable pig is cheapest, though dearest at first cost.

Of hogs
degenerating.

§. 4. The breed of pigs I had of farmer Stephens of Pomeroy in Wilts, which were used there to whey and grafs, being removed to Crux-Easton, where their food was corn and wash, did bring but three, four, or five pigs at a farrow, and so the descendants of them continued to do for three or four years, which I impute to their degeneracy, for want of the same food they and their parents had been used to.

Fruitfulness of
hogs.

§. 5. * Varro says, we may judge of the fruitfulness of a sow from her first litter; for she generally brings about the same number ever afterwards.

Keeping
sows unprofitable.

§. 6. I kept four sows, but soon grew weary of their farrows, for to a boy or other servant, that is to feed them, a great deal of corn is to be committed, both on account of the sows and weaned pigs, and in the favour that must be used to them when they come to be shutes; if such servant either gives them not enough, or your corn wastfully, or neglects them some hours, either thro' idleness, or being otherways employed; in either of these ways, the profit of breeding these creatures is lost; and if we make up the account how much corn the sow eats us, the weaned pigs, and shutes, they eat out their heads; especially considering, that in every year you keep your sow you loose twenty shillings, inasmuch as a pig ought to pay so much, and, when you kill your sow, the bacon is nothing near so good: I infer from hence, that it is no ways proper for a gentleman to be a breeder of pigs, or other young creatures, as poultry, calves, &c. any farther than a conveniency is to be regarded, but rather leave them to farmers wives, who can tend them themselves punctually in all respects; nor can I apprehend the profit to be any thing to them, notwithstanding their offal corn, which they might sell; we say a sow will undo a poor man, and we observe they never keep them, notwithstanding they may feed them with their own hand, and see nothing be lost.

I find great inconveniency by having four sows this year, not only on account that the greater pigs are the more neglected, such

* Sus ad sœturam quam sit sœcunda animadvertunt ferè ex primo partu, quod non multum in reliquis mutat. Varro. fol. 56.

such attendance must be on the little pigs, but also on account of the harvest coming on, against which time, and in which time, a boy's business should be to give the birds disturbance, and break them of their haunts, and drive the drove of pigs early into the field a leasing, at which season his time is lost (which is too precious to sling away) in breakfasting the little ones; besides, at that time a spare hand is very useful, for an hour or two, in the garden, when no weeders can be had.

§. 7. They count in Wiltshire, breeding of pigs not to make Of breed- so quick a return as buying in of Welch pigs, and fattening hogs. off with whey as fast as they can: a pig bought in will in six weeks, or two months, be very good bacon, or pork, and pay at least eighteen pence or two shillings per week. In Wiltshire they order it so, that the sows farrow not till May, because their dairy comes not in till then; but he that intends to keep no cows must order so that his sows farrow six weeks before harvest, that at harvest the pigs may be able to go into the field.

A certain dame was commending the breed she had of sows and pigs; I replied, I thought them to be the smallest sort; she said, the farmer could not abide the great large sort: I asked her what was his fancy for that; she said, that the pigs, that were farrowed in March, of the greater sort, would not make porkers in winter, for they would keep on growing still instead of growing fat.

Besides the trouble of breeding pigs, it is well to be considered, whether you can maintain the young shutes as well as the old ones between the leasing of the harvest and fattening, for, if not, you must be forced to thresh out barley the sooner, when most likely it is the cheapest; nor likely is there more waste corn in the field than the great hogs of a farmer can pick up.

§. 8. Sir Ambrose Phillipps had a hog, which they thought to Of a boar be gelt, and put him up to fattening, but he never fattened kindly, and, with his when they came to kill him, they found his stones in his back; stones in his bacon shrunk and eat strong: the shepherd says this is com- his back. mon to lambs, which when at cutting-time they find, they fat them up; it is common, he says, also to horses.

§. 9. They give the sows in Leicestershire, that they may take To make boar the sooner, a good piece of leaven once in twenty-four hours, a sow go for two or three times: it is nothing but the green dough made as to boar. common leaven.

§. 10. I was going to buy a sow and pigs, and consulted several Of the persons about the managing them, who acquainted me of these sow and particulars, viz.—First, That a young sow, as this was but a year pigs. old, would bring but small pigs.—Secondly, That being a young sow, and having so many as nine pigs, it could not be expected any of them would be so properly fat for roasters, as if she had brought but four or five.—Thirdly, That this sow had come too early.

early for most farmers keeping, though, if they had keeping for them, it was best of all, because, if not stunted, they would be young bacon within the year.—Fourthly, That such young pigs, and other lean pigs, should not have their bellies full given them at first of sweet whey, for by that means they often burst their bellies.—Upon which I asked a Wiltshire dairy-woman about it, and she said, she never knew them break their bellies; but one of our Hampshire women replied, it was because in their country they skimmed the cream off to make whey-butter, which took off from the lusciousness.

Varro's rule is to save as many pigs as the sow has teats: if she brings fewer, says he, she is a bad breeder, and not profitable to keep, and if she brings more, it is very extraordinary.

Of sows eating their pigs. If a sow be high in case when she farrows, I am informed, she will be apt to eat her pigs. The first farrow of a sow is accounted the worst.

Bean-flour good for sows with pigs. §. 11. I told a notable dame in Wiltshire, that I thought to give my sow and pigs bean-flour, instead of barley-flour; she said bean-flour was best, and would breed most milk; but when she gave them barley-flour, she used to have some oats ground with it.

Whey good for pigs. §. 12. Whey is more nourishing to pigs than skim-milk.

Of ringing. §. 13. I had little pigs of about six weeks old newly weaned; my bailiff was of opinion they would turn up the meadows and corn-land, and dig worse than older pigs (it was then just the opening of the stubble) he asked me why I did not ring them, for by that means the sow would not endure them to hang on her; for the pigs, though weaned, did run after the sow and would be lugging her teats; he said, it was a common thing to ring the pigs they designed to wean, in order the sooner to wean them, for, being ringed, the sow would be hurt by their sucking, and so forsake them sooner.

The smith came to ring my little pigs; I attended the operation; he said he never spoiled a pig in his life, which put me upon asking the question, whether pigs were ever hurt by ringing; he replied, yes, often; for, said he, if you run them through the gristle of the snout, which lies on the bone and beneath the fleshy part, the pigs noses will often swell and rancle so as to kill them; therefore great care must be taken that the ring be only run through the fleshy ridge of the snout: again, said he, if the ring be twisted too close to the snout, so that it binds too hard, and cannot run round with ease to the pigs, their snouts will swell, in which case the rings must be taken off, and the snouts anointed to give them ease.

Ring

Parcere tot oportet porcos, quot mammas habeat, si minus pariat, fracturariam idoneam non esse, si plures pariat, esse portentum. Varro. fol. 56.

Ring not a sow with pig, left in the dispute she cast her pigs, nor endeavour to take an oat-hull out of a cow's eye forward in calf, lest she warps.

§. 14. May the 17th, 1700, farmer Elton cut and spayed his Of cut-pigs, which were sixteen weeks old; the same day, by the same ing and gelder, farmer Biggs, my neighbour, spayed his, which were six spaying. or seven weeks old: they did very well, and fell to their meat presently; but farmer Elton's pitched, and would not come to their meat, nor eat of wash, when they called them to it, till the fifth day, at which time they began to feed; the farmer thought he should have lost them; I asked dame Biggs what she thought could be the meaning that there should be that difference between their pigs; she said, possibly farmer Elton's might be too hoggish and rank, and then they are apt to pitch; now I had observed, before they were cut, that they were apt to ride one another: upon this, I inquired of an understanding farmer, when he thought it was best to cut and spay pigs; he said, the boar-pigs, the sooner the better, if it was in a fortnight or ten days, as soon as their stones were come down; there was less danger, and they would pitch the less upon it; nay, if a pig was cut in that time, designed for roasting, it would be never the worse: as to a sow-pig, said he, they cannot be spayed under five, six, or seven weeks old, and then is the time for it: in two or three days after this I came into Wiltshire, and asked farmer Pain the same questions, and he agreed to what the farmer last mentioned had said.

I had little pigs cut and spayed the 3d of September; it was agreed, it was not fit to defer it, because the weather would soon grow too cold, and, when they are cut or spayed, they must be kept moving and walking for three or four hours, lest by lying down too soon they should swell.

If pigs be cut (or especially if spayed) they ought not to be suffered to creep through hedges, lest the thread which sows up the spaying hole, be drawn out, or the place bruised; nor ought they under a fortnight's time, in such case, to be ringed, lest they struggle and hurt themselves.

A sow-gelder, that had cut for me, cut four pigs for a neighbouring farmer, and the pigs happened to be broken-bellied, and they died on the spot, their guts coming out at their cuds, I asked whether it was usual for pigs to be bursten-bellied: they said, yes; and that, if they were cut young, they do often not perceive it, but if they did, they should forbear to cut such pigs, or, when cut, should take great care to sew up the skin.

If a boar-pig be cut or gelt, his tusks do not grow, which seems to shew a strange consent of parts between the stones of a boar and his tusks; and this seems to hold vice versâ; for this month
(Septemr)

(September) I broke the tusks of a large, fierce, and most venereous boar, which before was riding all the gelt and spayed pigs in the backside and would all the days and nights lie close to the sow that was brimming, having at that time seven sows, and would go over walls and pales after them, five feet high, but when his tusks were broke, he begun, from that time, to abate of his venery, and carried much less regard to them, and grew dull in his courage; I take the more notice of this^c, because I observe the antients took the like notice of the relation between the cock's stones and his spurs.

They told me it was common among the pig-jobbers to put off a farrowing sow for a spayed sow, by cutting a slit in her side, and sowing it up again; I asked what that cheat availed the feller; they said, such a sow was worth less by two shillings or half a crown than a spayed sow, for there is hazard in spaying.

A sow will not fat, unless spayed before put up to fattening, but will be continually riding the other hogs, and hinder them also from fattening; wherefore it is common to spay them a fortnight before.

It was July the 25th; and the sow-gelder was with me to have spayed my sows (for it seems that is a good time in order to their fattening before harvest) but we thought them rank, that is, desirous of the boar, and so we would not let him undertake it, for we look on it to be two to one but in such case it will kill the sows.

It is generally said, that it is good to spay a sow two or three days before her litter of pigs are weaned, because, in case she should take harm, the pigs will draw off the venom; or, without being spayed, she may be fatted at Michaelmas, because being young with pig will not hurt her.

Of turnips
for hogs.

§. 15. I was telling a person of great repute in husbandry matters, that I could not make my pigs, in the winter, eat turnips, which was a great loss to me; for I could not keep so good a winter stock as I otherwise should, but he assured me, he kept, one winter, a great many pigs by turnips; he said, he mixed some bran with them, and scalded the turnips, but, said he, they will not eat the scalded turnips without bran.

Of grains.

§. 16. In managing hogs a gentleman has a good advantage above the farmer in this respect, inasmuch as in March (when the corn is almost threshed out) great store of drink may be brewed, with the grains of which many pigs may be maintained till the middle

^c Of making capons (says Columella, lib. 4. cap. 1. fol. 185.) *se-mimares, capi, qui hoc nomine vocantur, cum sint castrati, libidinis abolendæ causâ, nec tamen id patiuntur amissis genitalibus, sed ferro candente calcaribus inustis, quæ cum igneâ vi consumpta sunt, facta ul-cera, dum confanescant, figurari creta linuntur.*

middle of May, when the broad-clover comes in; and in October another great brewing may be had, to supply a great quantity more of grains, so as to maintain porkers (if pork in October and November sells cheap) till December and January, when it is more likely to sell dear, for pork at the forehand of the year, viz. September, October, and November, is most likely to be cheap, inasmuch as the gleanings of the harvest do raise the porkers to a great height, at which height they must be killed, because they cannot be maintained at it.

§. 17. It is a common thing to sow half an acre of gore-vetches for hogs, where farmers keep a great many, and they will eat them greedily, if the gore-vetches run gross, and you give them to them when gross, and before they are run far in flower. Gore-vetches good for hogs.

§. 18. In Wiltshire they count vetches too hot a food to give pigs, which is apt to give them the measles; and therefore they mix other corn with them. Mr. Ray speaking of the vetch says, fol. 900. they are used in England as food for horses mixed with peas and oats, and adds, as peas are loosening, and of great virtues, so vetches are binding, and have no good virtues. Vetches too hot for hogs.

§. 19. I find broad-clover not only excellent for keeping pigs to a height in March and April, in which months the farmer's corn is gone, and the dairy not come in, but also excellent for heightening up porker shutes, after the gleanings of the harvest is over, all the months of September, October, and part of November, at which time pork is at the cheapest, because the harvest has fattened so many, which people must sell, because after the gleanings are over, they cannot maintain them; whereas, by the help of this clover, with some other little helps, the porker shutes may be kept on longer. Broad-clover good for porkers.

§. 20. I asked some farmers of experience, if pigs would not take the same damage by broad-clover as cows; they replied, that clover the full-grown pigs would thrive exceedingly with it, and be swells good pork, but that it would scour the young pigs, tho' of twelve, young thirteen, or fourteen weeks old, and make them swell as big as two, but they never knew it kill them: on the whole it was agreed, that young hogs will grow very fat by broad-clover, yet they never care that their young shutes and pigs should eat much of it, for it not only swells them for the present, but makes them pot-bellied.

§. 21. Henbane is beneficial and nutritive to hogs (as Dr. Meade observes, in his Essays on poisons) tho' it kills poultry. Henbane good for

§. 22. If any person in the winter time keeps thirty or forty hogs, as I and many hill-country farmers do, I do advise, if they have the building of their own hog-houses, wherein are their cisterns for their hog-wash (of which I have one holding about winter, eight hogheads) to set up a copper also and furnace therein, Warm wash in handy

handy to put in the wash, which may heat the wash for the hogs in the winter; I find it to be very profitable.

Nuts bad
for hogs.

§. 23. A butcher this day (September the 3d) wanted to buy some porkers and bacon hogs of me; my corn-erish was just eaten up by them; so I told him I would gladly have parted with some of them, if I had not hoped they would take to the nuts, which were in abundance in my coppices; he replied, the nuts would hurt them; nuts would make their fat soft and greasy, so that it would boil away, and nuts, being so sweet, would make them so sweet-mouthed, that the lean ones would not take to their wash when the nutting season was over, nor those, that are to be fatted, to their peas; and they would lie in the coppices whilst any nuts lasted, though there were not a tenth part enough to maintain them, or to keep them from pitching: my cook said, all this was true; she knew it to be so by experience: I asked her how she knew this: she said she had lived in families that had had experience of it, and had heard many say to the same effect: my woodman and other labourers do agree in it; but they add however, that, if such bacon be put in the pot when boiling a gallop, it will make it boil firm.

Hemlock-
root poi-
sons hogs.

§. 24. Farmer Collins of the Isle of Wight assures me, that if the pigs met with a piece of hemlock-root, in their digging up and down, be it never so little, they will be perfectly mad, and jump as high as an ordinary chimney-piece, and it is great odds but they die.

Not to let
hogs lie in
dung at
night.

§. 25. Mr. Edwards chid his man for his suffering his pigs to lie at night in the dung of the backside, and for not accustoming to chace them to their sty: I asked him what was the reason for it; he said, their lying in the dung was not accounted wholesome for them; for the heat of the dung made them so tender, that they would not endure the cold so well, nor thrive with their meat so well.

Of fattening
hogs.

§. 26. Mr. Edwards, and my neighbouring farmer, and I, were discoursing upon hogs; Mr. Edwards said, the farmer kept hogs in too good a condition before he put them up to fattening; the farmer replied, there would be the more lean, and therefore the bacon the better; for lean must be a long time making in a hog, and if a lean hog were soon fatted up, though you might raise him to what degree of fatness you pleased, yet such fat would shrink and boil away: the farmer said, the great cotshill-pea is much the best pea for fattening hogs, and a quarter of them would go much farther than a quarter of the others, the which they would not swallow whole, as they would many of the partridge-peas. The underling hog put up with the rest is longest a fattening, being beat off by the rest, so makes the fattest bacon; that bacon therefore they generally keep for beans.

At Newbury I met farmer White of Catmore; we talked of fattening pigs; I said I believed beans to be as good to fat with as peas; he said, he thought so too, and many persons about him did fat with them; he thought change was very good, which kept them up to their stomachs, and said, you must begin with beans, for after peas he thought they would not eat beans, peas being the sweeter food; he and farmer Stockwell did both seem to agree (that in reason, though they never tried it) the flour of beans or peas would fat better than the whole grain.

I find farmer Farthing, and my tenant farmer Wey of the Isle of Wight, without regard to the price of peas, be they cheaper or dearer, do still fat with ground-oats and barley, and do allow a bushel of barley to a sack of oats; they say, the reason for allowing barley to the oats is to make them both grind, for otherwise, I conceive, the mill could not be set fine enough to grind the oats by themselves; they assure me, the hogs will fat much sooner than with peas, but, I suppose, if peas could be ground, it would alter the case, for hogs seem very voracious of peas, and to chuse the pea-stubble beyond any other; they sling also into the trough, when they feed them, if there be many of them, a handful of bay-salt, but if that be not to be had, other salt, which makes them drink very much, and contributes to their quicker fattening.

In discourse with farmer Bristow, I observed, that the smaller peas were sweetest, and discernable so to our taste, and the small grey partridge particularly sweeter than the great partridge, and therefore, tho' the great partridge was always dearest, yet the lesser would fat a hog sooner. He said, his father, who lived near Reading, and the farmers thereabouts, gave their hogs the white boiling pea, and that they fattened much sooner; I answered, undoubtedly the blue pea (which of all field-peas is the sweetest) would for the same reason fat hogs soonest; he replied, no; for he could assure me, that about Reading they had tried them, and had found they made the hogs scour; therefore it seems they are too luscious and cloying.

Farmer William Sartain of Wilts came to see me at Easton, June the 18th, and I carried him into my corn, and shewed him several sorts of peas I had sowed, viz. great grey-partridge, or Windsor-greys, burbage-popping, and blue peas; the farmer assured me, that though blue peas, if they boiled well, would sell for most on that account, yet the grey-partridge would fat hogs better than the burbage-popping, or blue pea, as he had observed on experience; and he said also, that, though the popping and blue pea seemed sweeter, yet the hogs would prefer the great partridge to them, as he had often experimented, by laying all three sorts in distinct troughs before them.

Mr.

Mr. Smith of Stanton, a very experienced farmer assures me, that the best way of fattening hogs is thus; viz. to give them, when they are first put up, rough corn, or peas wads, that they may work upon the halm, which when they have done for two or three days, then he gives them threshed peas in troughs, and also a service, once or twice a day, of wash; and this he continues to do for two or three days, and then he plies them, in the usual way, with peas altogether and water; by this means they are not at first glutted and surfeited, but kept to a coming stomach, and are by degrees initiated to a full diet.—However, it is agreed that hogs should be well swilled with wash before they are put up for fattening, otherwise they will make themselves sick for two or three days.

I observed two pigs, after they had been about three weeks in fattening, to look very lank in the flank; notwithstanding this it was agreed they were very fat; and that pigs would bluff and swell much with their feeding the first six or seven days, and look fatter to the eye than afterwards; for, when they gather fat inwardly in their bellies, the weight of it draws down their bellies, and makes them look thinner and lanker.

Of fattening a boar. §. 27. A boar is fit to be killed when less fat than a hog; for all the soft fat between the flesh and horn will be, for the most part boiled away, therefore to no purpose to make it very fat.

If any gentleman keeps a boar for fattening, I advise him to be provided with another young boar to brim the sows, against the time he puts up the old one to fattening; for by experience I find, that, though the fattening-boar be penned up at some distance from the backside, and out of the road of the hogs, and hedged out from them, yet the brimming sows will rig over or under hedges to him, or labour so long at the gates till they shall open them, and, if they once get to the outside only of his pen, it does the boar more harm than a fortnight's meat will do him good.

Of a gelt hog and a sow. §. 28. Mr. Edwards and others I find do agree, that a gelt hog fattens most in the back, and a sow in the belly.

Not to send fat pigs a leafing. §. 29. About Holt in Wiltshire, the farmers never used to turn their forwardest pigs into the corn fields, for they that were near half fat with whey would never go a leafing to any purpose, but would either come home again, or lie down under the hedges, so that they would come home worse than they went out; therefore they usually buy lean pigs against such time.

Clean straw for hogs in fattening. §. 30. Of hogs says the *Maison rustique*, fresh straw often given them doth fat them as much as their meat, and you must take care their troughs be always clean, fol. 147. Special care must be taken that their meat be not cold nor too thin, lest it cause them

them the flux in their bellies. *Collumella has the like observation in regard to keeping them clean.

§. 31. In an acorn year the hogs will not thrive proportionably Of acorns:
on the mast, at the first part of the season, as they will after
wet has fallen, to make the acorns * chissum, for then they are * Grow.
far more nourishing.——They are apt to scour hogs, when
eat new from the tree, and are not then so good, as when they
have laid in heaps to sweat.

§. 32. A sign to know if a hog be sick, is, when he hangeth Signs of a
his ears very much, and, for your better certainty thereof, pull sick hog.
from him, against the hair, a handful of bristles off his back, if
they be clean and white at the root, he is sound and healthful,
but, if they be bloody or otherwise spotted, he is sick. *Maïson*
rustique, fol. 149.

§. 33. The signs of a meazled hog are blackish pustules under Of the
his tongue, and if he cannot carry himself upright on his hinder meazles.
legs, and if his bristles are bloody at the roots. *Maïson rustique.*
——^aAlso *Florentinus* in *Geoponicis*.——^c*Didymus* tells us
that *Democritus* prescribed for this distemper in hogs bruised
asphodel root to be given to them mixed in their food, and says it
will cure them in less than seven days.

§. 34. If a pig is hot in his body, which is to be known from Of the fe-
the driness of his dung; two spoonfuls of fallad oil in a pint of ver.
warm milk, such as comes from the cow, will cleanse him, and
bring him to his stomach again. ^f*Didymus* prescribes bleeding
in the tail.

§. 35. *Mr. and Mrs. Edwards* say, the murrain in pigs (for Of the
as much as they can observe, and as their doctor for drenching murrain;
tells them) proceeds from their being in too great proof, and
case; many hold that musty corn will give them the murrain;
as soon as they observe it in one, they drench all the rest.

It was the 25th of August I had a hog died of the murrain, and
many hogs did die about the country; I had some powders to
give them in their wash of grains, which I could not get them to
eat of, it being stubble-time; my bailiff said, he could not ever,

^c *Quamvis prædictum animal in pabulationem spurcitie versetur,*
mundissimum tamen cubile desiderat. Columella. lib. 7. fol. 181.

^d *Qui ipsos emunt ex-pilis de jubâ evulsis sanitatis ipsorum notas*
sumunt; si enim fuerint cruentati, morbum indicere aiunt, puros contra-
rium. Florentinus in Geop. fol. 468.

^e *In quem casum Democritus physicus asphodeli radicis modicè tunfæ*
minas tres cibo singulorum suam admiscere jubet, & ante septimum diem
integram sanitatem inde recuperaturos testatur. Didymus fol. 470.

^f *Si febricitent, sanguis è caudâ emittendus. Didymus, ib.*

in the like case, get them to eat of grains, but the way was to give them it in skim-milk, and then they would eat it.

This (1705) was a wonderful dry summer, in which for three weeks we fetched water for our cattle; about the latter end of October I had a sow with pigs fell ill, and, in a day or two after, a fatting hog fell ill, and died; we sent to the hog-doctor to drench all the hogs, who said Mr. Whistler had lost six, and that they died in many places, and the cause of the murrain was the mighty dry summer, whereby the hogs had not water in plenty to drink, nor mire to roll themselves in; therefore after such dry summers drench hogs by way of precaution.

Of the leprosy. §. 36. Mr. Boyle, in his advantages of experimental philosophy, recommends antimony to cure the leprosy in swine, it being a great sweetener of the blood, and says also, it is very good to cure the worms in horsea.

Of bleeding in the tail. §. 37. A noted pig-doctor in Hampshire advises me, if ever I bleed a pig in the tail, to cut off his tail above the hocks, and rub it first, it will bleed the better: pigs by having too little of their tail cut off, especially in the summer, when troubled with flies; will be knocking it about their hocks, and keep it bleeding so as to bleed to death. Note, he says, the long-legged hogs, as it were double-jointed at the knee, are of a breed subject to the staggers.

Young pigs not profitable for bacon. §. 38. We had a young pig of three quarters old; we killed it for bacon; the farmer said, though I gave six shillings per score, the pig eat him as much peas as he was worth, for, said he, a young pig, though he makes the best bacon, yet, fets not so fast as a pig of full growth, for his food runs into growth.

Of swilling a hog. §. 39. I bought a hog, and when it was swilled, the farmer commended very much the swilling of it, because it was in no place burnt; whereupon I asked him if it was usual to have them burnt: he said, where the hog was dirty there would be danger of it's burning, which in that place spoiled the bacon.

The chief or only damage of burning a hog in swilling is, that the bacon will be apt to rust there.

Care must be taken, after hogs are swilled that they be not bruised.

Of salt and salt-ing. §. 40. Remember to provide a stock of salt in the most dry season of the summer, because it will come dry to you, and is at such times always cheapest; for the salternes at such times, being able to make a greater quantity of salt than they have stowage for, sell it the cheaper.

Of drying bacon. §. 41. A hot fire in a chimney, which heats the bacon, and then letting that chimney be without fire again, makes the coat of such bacon slack, and brings a-rust into it.

P O U L T R Y

P O U L T R Y.

§. 1. **C**OLUMELLA, speaking of cocks, says, one cock is sufficient to five hens. Number of hens to

§. 2. Mr. Ray says, hemp-seed is looked on to make hens lay, a cock. even in winter, but to incline them to so much fat as to prevent Hemp- their kindly laying after; it is pernicious to be given to singing birds seed alone, without other feeds; it either kills them with fat, or makes them dull in singing. — The antients were of opinion makes hens lay: that the leaves of cytissus made hens lay. As to the age, when hens are in greatest perfection for laying eggs, they preferred those of two years old.

§. 3. In pursuance of what I have remarked before in regard Of eggs to the punctum saliens in seeds, viz. that it is answerable to the sanguinea gutta in an egg, and like that is a vital principle, which has action antecedent to bare rules of matter, and is owing purely to the will of God, suitable to Moses in Genesis, I do conceive farther, that the punctum saliens in a seed, as also the sanguinea gutta in an egg, have each alike their systole and diastole, that is, an opening and shutting in a springy manner, and that, if the egg is heated, or under incubation, the yelk being immediately attenuated by heat does insinuate some of it's parts into the opening of the heart or sanguinea gutta of the egg, which in it's reciprocal shutting motion squeezes the juices into the passages and first lines already formed, although wonderfully short and fine, which are the main branches of the bird; thus they are lengthened and thickened by each opening and shutting, till the whole yelk is absorbed; thus the flour also in the seed is attenuated by moisture and heat, till at length it is quite swallowed by the punctum saliens, which like an engine casts it into the vessels of the plant: these are the first food both of plant and animal.

Columella lays it down as a rule, that eggs ought to be set at ten days old, whereas in England they may be set well at thirty; the reason is, because the heat of the air in Italy is strong enough to act so on the sanguinea gutta as to lengthen the fibres so far, and to make such progress towards the growth of a chicken, that the circulation to the extremity of these fibres cannot be maintained, and consequently not the nourishment of the chicken without a greater heat, for want of which there is a failure, if not committed to incubation; but the air of our climate works so slowly, that it scarce forwards it.

I i 2

I asked

* *Cytisi folia viridia ipsas fecundissimas faciunt. Aptè ætate ad parienda ovæ sunt anniculæ, maxime vero biennæ, minus his valeat seniores. Florent. in Geop. fol. 379.*

I asked a notable dame whether it was true, that if a hen was kept too fat she would lay an egg without a shell, and a lesser egg; she said it was true: I asked whether she had a hen sometimes crow-trodden; she said her people would say so sometimes, and such hen's feathers would stare; it fell commonly on a hen that was black, but Mrs. Edwards affirmed, she had known it befall other hens too; they said it was incurable. I the rather mention this, because Mr. Markham affirms it in his book of husbandry, in his chapter of Poultry.

^b Eggs that are new laid may be known by their roughness and whiteness, and, if you hold them up to the sun, you will find a transparency in them, which is not in eggs that have been sat on two or three days. If they are sat on, Florentinus cautions us not to shake them for fear of destroying their vital principle. Varro says the same, and adds, that addled eggs will swim in water, and good ones will not.

Of setting hens. §. 4. ^c The antients, in many parts of husbandry, had a very great opinion of the influence of the moon, and accordingly in setting hens Columella directs it should be done from the tenth to the fifteenth day of the moon's increase; which is not only of advantage, says he, to the increase of the chickens in the eggs, but by this means it will so fall out, that the chickens will be hatched

^b Dignoscantur ova, an quod in ipsis est fecundum habeant, si post quartum diem incubationis ad solis radium contempleris; si enim quid fibratum transiens apparuerit, & subcrumentum sit, quod inest fecundum erit; si vero pellucidum erit, ceu sterile ejiciatur. Sed experimenti sumendi gratia, ova non sunt concutienda, ne quod in ipsis vitale est corrumpatur. Floren. in Geopon. fol. 379, 380, &c.—Ova plena sint atque utilia necne animadverti aiunt posse, si demiseris in aquam, quod inane natat, plenum desidit.

Ova si incubantur, si habent in se semen pulli; curator, quadriduo postquam incubari coeperint, intelligere potest; si contra lumen tenuit & purum uniusmodi esse animadvertit, putant ejiciendum, & aliud subjiendum. Varro, lib. 3. fol. 72.

As our author has given no directions for preserving eggs, the following short note may perhaps not be impertinent. Some dip them in hot fat, which, if care be taken that they are not overheated by it, may be a good way; but as easy and cleanly a method as any, and I believe the safest, is, to beat up the whites of eggs to an oil, and then to smear over the eggs you intend to preserve with a camel's hair brush dipped in this liquor. Take care that they are entirely covered with this varnish, and I am credibly informed it will keep them fresh above a twelvemonth.

^c Semper autem, cum supponuntur ova, considerari debet ut luna crescente à decima usque ad quintam decimam id fiat; nam & ipsa suppositio per hos fere est commodissima, & sic administrandum est, ut rursus cum excluduntur pulli, luna crescat, diebus quibus animantur ova, & in speciem volucram confirmantur. Columella, lib. 8. fol. 188.

ed also when the moon is increasing, which will be a great benefit to them.

When a hen is ready to sit it may be found by the feathering her nest, for she then begins to pull off the feathers from her breast, and to make her bed; and before she is ready to sit, if you would have her sit in the place you desire, it is good to confine her to that place before she has laid all her eggs, that by laying an egg or two there, she may be reconciled to it; for, if her laying be out, and she hath chosen another place, it will be hard to get her to sit to what place you desire; and it is better to let her sit in the worst of places she shall choose, than to remove her from the place she has once chosen. Columella directs to increase the number of eggs you put under hens as the weather grows warmer. fol. 187.

I find Pliny, Varro, &c. order, that the number of eggs you set under hens should be odd, without assigning the reason for it; but Markham, fol. 112. says, the eggs will lie the rounder, closer, and in evenner proportion together.

§. 5. Many of our turkey-eggs and goose-eggs proved addled Of setting this year (1706) so that we had very ill-luck in hatching our fea-geese and thered fowl; a maid, who came just after our ill luck, said the turkeys. reason must be, because we still took away the eggs from the hens See §. 13. as soon as they layed them, whereas if their eggs had been left, their desire of sitting had increased, and they would have sat sooner; therefore her mistress did let the eggs alone: note, it will be good therefore to pen up the hens soon after their laying is over, and make their nests and put eggs into them.

§. 6. Chickens do better, and thrive much the faster for run- Of breed- ing about with the hen, not being cooped up; for the hen, have- ing chick- ing her liberty, scratches up emmets, bugs, and worms, more ens. agreeable food than we can give them; but the hen, having been cooped up, is very wild when set free, and rambles at a strange rate, to the loss of her chickens, nor makes she, when set free, a tender mother.

§. 7. The princess's poulterer assured me, that rearing early Of rear- chickens by a kitchen-fire, as poor people did, was by no means ing chick- a good way, for it was not a natural warmth to them, and their ens in flesh would not eat well; that straw and the warmth of the hen, winter. but especially good meat in their bellies, was the best means to support them in cold weather: for outward warmth signifies nothing, if there be not a good vital substance; and, said he, in feeding little turkeys and chickens, you will find by experience they will feed better and thrive faster by pecking off of your finger than from the ground; barley-meal is the heartiest and best food for them, and cheefe-curd a very hard food, that nourishes

not nor heartens, and therefore it is a great mistake in housewives, who give it.

Vetches not good for chickens. §. 8. Farmers agree, that, at the time of threshing their vetches, it is common to have the chickens, almost as big as the old ones, die, being not able to digest the vetches, which swell in their crops; and even the biggest poultry will be sick with it.

Of a pullet with egg. §. 9. A pullet with egg is accounted very good meat, but then I conceive it is about the beginning of February, when they are but young with egg; for on their first being with young all creatures thrive, but the embryo growing big it preys on the mother, and draws the moisture and nourishment from her, which is the case of the pullets at this time of the year, viz. the beginning of March.

Of geese. §. 10. Mr. Cowslade of Woodhay tells me, notwithstanding the objection to geese on their tainting the grass, they are a great good to cattle, where lands are subject to murrain; he says the common of Emburn is the same sort of land as that of Woodhay, but in the court-leet at Emburn, such are presented as put geese in the common; yet Woodhay people take the liberty, and it is observed, where one beast dies of the murrain at Woodhay, ten die of it at Emburn. Salmon's Dispensatory says, goose-dung is excellent against the green-sickness, scurvy, jaundice, dropsy, and gout.

Pliny says of the geese, they tread in the water, and Worlidge says, it is observed of geese, that in case the waters are frozen up (as in some hard winters they are) about their treading-time, then the most part of their eggs will prove addled; the reason is said to be, because the goose proves more fruitful when she is trod by the gander in the water than if upon the land. fol. 175. Quære how it fares with those, who keep geese where no water is, or where the ponds prove dry in treading-time.

Young geese will never fat well when they are breeding their young feathers, for their feathers take off from their nourishment.

Three geese to a gander. §. 11. Of geese, Columella says, you should allow a gander to three geese; for they are too heavy to serve more.*

Old geese breed earliest. §. 12. The older the geese, the sooner they lay, for which reason an old goose is more profitable in bringing earlier goslings, which yield the more money. Some say, if the goose be two years old it is as well as if more, but ducks will breed as well at one year old.

Of setting geese. §. 13. Geese love not to sit but upon their own eggs, at least the better part must be their own; if you take them from them at first,

* Singulis maribus ternas foeminas destina; nam propter gravitatem plures inire non possunt. Colum. fol. 193. & Palladius, fol. 59.

first, as they lay them, they will lay on even to a hundred, till such time as their fundamentals stand gaping open; not being able to shut them, by their own laying. *Maïson rustique*, fol. 107.

§ 14. I asked a notable dame why she penned up the ducks Of pen- and geese, and the ducklings and goslings at night; she said it ning geese was, in the first place, because these last were young, and for fear and ducks the hogs should meet with them, and eat them: I asked her why at night. there was not the same danger by day; she said, there was some danger, but not so much, the old one keeps them then, for the most part, in the water, and when they are penned up they are more secure from the stote: said she, we pen up the geese and goslings much, by day, when young, because the goose is not so careful as the duck of her young ones, but will keep with the gander and flock, and run up and down with them, infomuch that the young ones, in following them, will frequently fall down dead on the spot; but the duck will keep with the young ones, without regard of the other ducks. I asked another dame of these things next day, and she agreed to it, and added, that, if pigs once took to eat up ducklings and goslings, they would never give over till they had eat up old ducks, and geese, and gander; the fows particularly, if kept hungry, were very subject to it.

§ 15. Ducks, I am informed, generally lay in the night, Ducks. wherefore a careful dame drives them then into a lower coop, and feels every one of them, in the morning, during their laying-time, to see whether they have laid that night, or whether they are full of egg ready to lay, if so, she keeps those in; if she takes not this method, they lay about in so many holes, that she is apt to lose their eggs.

I was saying to a certain dame, that I thought there was little profit in ducks and geese, for several reasons, and that there was little they could feed on, but what the hogs did and could find out; she replied, that ducks, whilst pigs fed on corn, would follow the pigs, and live very well on their dung; I asked whether it was so with geese; she said, she had not observed them to do it.

§ 16. This day (April the 24th) my servant was wondering Of ducks to a dame in my neighbourhood that my ducks were not for sit- setting. ting, notwithstanding they had laid out their laying of eggs; the dame replied, that was no wonder, for she did not expect her own ducks should sit under a month yet; for, said she, ducks have two layings of eggs, and do not sit to hatch till the last, which is about the middle of May; if you will, said she, have early broodlings of ducks, you must set the first layings under hens. Neither the *Rei rusticæ scriptores*, nor *Worlidge* speak of this.—Note, (April the 12th, 1707) this day I have two ducks that have been sitting this fortnight, but this is not very common.

Of fattening
poultry.

§. 17. Columella advises to put aftermales hay under fattening-poultry in their coops, for if they have a hard bed, they will not easily grow fat; and to keep them in a warm, close, and dark place, that they may move as little as possible, for cold and motion are a great hindrance to their fattening.

Of cramming.

§. 18. In cramming turkeys and chickens, said the prince's poulterer, be sure you give them time to swallow before you give them more; for, if you cram it down too fast, they will not thrive with their meat: he said further, that the prime season for a pullet is before she has laid, or a week after, for after that time the straining herself has so weakened her, that she pines, and her flesh eats not well.

Poultry degenerate.

§. 19. In poultry, if you keep long in the same strain, the young ones will degenerate, and oftentimes die before they come to maturity; it is the same with pigs and calves.

P I G E O N S .

Of the pigeon-house.

§. 1. **I**N pigeon-houses, many build a lower window in the wall under the eaves, to open and shut at discretion, to let the young pigeons of every latter breed (which are weakest) out the sooner, they being not strong enough to rise upright through the well of the house.

Some say, there ought to be double the number of holes, at least, as you have hen-pigeons, besides what are to be allotted for the cocks; because the hen-pigeon, whilst she has young ones in one hole, will be building and sitting in another.

It is a great doubt whether it is beneficial to a pigeon-house, to keep the holes clean from the dung and trumpery.

Varro^a calls the pigeon a very cleanly bird, and advises to sweep the dove-house, and clean out the filth frequently all the year round; for the neater it is kept the livelier the bird, adds Columella; the whole place, says he, and even the holes, ought to be white-washed, the pigeon being particularly fond of that colour. The Roman epicures had a custom of breaking the legs of the young

^a Varro (lib. 3. de Re rustica, fol. 70.) says, permundæ sunt enim hæ volucres, itaque pastorem columbaria quotquot mensibus crebro oportet everrere. Columella ait (lib. 8. fol. 190.) totus autem locus, & ipsæ columbarum cellæ poliri debent albo tectorio, quandoquidem eo colore præcipue delectatur hoc genus avium. Pulli fractis cruribus citius pinguescunt, nam fracta crura non plus quam bidui, aut ad summum tridu i dolorem afferunt, & spem tollunt evagandi. ib.

Nam quanto est cultior, tanto latior avis conspicitur. Columella, fol. 190.

young pigeons, that, not being able to move, they might fat the better.

^b Didymus directs us to hang up sprigs of rue at the entrance, and in many places of the dove-house, which, he says, is good to drive away vermin. The old authors agree in the same thing in regard to hen-houses.

§. 2. It has been a question with many, if dove-house pigeons pair or not, and keep true to their plighted love, which it seems to me they must do, because we often find in their hole a pair of eggs and a pair of hatched pigeons near fledged, which eggs are soon after hatched. also, which could not well be, unless the cock fed the young ones whilst the hen sat. Of pi-
geons
pairing.

§. 3. We had no rain all April and May, and had never so poor pigeons in that season; the reason seems to be, because the corn in the fields was dry, there having been no rain to moisten it; for the young birds must have what is tender of digestion, and so we treat all sorts of poultry. Dry wea-
ther bad
for the
breed.

§. 4. Towards the end of the month of June, in the pigeons benning time, I entered my pigeon-house to see, in case there were any young ones, what feeds they had in their crops; I took half a dozen young ones; besides what corn they could here and there pick up, I found much charlock-feed, and the seeds of the common creeping crow-foot or butter-cups (in their crops) which is a small, flat, and sharp-pointed feed, (vid. Ray, fol. 581.) and afterwards did observe great flocks of pigeons to light on those fields, where that plant grew plentifully, at the time of it's feeding. Of their
feeding on
the seeds
of weeds.

July the 19th I had a pigeon killed in the field, and opened his crop, which was full of the before-mentioned butter-cup seeds, and fumitory-seeds, and nothing else, saving half a dozen bud-flowers of charlock, and two or three oats; I observed they were very voracious of these feeds; for I had three acres of arable, which had laid down to grass two years, and that had more butter-cups in it possibly than my whole farm besides, in which my whole flight of pigeons lay all day, and in a piece of wheat near my house, which had much fumitory in it; you may see, where these plants grow in fields near pigeons, the seeds picked off: they are therefore of great use in ridding the fields of weeds.

§. 5. It is not to be doubted, if you, in winter, feed your pigeons, but others from other dove-houses will come to the table in your dove-house, by observing them sleek, and in good liking. Of feed-
ing pi-
geons.
or

^b In fenestris & ostiis aliisque pluribus columbari locis, rutæ ramulos deponito, & suspende; habet enim ruta naturalem quandam contrarietatem ad bestias. In Geoponicis ex Didymo, fol. 773, lib. 14.

or by smelling the sort and plenty of food they have in their crops, as well as is elsewhere noted of rabbits.

Water necessary near a dove-house.

§. 6. A pigeon-house will not thrive unless very near water; not but the pigeons can go far for water for themselves, but their returns must be very frequent and quick for their young ones, who are wanting much water, and by carrying it far, it will be dried up in their crops before they can bring it to their young.

B E E S.

Of bees in general.

§. 1. **W**HATEVER you do to bees must be in the morning and not at night by a light; for every bee, that is disturbed and strikes against the light, is lost and chilled by lying out.

The honey-bee never draws it's honey from the broad-clover, for it's proboscis is not long enough; it is the humble-bee that feeds on that. The best provision for bees early against the spring is by sowing turnips in August, which will flower in the spring, from whence the bees extract abundance of honey: they draw abundance of honey also from the vetch-blossoms, but never lie on the pea.

A south-westerly exposition is better than a south-easterly; for the south-easterly calls the bees out too early in the morning, and in a south-westerly they will work an hour later at night. If a hive will not swarm, so that you are forced to raise the hive, you must be sure, before winter, to take the prop from under the hive, and though they have worked down into the prop, the combs must be cut away, that the bees may lie closer and warmer, for the reason why a smart comes to nothing is, because they are too few in the hive.

Their manner of breathing.

§. 2. This day (September the 15th) I could not but recollect what Pliny says of flies, that they breathe not from their mouths, but from porous parts of their bodies, in which opinion I was confirmed; for a bee had fallen into my garden pond, and was labouring at the oar to get out; I wondered to see, from the sides of his body, divers quick curling streams on the surface of the water, which extended two inches long from each side of the bee, and each stream was distinguished and divided from the other like the points of a compass; I saw plainly this could not be from his legs, and his wings laboured but little; I was satisfied these streams proceeded from the porous portals his labouring breath came out at, which issuing with force (for otherwise it could not have made so long streams) may give some account how the vibration of his wings on those portals makes his wind-musick, and plays thereon as we do on a flagelet.

§. 3.

§. 3. The 16th of January was a still fine frost, and at noon it was fine and warm in the sunshine; I observed it to invite many bees out of my hive, especially out of my boxen-hive, which stood under my straw-hive, and in the sunshine I saw them play; I saw here and there one fly out of another straw-hive, but very few; the next day I told between twenty and thirty that lay dead on the ground under the hive, and at the hive door, with a hoar-frost of the night covering them; note, the entry-hole of this hive was very open, wherefore I do infer that such entry-hole, being large, lets not only the cold and wind in, to their prejudice, but the sunshine of the winter to their utter ruin: I do infer likewise that these boarded hives are not so warm in winter to resist the cold, nor so able to resist the sun either in summer or winter, as the straw-hives, because the heat and cold cannot penetrate, where the particles of each injected have their powers broken by such a numerous body of twisted straws, between each of which there is a sort of vacuity, which must needs make the frost and sun break their lines; whereas timber being porous, and yet a continued body, the heat and cold passes through it without interruption; so that, I believe, the sun has too immediate an influence on the bees in those boxen-hives to their great prejudice, both at spring and winter.

§. 4. Mr. Cherry's gardener of Shotbroke had put, during the winter, a piece of slit trencher before the bee holes, with two little arched holes cut in them, to let the bees just have room to pass in and out; I thought it had been for warmth, but he said it was to keep out the mice, which would soon, in the winter, destroy a hive: he said the moths were likewise very pernicious to bees; for they would get into the hives towards the latter end of summer, and at the bottom of the hive, about the edges of it, lay their eggs, which at the latter end of spring come to great maggots, and crawl up and down the hive from comb to comb, sucking the honey; thus, he says, he has known five or six hives, in a season, destroyed by them; his way is to lift up the hives, and examine them, after Michaelmas, and destroy such eggs; he says, the mice get not into the hives all the summer long; for then the bees are strong and lie before the hole all night, and will not let them come in.

H A . Y.

§. 1. I Was taking notice that some hay my servant had bought for me had lost it's smell, which could not be from the rain; for none fell that year in the hay-making time, but it had laid abroad in the dew without being made into cock; and this is frequently

frequently the case of hay below our hill; for below the hill after it is laid in swarth and tedded, that is, scattered abroad, they do not cock it till they cock it for good and all; whereas in the hill-country they cock it the same day it is tedded, if it be a hot day.

Making broad-clover hay.

§. 2. If you will make aftermas broad-clover, I hold it best not to let it lie one night in swarth, but against every night to cock it in large cocks to secure it from the dews, which, at that time of the year, fall very largely; for the dews soke into the broad-clover, and thin the spirity juice, and thereby make it volatile and easily exhausted by the sun; whereas, if the spirity juice, which is of a consistency, be not thinned by the water getting into it, the sun will fix it, by drawing out the watery part from it, but if it be thinned by adventitious water, by reason of such thinness of the body, it will all evaporate: it is true, by laying it in swarth night after night, it will sooner be hay, but then the hay will be spoiled; for the driness of the body proceeds from the above precipitate manner of exhausting the spirituous juice by letting in the water^a.

Great-burnet hay.

§. 3. They count the great-burnet hay in Leicestershire, the best sheep-hay, and the best horse-hay.

Hay better in a reek than barn.

§. 4. I was saying, at the appraisement of the hay in Sir Ambrose Phillipps's great barn, at which I was present, that I would not make use of that barn for my hay, unless the season of hay-making was wet, but put it without door in a reek; to which the keeper replied, that he owned hay came better out of a reek than a barn, and that hay reeked abroad required much less making, having a passage for the air and wind to qualify it.

I was proposing to set up a^b reek-house for hay in my meads; several of my oldest and most experienced labourers seemed to be against it, but I could not have a reason, only they said, hay never came so well out of a reek-house as out of a reek, and one of them said, the reason was, it never lay so close; the timber posts, bearing against the hay, kept it from sinking close, and so it lay too hollow; I replied, that then in making the reek, room of a foot space within the timbers should be allowed it for sinking, which caution, I take it, should be always used in such cases.

Of making a cock.

§. 5. In making hay-cocks it is of great consequence to see that the cocks are made with a narrow bottom, and round head; for where they are made with a broad bottom and sharp top, pyramidwise, the cock sinks flat, and squats down, and lies so wide, and

^a For making St. Foin or French-grass hay, see note extracted from Mr. Tull, under the article Grasses, §. 50.

^b Dutch barns had not been introduced, or were but little known in our author's time.

and broad, that rain damages it greatly, whereas a round top with a narrow bottom will save the cock from rain.

In making hay-cocks, in order to be carted, I find by experience, that they ought to be made large (from a dozen to fifteen to a load, which they ought not to exceed) because the fewer make a load, the sooner they are loaded, and the greater is the dispatch, and, if they are set out in rows it is the better; less time is lost in going from cock to cock; the more hay-cocks you make, the more bottoms, and, in proportion to the hay, more lies on the ground, and consequently, if the season be wet, it is by lying long on the earth liable to more damage; a little cock is apter to fall flat, and, if rainy weather comes, what with the bottoms and tops, it all takes wet, there being little in the middle; again, being light of weight, it cannot compress itself close, but is hollow, and so takes in the rain, and, if you cart in the dew, or when the ground is wet, there is more hay spoiled by raking in the wet, where are many small cocks, than where a few great ones.

§. 6. It seems fit to be considered in the buying a hay-reek, *Of it's* how far the hay-reek may have heated when it was made, for, if *sweating.* It heated well, provided it be not too much, the hay will yield the more loads, because in sweating it falls so much the more close; whereas, if the hay was put up over-ripe, it will not so well answer expectations in the quantity, it lying so much the hollower.

§. 7. An antient experienced farmer tells me, he always found *Of old* old hay as good for cattle, till the latter end of the year, as new; *and new* but then it grew too dry for them. *hay.*

§. 8. We found it manifest this year, in hay-making, that short *Short hay* hay of the same bulk out-weighed long hay abundantly. *weighs* *best.*

W O O L.

§. 1. **O**NE of my labourers in *mowing complained of the *Growth* old rowet that choaked up the scythe, and compared it *on the* to the young wool, which, when sheep have been pretty well kept *sheep's* in the winter, and then checked in the spring, comes up under the *back.* first wool, and deadens the sheers, so that it is troublesome to cut. ** See* I immediately went to another, who I knew had been a shep- *mowing.* herd, and had sheered much, and inquired of him concerning such wool, he said, it was true, that, if sheep are kept well at the forehand of the year, and have a check in the spring, and then comes a flush of grass on the first rains, their winter wool will grow no more, but a young wool will arise, and cast off the old wool, so that one may almost wipe it off with one's hands; now if the young wool is not grown so long, but that the sheers slide over it, or between the young and old, then it is not troublesome to shear;

sheer; but if it be grown so long that the sheers must cut it, then it chokes up the sheers, and makes it troublesome; and in drawing the wool out with one's finger and thumb, to see the fineness of the thread, it will part.

When
wool
grows
fastest.

§. 2. I sold my wool to a fell-monger, and we happened to fall into an argument what time of the year wool grew fastest on the sheep's back; he said, it grew fastest that quarter of the year which was between Christmas and Lady-day; I wondered at that, because it was the coldest quarter of the year; but he answered me, it did grow faster then, than from Lady-day to the 17th of June, which was the day I sheered, for, said he, the wool stops in growth long before that, and begins to loosen from its root, and a new wool growing thrusts it out.

This put me in mind that the fleeces in the eastern countries might be easier plucked, and with less pain to the sheep than we imagine, if they nick the time in doing it, when the wool loosens from the skin of the sheep.

Wool on
the sheep
affected
by the
weather.

§. 3. May the 19th farmers Box, the father and son, and farmer Ides, farmer Stephens, and young farmer Sartin of Wilts, all agreed, that wool grew faster on the sheep in dry than wet summers (for from the growth of the sheep the wool depends) and that all sorts of cattle fatted then faster, and grew faster than in wet summers, if they had meat tolerably sufficient: for continual wet outwardly on their coats washes them out, as well as inwardly, and then the grasses are sourer also; besides cattle have more hours for eating in dry than in rainy weather.

Of swathing
sheep
in Persia.

§. 4. There is a particular sort of sheep in Persia of which they are very choice, their wool is as soft as silk, and I am well informed, that to preserve the beauty of it, and keep it to a good curl, they swathe their sheep.

Of wool
peeling off
the sheep.

§. 5. When a sheep's wool peels away under his belly, the shepherds say, it is, most generally, a sign of an old sheep; not that but a young sheep will be sometimes subject to it; that which will best prevent the like another year, if young, is to keep him up in case.

The ewes that lamb about Lady-day will have their lambs, by the quickness of the grass at that time, so brisk and forward, that with sucking and butting they will have beat all the wool bare from the ewes belly by the time they come to be sheered.

Of Span-
ish wool.

§. 6. Mr. Methwin and Mr. Holliday, clothiers, say the Spanish wool is not near so fine and so good of late years, not above half so fine as it was formerly; the finest, they say, comes from Segovia, in Spain; the same they say of Herefordshire wool.

Fine feed
makes fine
wool.

§. 7. Tho' one farm and another is said to have better and worse wool, yet the rule is very uncertain; it is according to what sort of sheep a farm keeps, which may occasion a great alteration,

alteration in it, for ewes carry finer wool than weathers and hogs; again, the wool is improved according to what grafs one gives the sheep, clover grasses raising a coarser wool; again, it depends on what sort of hay the sheep have at winter; the better the hay the finer the wool; and hill-country hay, if one has enough of it, will bring finer wool than the next farmer shall have, who buys a vale hay.

If sheep are abused in their keeping so as to pitch, their wool, tho' never so short, will handle hard and rough, be curled, and not run into a strait thread, and break off in combing.

§. 8. At Bishop's-Cannons and all the Cannons, where the Short wool is so fine, and the land so good, they keep their feeding as grafs best close as may be; for they count, amongst them, the short-for the er the sheep's pasture the sweeter; if so, it must be more so wool, with us, where the ground is poor and sour. The wool from Wodcote-farm, which is contiguous to me, will out-sell that from Crux-Easton, because their sheep feed on the downs, and ours on the corn-lease.

§. 9. In Librants Ides History of his embassy from Muscovy to Fallows China, printed 1706, he says, fol. 189. the mulberry-trees in produce China are managed in a manner different from all other countries; good for they are kept low, and annually lopped, as the vineyards are; wool. because, says he, the young shoots occasion the production of the best silk; and indeed the difference between the silk produced by those worms which feed on the first leaves, and that of the latter growth, when they are much harder, is very considerable.—I note this, because I have made a remark before, how the best wool proceeds from grafs growing on fallows, which proceed from a seed of the same summer, and there seems to be a great affinity between wool and silk.

§. 10. Burn-beaking the downs will be a great prejudice to the Burn-staple of wool; for, though the bulk of wool may come off the beaking vale, yet it is most born and bred on the downs, from whence the prejudicial men buy their sheep, or otherwise they would not have so al to the good wool; and though particular parts of the vale, as all Can-wool. nons, &c. produce a fine wool, yet the reason of that is before given.

§. 11. Mr. Bishop's shepherd of Dorsetshire said, the older Wool of sheep grew, the finer was their wool, and the least of it. old sheep

§. 12. Where the ewe-wool is dearest, the lamb-wool is cheap-finest. est; for the ewe's wool sells for it's fineness, but the lambs wool for Of ewe and lamb it's length. wool.

§. 13. Mr. Bell of Marlborough, coming to buy my wool, asked me whether I sheered my lambs at Midsummer, as I did my other sheep; I told him yes; because, said he, many will shear their lambs a month after; for the wool is so much the Of lamb's wool. better

better for being the longer, the ewe's wool the shorter the better, the lamb's wool the longer: I asked how much it might yield the more for being a month's growth the older; he said, a penny perhaps in the pound: I answered, twice shearing made two troubles and charges, and I knew not whether it would turn to account.

I told my shepherd what Mr. Bell said about shearing the lambs early; and he replied, if the lambs were late shorn, they would not at Michaelmas carry so good a body and look so full, nor carry so good a price; some shear them so shallow as to leave a good coat behind, because they may look more burley at a fair.—
 Quære therefore, if I should not shear those later which I keep myself.—Asking my shepherd this question afterwards, he said, it would be two troubles both in washing and shearing, and chargeable, more than the profit on the wool would come to, and the sooner we sheared our lambs, the more wool they would have when they were sheep.

Wool of
colley
sheep.

§. 14. I asked Mr. Townsend and Mr. Fry, clothiers, the reason why Hertfordshire wool should be the worst in England; they said it was certainly so, and that they affected the sort of sheep they had, as a very large sheep, which, said they, are of the colley sort, that is, black faces and legs, and their wool is very harsh, mixed with hairs, like dogs hair, and not so white as ours.

Black
wool.

§. 15. Stevens of Pomeroy in Wilts desired to have two or three fleeces of my black wool, and made no scruple to give me nine pence per pound for it, though he was loth to give so much for the white fleeces; for, said he, the black fleeces are of more value than the white, and he gave this reason; in the making a dark-coloured medley drugget, or cloth, the thread of the white being twisted with the black will effect it without being dyed, and will make much stronger cloth, in as much as all dyes that dye a dark colour do much rot the worsteds; but the dyes of light colours, being only a light staining of them, do not so much hurt the wool.

Curled
wool.

§. 16. When the wool-man was weighing my wool, he shewed me the difference of some fleeces in goodness, and particularly the locks of some fleeces that were curled, and said, such wool was not, by a penny in a pound, so fine, as that which was soft and strait, nor would such wool lie fine and smooth in the druggets.

Goodness
of wool.

§. 17. I was arguing with my wool-man on the qualities of wool, and insisted that, tho' they judged according to the fineness of the thread of wool, yet wool of the same fineness might be much better than other wool, because the proof and strength
 of

of the thread in one sort of wool, might be better than in another of the same fineness, by reason of better food, being never pinched summer or winter, and consequently having proof to the very end of the hair: he said, that wool impoverished by ill-feeding or starving, at any time of the year, was plainly discernible; for it would run off thin towards the ends of the hairs more than suits with a taper figure. I suppose the change towards the end is discernible as in corn and grass, when it withers at the top: he allowed my wool was better than my neighbours, for my not pinching them any time of the year.

§. 18. A great dealer in wool assures me, that wool of sixteen shillings in the tod is eighteen pence in the tod worse in goodness when three years old; for then it grows starchy and dry, and will not lie smooth in the spinning; for the oil of wool wastes very much after two years old.

§. 19. I was with Mr. Anthony Methwin, a great clothier, Edge- and entered into discourse with him of wool; the edge-grown wool, I spoke to him of, he assured me, was the worst abuse wool. the wool-men put upon the clothiers, for the young wool of it was all to be flung away, because it could not be worked up in cloth; he said, wool that pitched, by reason of the sheep's poverty, would tear and break in pieces, and great waste was made of it, that wool managed as I manage mine was much the better in all respects, and more profitable to the clothier to buy, and tho' it might run a little longer for it, would be extraordinary good for cloathing: he agreed with me, that fallows always produced better wool than the very same ground when laid down to grass, and said, the longer a ground lay to grass, and the older the grass was, it was the ranker food, and the wool coarser; for which reason the fallows, having new young grass in them, produce so much the finer wool; he did, for the same reason, assent, that the hop-clover generally speaking (especially in clay-land) might produce a finer wool than it's natural grass; that the thicker and closer wool handled, and straiter in it's threads, and not curled, it was the finer, and laid smoother in the piece of cloth: That wool, added he, in the sheep, that hangs least under the droppings of the other, is the finest, such as the neck, and breast, and belly.

§. 20. I find the pitch-mark, if it be not worn out before shearing-time, the wool-men do not like, because, say they, we have no help but to cut it off, whereas, tho' the ruddle, if the sheep be much ruddled, weighs to our loss, yet that washes out. Of the pitch-mark in wool.

§. 21. Wool increases by lying by, and, if put up hollow, will in two or three years feel very close, and be intangled, which is occasioned by it's growing: but it will not grow till after it's sweating it's over, which is not till Michaelmas. Of binding wool, and of it's growing.

K k

It

It is generally agreed, that wool, being bound up very close, so that the wind cannot get into it, will pay interest in growth till towards the next spring, but should be sold before the March following, lest the winds of that month should dry it too fast.

Of the wool-loft. §. 22. The wool-man having bought my wool, and coming to weigh it, assured me, that by the tumbling and removing the wool, and letting in the air to it in the carriage, it would lose in the weight a pound in the tod, before he got it home: from hence it follows, that to move your wool in the loft, or from one room to another is loss, or to tumble it up and down in search of mice.

Time for felling. §. 23. When wool-men buy not at the first hand, when the wool is sheared, they care not to buy in the winter; for the damp and foggy air gets into the wool in winter, which makes it weigh heavier; therefore the chapman chooses not to meddle with it till spring.

Of the several parts of the fleece. §. 24. I find, by Mr. Brewer, Mr. Methwin, and many more clothiers I conversed with in Wiltshire, that the wool-breakers do, in the first place, separate the fleeces by themselves that run most of a sort.

Then they sort the different kinds of wool in each fleece by itself, which fleece is never divided into less than four parcels, viz.—The tail-wool is laid aside for lists for cloth, rugs and blankets.—Half the buttock towards the flank is for the long worsted thread, in serges and druggets, which they call the woosted, and runs the length of the serge or drugget, which, tho' spun to a finer thread, yet is harder than the ebb, which crosses the woosted thread, and runs the breadth, yet is of a coarser wool: but Mr. Merryman, clothier of Newbury, denies that any of the buttock is fine enough for the woosted thread.—What is on the back and ribs is somewhat finer, and makes, in druggets, the thread called abb; which runs cross the chain, called the woosted, and is of a finer wool than the buttock, and twisted in the thread looser.—The neck, and breast, and bottom of the belly make the thread which in the finest cloth is the chain, called the warp in cloth, which answers to the chain or woosted thread in druggets; but the abb in cloth, which answers to the abb in druggets, is all made of Spanish wool, which being finer will come closer together, and the finer it is made, tho' the thinner yet will keep out rain the better: but Mr. Merryman of Newbury, clothier, will not believe the neck and breast fine enough for the chain.

H I D E S.

H I D E S.

§. 1. **A**CCORDING as the beasts were in proof, in flesh and fatness, proportionable is the value of the hides, quality of and such will be the proof of them under the hands of the tanner; for example, as young meat and fat meat plims and increases in the roasting and boiling, but lean and old shrinks, so a hide of a young and fat beast swells and thickens in the tan-pit, and yields a proportionable increase according as the beast is young and fat; but the hide of a lean and old beast shrinks and loses its substance in the tan-pit, and will not take the tan as a young hide: therefore a murrain hide is of small value, unless it be the back part, to make a pair of boots, to which purpose it is useful, on account of its shrinking and closing of the pores; the very best of the hides are bought by the bridle-makers, because they are required to be of the best substance: the value of a hide is known by its weight, by lifting it with the hand, as it weighs heavier or lighter in proportion to its largeness or smallness, nothing being a greater commendation of a hide, than to weigh much heavier than one would expect from the size of it.

The north-country hides are the best, and thickest, and generally handle best, the reason whereof probably is, because their feed is deepest, and they are maintained always in good keeping, and never pinched.

It is generally agreed, the finer the hide the sweeter the meat of a beast.

§. 2. The skins of the sheep thicken much, after they are shorn: in some time after they will grow as thick again as before: I judge this must proceed from the cold, and puts me in mind, that the hides of all cattle are thicker grained in the hill-country than in the vale, as also of the story (which, as I remember, Herodotus tells) of the Persians and Greeks, that when they were, on both sides, slain in a battle and stripped, the nations were not to be distinguished but by their skulls; for the Persians wearing always turbans on their heads, which kept them very hot, their skulls were much the softer, and would yield to the impression.

RISE and FALL of MARKETS, and their CAUSES.

Of buying early.

§. 1. **G**ENERALLY speaking, the earlier a thing is bought, when the market is open, it is bought the cheaper, for though afterwards many contingencies may have an influence, yet the general condition of mankind, who are not provided with money to buy as early as their occasions want it, or want to sell before there is a general demand for goods, must favour the ready-moneyed man, who is provided beforehand; thus, for example, they, who at spring of the year first buy barren beasts to fat, or sheep, have the advantage; for they, who sell earliest, either want the money, or winter-provisions, as hay and straw, to maintain them till the grass grows; which is a general case of too many; and they, who buy early, do it because they have money before the generality have it for such purposes, or a remaining surplus of hay, or straw, more than the stock of their farm can spend, which is the case of few, so at such times there must be regularly more sellers than buyers.

Plenty of one kind of provisions affects all others.

§. 2. In the summer 1702, there was a great scarcity of hay and grass, for which reason beasts were not fatted in so great a number as usually; consequently the breed in England of beasts increased; this year, 1703, there was much grass and hay, abundance of beasts therefore were fatted, which made beef cheap, and fat mutton; by reason of a bane, was cheap; and seeing beef and mutton was to be had cheap, people would give but a low price for cheese and bacon: so that any one kind of food being cheap is apt to lower the price of all other sorts.

Scarcity of beef makes lamb, &c. dear.

§. 3. From the exceeding last year's hot summer, 1719, whereby fewer beasts were fatted, and hay very scarce the spring following, beef yielded five pence per pound; this made fat lamb sell exceeding dear, not only at spring but all along June and July; the reason is plain; because there must be a great many fat lambs go to make up the failure of each ox's fattening, and meat must be had.

Sheep and wheat cheap about September.

§. 4. On the 16th of September wheat was sinking, and about this time of the year wheat generally falls in price, for the farmers, who live in the pasture and turnip-countries, do, about this time of the year, tumble out their wheat in the markets, and glut them, in order to raise money to buy sheep at Weyhill, and the sheep-markets, as well as to pay harvesting, and for seeding their ground with wheat.

Wheat sunk for a few markets, and sheep, notwithstanding it was a great autumn afterwards for grass, and a great turnip-year; the

the reason of it was, that money must be raised by most farmers out of the produce of their farm at this time of the year (September) to answer their many occasions, and they, observing wheat to sink, thought fit to lessen their winter stock of sheep, and keep their wheat, because hay, through the wet, was generally damaged, and not great in quantity, and so the maintenance of sheep was like to be chargeable; and consequently such sale out of the capital must glut the market and sink the price.

§. 5. From the 24th of September to the 20th of October, Of the 1704, the land was so dry, that the farmers stopped ploughing rise and for, and sowing of wheat: Mr. Raymond, and Mr. John Horfall of Wiltshire, came to me in a visit, and I was saying to them, surely if this weather held a week longer it would make wheat rise; no, said they, at such a time it sinks in present, because the farmers send their wheat to market, which they would have sowed, but the next year it will be dear: it is the same case as in a rot of sheep, every one having sheep to sell, for the present they are cheaper.

§. 6. Generally it may be foreseen and concluded, that, when Prices of the harvest falls pretty late, seed-wheat, of the old year and of seed-the new, will hold dearer, in the hill-country (in proportion to wheat the following price of wheat when the markets open) than when the harvest comes on early and quick; the reason is, because, when the harvest falls out late, farmers sow much, in those countries, of old wheat, because they sow early, which goes a great way in the consumption of the stock at the latter end of the year (i. e. September); also, when harvests fall out late, the farmers can raise money soon from barley, oats, and peas, because by October those grains are vendible, and so they are not forced to sell wheat so soon, to raise money by that grain alone, to discharge the harvest wages; but when harvest comes early, old seed-wheat may probably sink in price, vice versa.

§. 7. The nearer the market is to London, the worse the Cold or market is, if wheat be cold or grown.

§. 8. From harvest time through the winter (1705) barley corn unfit was three shillings in the quarter dearer, near Salisbury, Devizes, for London and the inland towns, than at Newbury, Reading, and those don market countries that drove the London trade of malting; the reason was, the great stock of barley, the traders in malt to London had provided the year before, had glutted the London market, whereas the malsters in the inland trade do not provide great quantities beforehand, and therefore, the crops of barley miserably failing this hot summer, barley bore a better price with them than with us.

Bane in
sheep
makes
corn dear.

§. 9. I was observing to Mr. Hawkins, the great Hampshire farmer, it was a saying in this country, that if corn was dear sheep would be dear, and vice versâ; he said, the foundation was in the sheep and not in the corn, for, if a bane fell on sheep they would be dear, and, if a bane fell on sheep, corn would be dear, because there could not be a fifth part of the folding that otherwise there would be, and consequently a deficiency of the crop, and therefore dear; but if no bane, and a great breed of sheep, corn would, on the other hand, be plenty.

I add to this, that by a bane year of sheep, it may generally be taken for a rule, wheat will be made dear, because in baning years it is a wet spring; but a baned year makes, for the present, beef and mutton cheap, because such abundance of mutton must be killed, before the bane be too far gone in the fat sheep, but the rot makes both afterwards dearer; the dearest time for mutton and beef is Lent, though it is scarce also the latter end of March and April, but then the plenty of lamb and veal keeps the price from rising.

A bane or
rot makes
ewes sell
well.
Scarcity
of hay
makes
lambs sell
well.
Prices of
cattle.

§. 10. When there has been a rot of sheep, it may be reasonably expected that ewes will sell best, in order to replenish the breed that is lost.

§. 11. When there is great scarcity of hay against winter, it is to be supposed that lambs will sell best, because they can live best without hay.

§. 12. In years of warm dry springs, or only of moderate rains, I observe, cattle are always cheap, because the breeding counties, which are always the barren, especially Cornwall and the mountainous parts of Wales, tumble out so many into our markets, being not able to maintain them; on the contrary, in years of wet and cold springs there is a good growth of grass in the breeding counties; therefore those counties, rather wanting more mouths for their grass, do not send them to our markets, and therefore cattle are dearer; after many dry springs, that their breed has been drained by our markets, if a cold wet spring comes, then cattle may be expected very dear, as in this year (1709) was the case; for then they can spare none; note, though in dry hot springs there be a greater growth of grass in deep cold lands, as Somersetshire, &c. for which reason it might be thought their demand might set a good price to the Welch cattle, yet it is to be considered, that in such case the greater necessity lies on the seller; for the Welch cattle must starve, if they keep them, whereas no great inconvenience lies on the renter of the deep lands, whilst his grasses grow a little the longer only, if he keep off from buying; it is plain in this case the Welchman must buckle to; whereas in wet and cold springs, when the Welch-

man

man can keep his cattle, it is as plain the necessity lies on the buyer.

§. 13. During September, October, and half of November, Prices of fat hogs sold for 4s. 6d. and 4s. 8d. per score; but these are whey fat hogs, i. e. fatted with whey, and drove pretty far from the dairy countries, which driving, and their sort of food, takes away the value of the bacon; so our hill-country bacon, where the hogs feed on corn most of the year, and are fatted therewith, yield six pence or eight pence per score the more; about the beginning of November I sold for 5s. 2d. per score, and thought the price of eight pence per score more a good equivalent; but by the latter end of November I found the hogs fatted sold at the market for six shillings per score, at which I was surprized, peas not rising in the price; but, inquiring into the reason of it, I found that our hill-country bacon seldom came to it's full price till about the latter end of November or December, when all the whey-bacon is gone, for, whilst that is plenty in the market, it keeps down the value due to the hill-country hogs, though at the same time they may yield eight pence per score more, yet seldom so much then as they do afterwards; therefore it is good husbandry not to be too ready to sell our hill-country fat hogs.

§. 14. This summer, 1720, young pigs on a sudden grew dear A dry all over England; the time they first appeared to be so was about summer the middle of June, and the reason for it was (as assigned by the makes farmers about Holt) because the last summer was as hot and dry young as had been known for some years, for which reason the quantity Pigs dear. of whey was much lessened in the dairy-countries, and the crop of corn, particularly peas, run very short; and so the breed, which would have been otherwise preserved, was sent to market for the spit.

§. 15. If a dry spring should come, with a succeeding hot and burning summer till Midsummer, so that the first crop, or burden of grafs, be lost, and, being under-stocked with cattle, you have a hay-reck in store, you will have good encouragement to buy; for in such case you may buy very cheap, and will be very well paid for the hay they shall eat; for you may expect a great after-mass, the earth not having then yet exerted her strength; for the hot sun thereon will have been equal to a dunging; but then you ought to buy your cattle half fat, that your aftermass may finish their fatting. When to buy cattle

§. 16. This summer (anno 1720) about a month or five weeks before hay-making, there fell so much rain in most parts of Eng- barren land; that the water-meadows were overflowed, and very much cattle are stranded, in so much that in several places they sold the hay to dear after them who would cut and carry it off: in general they made the wet sum- hay up in reeks, with design to buy-in lean cattle, after Christ- mers.

mas, and early in the spring, for fattening, and so to get them forward in flesh.—Note therefore, when such wet summers happen, doubtless lean and barren cattle for fattening must after Christmas, and towards the spring, be dear, because a large demand for them for that purpose may be expected.

Consequences of dry weather in June and July.

* Not prove with calf.

Of a cold dry spring and summer.

When grass is plenty the beginning of spring, &c.

§. 17. This year (1704 there was a plentiful spring for grass, but no rain fell all June and July, and so the grass was all burned up; from whence I inferred, first, that beef and mutton would be dear by September; for by that time the forwardest beef and mutton would be spent;—secondly, that barren beasts would be scarce and dear the following spring; because, there having been plenty of grass in the spring, few beasts would * go through, —thirdly, that cows with calf, that had been early bulled would be plenty and cheap at Christmas for fattening, and yet not easily to be fatted, by reason of the dry months of June and July.

§. 18. There had been (anno 1716 a cold dry spring and summer to the very autumn, i. e. the latter end of August, so that there was but a small crop of hay, and the aftermas ran very short, rain coming too late to bring it to any length before winter came, and turnips also failed; whereupon it was the opinion of both Mr. Biffy and William Sartain, two Wiltshire graziers of great experience, that beef would be very cheap till Christmas, because the graziers would sell off their beasts the forehand of winter, though but half fat, for want of hay; but that beef would be very scarce and dear in the spring, and the rather, because very few old cows, that have had damage, or went through, will be turned off to fattening at autumn, for want of hay; but will be milked another year: this will also make mutton very dear at spring.

§. 19. There is no hopes of a good year for the graziers when grass is plenty at the beginning of spring; for then they buy their cattle dear, and yet meat will be cheap all that summer; for so many will buy-in for fattening, that, though the summer should prove never so dry, yet so many beasts will be made half fat by the spring-grass, and must of necessity be fatted out, that beef must needs be plenty.—On the contrary, a good year for the graziers is, when, for want of grass in the spring, barren cattle sell cheap, whereupon fewer buy for fattening; and then rain coming plentifully, the beasts being bought cheap, and a scarcity of beef in course following, and the grazier having plenty of grass to keep cattle in for a market, makes them pay well.—And note, that in wet forward springs barren cattle may be expected to be scarce and dear the year following, because beasts being well in case take bull and go not through; the contrary may be expected in backward springs, especially when winter-meat proves scarce.

§. 20.

§. 20. Last summer (anno 1719) was very hot and dry, and so little rain fell, that the crops of both hay and straw fell so short, that the vale-farmers, for want of winter-provisions for their cattle, sold cows after Michaelmas for thirty shillings a-piece, which ordinarily were then worth 4 l. per cow.—It was as forward and plentiful a spring for grass the succeeding April and May as had been known for many years; yet cows sold cheap, because the stock of cattle, so few having been fatted, was still too great; but after Christmas beef was so very dear, that, take the whole quarter of an ox, it yielded a groat per pound: bulls also were excessive dear this spring; a bull that ordinarily would yield but 40 s. sold for 3 l. 10 s. or 4l.—The reason was, because, the wintering of cattle having been very chargeable, the bulls were supposed not to answer the charge of wintering so well as other cattle; so the farmers killed them, though but just wholesome, and sold them for a farthing, and an halfpenny a pound, and eat them in their families; so the great slaughter that had been of them the winter before made them very dear in the spring.

A hot and dry summer occasioned the cheapness and afterwards the great dearth of cattle.

§. 21. October and November are the cheapest times for beef, because there is then a glut occasioned by the old cows, which are turned off by the dairy at May-day to be fatted, and are killed in those two months.

W E A T H E R.

I. **T**HIS year (1712) was hitherto (June the 20th) a very hot summer; it was a dry February and March, then a little rainy the first week in April, then no rain till about Mid-may, when we had a hard thunder shower, which went to the roots of the corn; then no rain till the beginning of June, when fell moderate rain, for half a day, enough to go to the roots of the corn; then no rain till this day, June the 20th, when a hard shower, of two hours, went to the roots of the corn.—This hot summer, with so little rain, had this effect upon my oats, as follows.—In November I had ploughed up forty acres of white poor land, after it was run to a thick short grass, and had laid down two years to hop-clover, in order that, after it had laid ploughed all the winter, and took the frosts and rains to fat it, the ground might be a fit and mellow bed to receive the oats; but, notwithstanding the ground was ploughed so early, yet, being a pretty dry and mild winter, at the middle of February, when the oats were sown, the ground required much harrowing, and though they came up well and promising, yet, for want

want of rain to soften the ground and mellow it (having the disadvantage of being sowed on land not sufficiently loosened) they did not strike good roots, but dwindled, and by the 20th of June, when they were shooting into ear, were very thin, for want of tillowing, and were run into spindle, and looked very poor and starving.——The bad condition of these oats seems to be owing to the drought of the year, and the chalky constitution of the ground, which, being lay ground, was not sufficiently loosened, though ploughed early, and dragged in with the best management, in order to help it's natural defects; and therefore, for the future, it is to be observed, that a crop of corn sowed on such white earth, after it has laid down so long to grass, is very much hazarded in case such a hot summer happens; whereas, if this had been the second crop sowed to oats, instead of the first, doubtless the success would have been much better; for then such white ground, in the second year of it's tillage, would have ploughed up fine and rotten, and the oats, with the drags or harrows, would have been let in as deep as the plough went, and then, being rolled, would have endured the heat of the summer, and the want of rain, as I experimented this same year, in a crop of oats sowed in the same down, on a black rotten earth, but poor and wood-seary, which I had not thought worth ploughing and sowing; but having sowed it to oats and French-grass from lay the year before, and the French-grass miscarrying, I sowed it again to oats and French-grass this year; the ground turned up like ashes, as deep as the plough went; I dragged in the oats, and French-grass ten days after the former, yet both the oats and French-grass endured the drought and hot summer to a wonder, and held till this 20th of June, when rain came, the colour of a strong dark green.——Other fields ploughed up early for oats, after they had laid down two years to broad-clover, ploughing up pretty mellow, and, being clay grounds, endured the heat of this summer very well, and held a flourishing colour, though sowed not till the first week in March; yet I was sensible, through the drought several of the weak tillows were lost.——But white land, as above said, having laid to grass, is more difficult to be brought to a friable temper by once ploughing than the other sort of grounds here mentioned, which are of strong clay.——Also, when wheat has, the year before, been sowed to one earth, on whitish ground that has laid to grass, I observe, not only, that such ground is more apt to run to rowet in the wheaten crop (whereby the earth is more bound by the roots of the grass) than clay ground sowed on one earth, especially if it be a little stony; but also white earth, in case it ploughs stiff, does not separate and break, when it is to be harrowed, as the clay, if a little stony; and

and this I plainly see by comparing together, this year, several pieces of barley.

Though our spring corn is better in cold clay lands, in the hill-country, in warm than in cold wet summers, it is apparent to me, not only from this, but from many years observation, that, tho' spring corn will hold it's colour in a hot dry summer, in the hill-country, in clay lands, yet our clays are seldom so good, and of such depth as to bring to maturity, in such summers, all the backward tillows, but the strength of the ground gives off, and the number of ears is not fulfilled, in such cases, for want of seasonable rains; whereas in rich clays of the vale, where the corn is buried deeper, possibly no summer is too hot.

§. 2. This spring (anno 1707) was exceeding dry from about the 12th of March to the 22d of May; for but one moderate shower, on or about the 13th of April, fell, which went not to the roots of the corn, for it brought up none, and but moderately refreshed any grass. During this season the winds were very parching, the sun hot by day, but the nights cold: my French-grass, on a burn-beaked ground, sowed the year before, was very hopeful at the beginning of March, and so on to the middle of March and the latter end of April, and looked so green, that I thought I should cut half a load at least on an acre; but from the latter end of April it began to fall off, and to turn their towards a fillemot colour, and made little or no growth all the spring: on the 22d of May rain fell plentifully, and frequent rains after; I had great expectation my French-grass would recover it's colour, and also grow in stem and length of blade, in hopes of which I waited till the 19th of June, but then found all hopes were in vain; for the grass altered not in colour, and very little in growth, from these rains. The very same thing happened to six acres of wheat I had in very white poor ground, which having lost it's colour (being within a week or ten days of earing before rain fell) never recovered it's colour after, and put forth a yellowish and very small ear: the same happened to my French-grasses sowed the autumn before with my wheat.—From hence I observed that, when the air and the sun have connected the juices of plants, and confirmed and hardened the fibres of the leaves and stems (which the air and sun do rather in less time than they otherwise would, where there is a poverty of juices) the fibres being so fixed and hardened, that they are not capable of being enlarged, and so not to be extended by more juices, the juices, struggling for a vent, discharge themselves into soboles above the roots, if the plant be perennial, providing tender juicy buds for the next year; for thus it was with my French-grass, when I pulled up it's roots: from hence I may for the future judge when the hopes of the year are lost.

§. 3.

Effects of
a dry
spring,
&c.

§. 3. This spring (1714) was very dry, and the summer very hot and dry; it was observable, that the increase of rabbits, pheasants, partridges, and hares were very great, and I saw many coveys by July the 20th, near as big as the old ones; so much does the sun favour their increase in number and bulk, and doubtless the increase of the vermin that destroy them, as polecats, stotes, and foxes, hold a proportion; as such summers conduce to the destruction of the fish by reason of the lowness of the waters, so they contribute exceedingly to their multiplication and growth; the last summer being very raw and cold, the miller of Long-parish complained of the small size of his spawn, occasioned by the coldness of the season, and made it his apology for furnishing me with no better trout.

Of a re-
markable
mild win-
ter and
dry spring.

§. 4. This winter (1713) has been the driest and freest from rain and snow I ever knew, and the mildest and most moderate for frosts; and the spring was also cold, and the driest, and the summer, the driest, for we had, during the whole spring and summer, but these three rains following, viz. January and February dry, March the 10th, or thereabouts, fell a rain that might possibly go to the sheer-point; then it continued dry till June the 9th, when we had such another rain as the former; it continued on dry with us (though some storms did scatter in several parts as we heard) till June the 21st, and 22d, when a rain fell, which I believe went to the sheer-point; and by this time the wheat was ripe in most places, and the reapers were set on the white oats, and peas were hacking, and some barley was cut; it is true, generally speaking, the last mentioned lacked above a fortnight of being ripe, the spring having been dry and cold, which kept the grain backward; black oats were fit to be cut, with me, by July the 28th.—From the account, before given, of the dry winter, the cold and dry spring, and the hot summer, which periods of time, from the beginning of January to the 28th of July, being above seven months, take in only three moderate rains, it will be fit to consider what consequence it had on all sorts of corn, and the different properties of the land on which it grew.—First, as to wheat; it was generally very good throughout the kingdom, and flourished strangely on all strong healthy lands; nor did I observe any light poor lands suffer thereby, so as I could impute the weakness of the crop to the continued drought; the berry was plump and well coloured, golden coloured and not horney coloured, and no failure of chests in the ear, as there was in the last cold and wet summer; it is true, just on the hardening of the wheat the straw did, in many places, give off, so as to be struck with a blight, and felt tough and rottennish under the hook, but this was for so few days before the berry was ripe, and the wheat was reaped, that the wheat being, in a manner, already ripe, the
the

the berry did not suffer thereby: what I did particularly wonder at, during the fiery trial all corn did seem to undergo this summer, was, that I had twenty acres of wheat, and the ground being of a cold clayey nature, I had sowed the wheat under furrow, and laid the ground round in small high ridges, of seven furrows in a land or ridge, thereby thinking to lay this cold land dry and warm, (though this land had by nature a dry situation, being on the summit of my hill-country farm) and the lands being thus laid round were so dry as to be dust, to the eye, before the beginning of June, insomuch, that if I run my stick in as deep as the roots of the wheat, and turned up the earth, there was no moisture to make a cohesion, but the earth so turned up fell into the driest powder, yet did the wheat of this ground flourish, and grow proud in colour beyond any wheat in my farm, though the land was poor, under the fourth crop, and had no dung or fold to support it; and this wheat proceeded to ear, and brought me ten to eleven chests in the ears, and perfected the berry, without giving out the support of it, till harvest; and yet the earth seemingly iron whereon it grew throughout the whole summer; this evidently shews, the clay land of England ought to be so prepared by tillage, that the sun may carry on it's business of burning and drying it, to the greatest degree it is capable of doing.

As to the winter-vetch crop of this year, it bore the tedious drought and heat better than the peas, where-ever they both grew in land of the same kind; in hill-country land, if the mold was any ways light, weak, or poorish, they bore up against the heat, where the peas gave out, were parched up, and were lost in blossom or kid; this advantage the vetches had over the peas, by having their roots established during the winter, and by the earth's being well settled and closed to the roots before the drought came: yet I observed, where vetches were sowed on one earth, on stiff land, in our hill-country, which had laid two years to grass, such vetches did give out at blossoming time, and yielded only top kids, and the leaf soon blighted after the blossoming time was over; which was occasioned by such land being unfriable, harsh, and churlish, and so did not close to the roots of the vetches, to keep out the scorching heat, as did the earth of mellow land, tho' not so strong; parcels of whole land sowed in the same field, tho' of a weaker yet of a more loose texture, did support the vetches better.

As to the peas crop this year (1714) I observed where lands were pot of a strong clayey or malmy kind, or of a fat sandy mold, they failed extremely both in halm and kid: generally all dry, harsh, or hungry ground, all ground that was not well worked with the plough, or where the pea was not sowed early, to establish the root before the drought came, and blossomed late, there

was

was a great failure both in halm and number of kids, and those kids were very short, and but two or three peas in them.

As to the black oat crop, it being generally (especially in the hill-country) sown either on light weak land, or on stronger land after it has been worn out with three former crops, and for the most part being sown on one earth, they were in general very indifferent and poor throughout the hill-country, yet being usually sowed at least a month before the barley, their roots were so well established, and the ground so far settled to the roots, that of the two they escaped better than the barley, though that was sowed in much better ground; in the vale I also observed a great failure of oats.

In regard to the barley-crop of this year, there was a great failure throughout the hill-country; for the lands there are generally of a lighter, drier, and huskier nature, and not partaking of the malmy fatness of the clays, or of the mellow, rich, hazle mold of the vales; wanting therefore the stock of vegetable spirits to support the root, and having not that mellowness of parts, to clasp about and close to the roots, the barley failed in proportion as the lands did more or less partake of the aforesaid properties, or were later sowed; yet it must be granted, that in the hill-country, where was strong land, or cold clays, if the land was in good heart, worked well with the plough, and sowed early, such land bore very flourishing barley: in the vales, where the earth was of a white malmy clay, of a binding sand in good heart, or of a fat hazle mold, and in good bean and peas land, well worked, and sowed early, there was excellent barley; but where-ever, in the vale, the land came short of these properties, was indifferently husbanded, or was sowed late, there also was a lamentable crop of barley.

Of a cold
spring.

§. 5. This year (1709) we had a cold April and May, inso-much as between Wincheffer and Banbury I hardly saw a good acre of corn: but when I went from Banbury all along to Garenton in Leicestershire, I never saw better in my life (so said the country people, in those parts, of their corn) the reason of which must be, that the first lands, being poor and lighter lands, were penetrated by the colds, and had not strength to support the corn against them; but the northern lands, which were ten shillings per acre, did support their corn; therefore a cold April and May will not make a scarcity, if not wet.

Effects of
rain.

§. 6. I look on rain always to carry with it fructifying principles; yet it happens sometimes, that rains, being very frequent, do beat the fallows flat and close, so as to prevent the ground from letting in the sun and air, and in that respect they may be prejudicial.

Wet

Wet summers (such as in the year 1703) keep that juice, which forms the flour in corn, watery and thin, and hinder it from digesting and fixing into a firm body; and time lost is never to be regained by any plant, in any of its progressions, whether as to its formation of roots or fruit; there are certain progressions limited for every day and week, as on the hatching an egg, and any interruption is a prejudice: nature will finish what she has undertaken (with a very little regard to the difference of time) whether it be perfect or imperfect.—The wetness of this whole winter, which was very rainy, prevented so many grains being formed in the ear as is usual; for it was matter of fact, the ears were never shorter; the wetness of May and June prevented the grains in every ear filling before it shot out of hood; for it was manifest there were four or five husks in most ears, at the bottom of the ear, which were not perfected nor filled; and doubtless the remainder of June and July, if wet, will make the grain in the ear thin, and the lowermost grains more especially.

It seems a great deal of rain and wet weather, to wheat in ear, and other corn when it is high, is a prejudice; for those juices, which form and fill up the ear and grain, and fashion, and make the blade to grow, seem to be different; inasmuch as, both in corn and fruit, it is worse the wet years, when the blade and shoots run longest: when the corn is up so high, though the season of the year be hot, yet the ground is so shaded as to be in danger of being chilled by much rain; it seems that the heat and power of the sun must, the whole time, attend the ground in its incubation; for none doubts the West-Indies being better ground than England, yet runs the corn up to so mighty a stubble, (to which length it cannot grow till towards the latter part before it's ripening) that to it's length, which runs so high, and keeps off the benign influence of the sun, Mr. Ray imputes the thinness of the grain.

§. 7. This spring (1711) was wet and cold for the most part of Of a wet March and April, and May was also rainy; the consequence of spring. which, in ripening our corn at harvest, was this; the wheat ripened, and we were reaping it by the 27th of July; but the oats ripened not till the 18th of August, when I began to cut them; and the barley began to ripen not till the 26th of August, when I began to cut the barley; so there was near three weeks distance between the wheat and oat-harvest, and near a month's distance between the wheat and barley-harvest. From hence I conclude (as it seems to me) with reason, that the colder and wetter a spring happens to be, and the longer it continues so, there will be the longer distance of time between the wheat, oat, and barley-harvest; for the wheat being a hardier grain, and being strong and well rooted at the spring of the year, is not pinched by a wet and cold spring, nor kept back in growth, as the
oats

oats and barley are, they being tender grains and their roots weak at that time of the year; and (vice versa) hot springs may ripen the barley before the wheat, as it stands in more need of warmth, and is more sensible of it than the last mentioned grain.

Of wet
winters.

§. 8. Last winter (1702) was a very wet winter, and May and June following were also very wet, which made corn yield very ill: I infer, if the next winter and summer should prove as wet, and yet not wetter, corn will prove thinner and yield worse, and be dearer than in the former year; because that year came after a very dry summer, for which reason the corn fared the better; but it's a great disadvantage for land to wear wet cloaths to it's back two years together: the more years prove so unseasonable, the more and more will the land be poisoned.

It is a common imagination of the farmers in the hill-country, when much and almost continual rains fall for a good part of the winter, that it will make corn dear, whereas I have commonly found them disappointed in such their expectations, and that the lands in the vale do not so much suffer, through a rainy winter, as they imagine, nay not so much as the high hill-country lands, if the ground be of a cold clay: for the vale lands, though they lie low, and are thereby subject to be wet, yet, for the most part, are warm in their nature, by reason of a mellow hollow texture, whereby they soon recover and grow dry after the winter is gone off, the sun and wind piercing into them, especially if the ground of the vale be good, as it usually is much better than that of the hills: in such case, by it's own vital heat and spirit it resists the chill of the winters, and soon recovers itself again; whereas lands of the high hill-country, especially the clays, being of their own nature much poorer, and more out of heart than those of the vale, do more in that respect suffer by winter cold rains, and, by reason of their heavy and close obstinate texture, do much longer retain the water in them after the rainy season is over; by which means I have often observed, that if cold rains return on the back of the former, the corn of such cold clays on the hills, being still sickly through the former wet, often dies; whereas that of the vale, sooner recovering (as I said before) the chill of the former wet, has got some days strength and refreshment to bear up against the cold poison of the second rainy season which so soon returns after the former.

That winter wet is not reckoned to harm wheat by fogging the root of it, answerable to the wetness of a March month, has this reason for it; because the pores of the roots are, in a manner, quite choaked up in the winter, nor is the winter water active, because there is not sun enough to attenuate it's parts, and to make them penetrate the tubes and roots of the wheat; whereas, when the month of March comes, the sun has got strength, and has

has opened the porous roots of the plants, and has attenuated the juices, which are therefore drank in greedily, and at this time the sun has not yet power enough to qualify this dropsy by it's heat, by drying up the waters, &c.

§. 9. I observed, at one end of a field, that my barley looked much more sickly and thinner (when sowed a month or six after sowing) than the rest, but remembered that very patch had been inundated the year before for the wheaten crop much more than any part of the field, at which I wondered; but was told, that that patch was sowed, and before it was harrowed wet came, so that the ground was chilled and did not harrow well; so much the good condition of corn depends on these two things.

§. 10. I do conceive the coldness of the nights, (where the ground is cold clay, and the country high situated and hilly) does most contribute to the coarseness of the corn; for the summer days (tho' the coolest) are somewhat refreshing to corn as well as man, but the nights are many times of so cold a degree as to check the vegetable progression; especially, when there has been rain from a cold corner, and a cold soil for the corn, such cold of the night being of a degree beyond what the corn can support itself under, it is pinched thereby.

§. 11. On several years experience I find, that on our high hills situated near a vale (especially in the spring time of March, April, and perhaps May, when the air is cold, dry, and windy, and of a harsh astringent temper, as usually it is at those times of the year: or, in fewer words, when the weather glass imports dry weather, for to that temper of the air I conceive the cause following is assignable) it is to be observed, that though there be large floating clouds boding rain, that rise and pass on one after another, watering liberally some parts of the earth over which they pass; yet that such clouds at those times of the year seldom empty themselves on our hills, but on the vales, whilst we, enviously, at a distance look on our neighbours happiness: this seems to be, because the air, being, as before mentioned, dry and thin, has more elasticity in it, and consequently gives a greater resistance to the clouds driven on by the winds, so that the clouds are easily diverted and turned aside into the stronger channel of the wind in the vale under the hills, and therefore our expectation from the clouds rising from the horizon big with rain, at those times of the year, are generally vain: whereas I observe, on the contrary, when the air is loaded with moisture, as may be sensibly perceived by the dampness of most things, and by the weather-glass being low, that such clouds before mentioned shall keep their steady course towards us, in an impartial manner, according to the tendency of the air and wind at that time; so that every cloud moves in a direct line without making a curve, or yielding to the

vortex of the vale, and then we have a share of the rain with our neighbours. This seems to depend on the yielding temper of the air, whose tension, by the moisture, being unstrung, and it's elastic power being lost, the clouds meet with resistance, and so pursue a more ready and direct course, and are less drawn off and solicited by the collateral current of air in the vale, but take their course pursuant to a direction of the wind behind them, the air before them easily yielding.

Indicati-
on of rain.

§. 12. From constant experience I have concluded, that, if the air be sultry and gloomy, without a breath of wind or very little, the sky full of wool-pack clouds boding no rain, yet in such cases fierce showers are very near, suitable to the gloominess and sultriness that forerun: for the clouds moving towards you, though not above your horizon, according as they are larger, stop the current of the air; whence such a coolness happens, that breathing, on such approaching weather, is not so easily performed, and from the atmosphere being full of ponderous clouds, it happens that the heat of the sun-beams, on us, must be very intense, when they are collected and contracted into narrower spaces, and either pass through the concave clouds, or are reflected from them, or break through the narrower interspace only between the clouds, which makes those scalding uneasy heats: then in such cases, tho' no threatening cloud appears in sight, yet be assured that rains are not far distant, and in an hour's time you may be likely to be surprized; then govern yourself accordingly for that whole day, whether it be in harvest or hay-making time, or when any business may suffer by rain, and lay not yourself open to the power of fierce rains to hurt you, but be on your guard, and forecast the most advantageous game you can play, on the certain expectation of hasty showers, and let not the fallacious opinion of the labourer, in harvest or hay-making, deceive you, who thinks rain is far off because no cloud is near, and a pretty clear sky.

Of rain in
hot cli-
mates.

§. 13. It is an instance of great providence, that in the hot climates God sends rain but seldom, unless the first and latter rain, to bring up the corn and ripen it, and to bring it out of the hose; for did it rain frequently there, as in England, &c. the corn would run up to such a height as to lodge and rot.

Of the
moon's
influence.

§. 14. By what I can collect from the antients, they certainly thought the moon had a considerable heat, more or less, according to it's increase or decrease, and in that sense the expression of Columella must be understood;—*sol & luna coquant*, for Virgil applies the same to the sun,

“*Glebasque jacentes
Pulverulenta coquat maturis solibus æstas;*”

and

and what else can that verse in the Psalms signify; "The sun shall not BURN thee by day, nor the MOON by night?" With regard to it's power and influence, sublunary things seem to have a force and strength increasing as the moon increases, and a force and strength decreasing as the moon decreases; and this is more visible or intelligible in things weak of themselves, which are more easily affected, such as are seeds sown, which are young and tender, children ill, sick persons, persons weak in their understandings, and consequently in the spirits, persons weak in their eyes, and consequently in the local animal spirits of that part, which have not a good influx; thus we see it is in a moon-blind horse; but, if ground be strong, I believe it is not much in the power of the moon to affect the seed, as strong-constituted persons are not affected much with weather, good or bad, whereas valetudinarians must live by rule; for I apprehend the influence of the moon to be no more than what she has by her borrowed light; the increase or decrease of which, when the sun is withdrawn from us, may sensibly affect things weak, to their comfort or discomfort; and the juices in the plants and seeds, and spirits in our bodies may rationally and experimentally enough be allowed to move brisker, or the contrary, as her borrowed light is greater or less: persons who, through a laxity of muscles, stammer, are observed, the wind being south or south-west, which relaxes, more to stammer; but such winds affect not the speech of other persons, who at other times pronounce distinctly.

§. 15. The wind moving the plants, and blowing them to and fro, seems, as Sir Francis Bacon has observed, to be the same Of the wind. towards strengthening the fibres and solids of plants, as exercise is to us.

ENEMIES to HUSBANDRY.

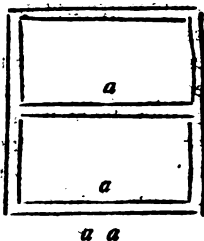
§. 1. **M**R. Bishop of Dorsetshire, his shepherd, and his carter Of foxes. told me, that in lambing-time, and whilst the lambs might be in danger of the fox, they send out a couple of fellows with horns all night to walk about, and blow and halloo, and on these nights stake down a couple of dogs, at fit distance, in a bleak cold place, which will make them bark all night; but that way, the shepherd says, will not always do, but a lamb however will be lost sometimes; nor can the same dogs abide it for above two or three nights; for then they will be so cramped as not to be able to get over a stile for two or three days afterwards: these men who walk about have sixpence a night, and meat and drink; they must not walk about with a dog, for by so doing the sheep will be set o' bleating and running as much as if the fox was amongst them; so that they would not know when the

fox came, which by the disturbance among the sheep may be known; nor will they, after he has been with them, be quiet from bleating till every ewe has got her lamb.

Another, a gentleman farmer of that country, assured me, he drew his flock together within two acres of ground almost as close as if he had folded them; and set four dogs, staked down at each corner, to keep off the fox by barking all night, and yet the foxes stole away that night two lambs, and bit a third.

Hares. §. 2. I observed in the barley several full-grown ears withered lying along in a track of the field, which seemed to be a great spoil; I took them up, and found the hares, to make a more convenient track, had bit the straws off at the ground.

Moles. §. 3. The square of timbers I saw in the Isle of Wight, to cut mole-hills off; were six feet and a half in length, and the plate of iron about two inches broad, and sharpened as a knife is, from the back to the edge; and made after this fashion, *a* the joists, if one may so call them, across, which are sloped all away upwards, so as with the flat side they lie on the ground and are sharp; all the pieces of timber are much of the same bigness, about half a foot broad and four inches, or better, thick, and the plate of iron set on the uppermost side of the lowermost bar, marked *a a*, hangs a quarter of an inch with the sharp edge over that bar of timber.



Mice. §. 4. In taking down a reek-staffold of wheat, I observed (as at other times) the mice for the greatest number by much lay on the south-west side of the reek, from which corner comes most rain and moist air, of which they may drink; this reek was carried up to a center like a cockpit, thatched as well, to my neighbouring farmer's judgment and mine, as ever we saw a reek; yet these mice had opened holes in the center top, and hollowed it in such manner, in order to come at the water, that, being a wet winter and summer, much rain had fallen in and done considerable damage; so that the top thatch of reeks is to be looked after, where mice are suspected to be.

To my great surprize I find, that mice will not eat the hulled hop-clover seed, but will scoop out all the flour of the broad-clover seed, and, to amazement, will not leave one seed in a bushel, but what is thus scooped, in a short time.

Rooks. §. 5. This day (April the 24th) I observed the rooks, in my garden, to pull up the beans when they were come up green; they pull at the green stalk, and, if the ground be loose, the bean-seed but little wasted comes up with it. Corn was almost all sowed now throughout the country, which I believe made them apter to

to fall on the beans : and in the afternoon of this day I observed the barley just coming up out of the ground, and a parcel of rooks lying thereupon, with their heads going apace up and down from the ground ; I went to the place, and found they had been pulling up the blades of corn, with which often, especially with a little scratching, came up the seed itself, little wasted, and only swelled, the blade but just appearing : note, my ground being rolled, they could not so well draw the grain after the blade, and on that account grew, I believe, sooner weary : the reason why they fell on the barley was, I suppose, the same for which they fell on the beans, viz. all corn being sowed, they could, for a few days, make better wages in fishing after the corn thus than in looking after the loose grains above ground.

In Wiltshire, at Holt and thereabouts, I observed boys keeping off rooks from peas in the fields after they were come up ; upon inquiry I found it was necessary, if peas came up before other corn was sowed, which was usual in those parts. It is not so in our hill-country, because we are sowing black oats in abundance before our peas appear ; but if I sow the great cotshil-pea, which I intend to do, which must be sowed very early, and come up before other corn is sowed, I must have, I find, the rooks kept off, or else, if I should go from home for three or four days without taking care about it, they may be all pulled up before I return.

§. 6. The destruction that pigeons and rooks make is incredible ; a neighbouring farmer assures me, that he has known an acre sowed with peas, and a rain coming so that they could not be harrowed in, every pea was fetched away in half a day's time by the pigeons.

I sowed wheat very early (viz. by the 3d of August) which was before the wheat harvest opened ; the rooks, having no other corn to prey on, laid on it, and devoured a great quantity : but they do most harm, when, in the winter-time, the snow lies on the green wheat, and is first going off ; for having had no food for some time, they fall then very greedily on the wheat.

* Rooks, if they infest your corn, are more terrified, if in their sight you take a rook, and, plucking it limb from limb, cast the several limbs about your field, than if you hang up half a dozen dead rooks in it ; this Mr. Ray says in two or three leaves of Remarks on husbandry, fol. 194, in his Etymology of words.

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* Among the many contrivances to frighten rooks, says Mr. Tull, as feathers stuck up, the limbs of rooks scattered about the ground, dead rooks hung on sticks, the gun, or a boy to halloo, or throw up his hat, or a dead rook in the air, I have found the last to be the most effectual.

* Fole. The grain of my wheat began to harden in the ear, and the rooks to gather to it: I was saying to my bailiff, that it would be hard to keep them from it, unless two men compassed it with guns; but he answered, it was a field of whose haunt the rooks might easily be broken; for, said he, there is only a dead hedge for a few * lug on one side, all the rest is quick hedge, and if you frighten them there, they will fly off to another haunt; a rook does not like to come to corn, but where there is a dead hedge, for they must be out upon the watch (and they do not care to light upon a quick hedge) to tell tidings: but crows will often light on the quick: I observed this year towards harvest, that the rooks gathered much about those corn grounds where my ponds were, to rendezvous and drink, and so to the corn again; therefore break them of their haunts early there, before the corn ripens.

* Loose at root. Rooks will not pull up the lanten-corn till seed-time is over, and there is not grain for them; and they seldom care for peas in the grain, nor barley as long as they can come at oats: for the oat stripped of it's husk is much sweeter, and tenderer to be bruised than barley, but when it is come up into blade, then they will most fall on barley; being last sowed, and a fuller bodied grain, there is more flour left in the barley than in the oat; when they fall on the barley in the ear it is in light ground that is hollow, where it is * more-loose; if peas were sowed late, without doubt they would sooner fall on their blade, and pull them up than other corn, because of the bulk of their grain, in which there is more flour to be found unexhausted; and I do remember, they fell on gore-vetches, that were sowed in May, with that voraciousness that it was very hard to secure half of them: in some grounds, which they take to, one may gather in the compass of a yard a handful of blades they have pulled up:—it is true, pigeons love peas best, which may proceed from the weakness of their bills that they cannot unshell the oat, and from the heat of their crops, which may digest a pea better than the rooks can.

It had been an excessive dry summer from April to this day (7th of July) and tho' there were no worms nor bugs, by reason of the drought, to be met with, yet the birds did not fall on the cherries, which I and others wondered at, but probably it was because there was so much corn sown about the house; but, where the summer is so very dry that rooks cannot come to worms, nor the plough go to turn them up, they will fall on the corn before it is half ripe, even when they can have but a green juice in the straw to chew, therefore are to be prevented.

§. 7. A farther evil there is in rooks, that their nests, when ^{Rooks and} their breed is over, is a harbour to the latter brood of the sparrows, ^{sp arrows.} which bird chooses then, when the weather grows warm, and the air mild, to build sub dio, and not to stive herself up in nests under the eaves of a house.

§. 8. In September I found many snails eggs laid at the roots of ^{Snails.} plants I pulled up: the 21st of October in rainy weather I observed a multitude of white snails or slugs, crawling on the ground, under the cabbages in the garden, most of which were not half so long as my nail, and in thicknes no bigger than a pin's head; so that I concluded them newly hatched from the September eggs; therefore it is seasonable to destroy the old ones before September, in order to destroy the brood. Quære, if they lay eggs any other months of the year; if so, to be chiefly taken off before such laying also.

In February I planted cabbages, and by the latter end of March had most of them eat up by white snails, or slugs, of which sort of snails we picked up a quart or more in a morning early for many mornings; the country was this year much infested with them; this evil seems to have proceeded from the very mild winter, which did not destroy the eggs they lay every autumn in abundance at the roots of all manner of herbs: the same is to be expected another mild winter, therefore look after them early in the spring.

Worldige (fol. 262.) says, that snails are of both sexes, and couple from spring until midsummer and after, and lay their eggs in the ground; you will find them with their bodies buried in the warm dust, and only their shells above the ground; when you take them out you must rake out their eggs and destroy them, or else some will be hatched the same year, and some in the spring following.

§. 9. Ants, in the hotter regions, are reckoned among the pests ^{Ants.} of the field, as in Italy, Spain, and the West-Indies. Mortimer, fol. 253.

One Timothy Skrine (a very industrious and laborious person in planting orchards, and my neighbour in Wiltshire, who, from an estate of ten pounds per annum, improved it that way to fifty pounds per annum) came to see me in Hampshire, and walking out with me in my meads, and observing the emmet-casts, he told me, he had tried many ways to destroy them, being much troubled with them, and particularly the opening their hills in winter, which they would rebuild again; (I suppose at winter they lie lower than people usually dig after them, therefore that way is unsuccessful) but that the best way, as he has by experience found, is to sling abroad their hillocks in the month of

June, in their breeding time, when they lay their eggs, before they come to be flies: I suppose this destroys their breed, puts them on endless labour to find them out, till they are hunger-starved, and, the brood being destroyed, the old ones (who are not I imagine long-lived) decay, and die in a short time; or perhaps they leave their habitations out of resentment for the cruel usage of their young, God having with his first blessing at the beginning implanted in all creatures an earnest desire of propagating and protecting their species; and we see the most fearful of them will venture their lives for their young ones; and it has been known, when persons would destroy rookeries by firing at the old ones daily, it could not be done, but, when the nests with young ones have been brought down, and burned under the trees, they have all deserted.

Worms.

§. 10. I made a gravel walk in my garden, and underlaid it with white mortar earth rammed in, and laid strand on it; both coats were above a foot thick; notwithstanding which the worms, in a few days time, made their holes through; I cannot suppose it possible for the worms to thrust or bore thro' such a solid with their snout; but having observed what a power they have with their mouth to pluck at grass, do believe, in the same manner they use their mouth in pulling away the earth in little crumbles, which they still tumble downwards under them.

I made a little court with a gravel walk in the middle, and grass-plots of turf on each side the walk; the worms came thro' the turf in vast numbers, and were very hurtful to it; the days being very rainy for a season, which brought them out at nights; my servants visited them with candle and lantern, and caught great quantities of them, till at length they grew so cunning that on stepping on the turf, though at great distance, they would feel the turf shake, and shoot into their holes; besides they would not, at their usual hours, come out of their holes, nor then, as they usually did before, lay out with most part of their bodies, but with their noses only; observing the improveable wisdom of these insects, I thought to be cunninger than they, and made sure of taking those that lay within my reach on each side of the walk; for the gravel walk laid lower than the turf, and being a solid, did not shake the turf, so I carried, as I stood in the walk, my candle and lantern over the turf as far as I could reach, but the worms being used to the light shot into their holes as soon as ever the rim of light came over them; I suppose they have no eyes, but God has given them an exquisite feeling to supply that defect, in many respects, in order to self-preservation. Light being a fluid body makes a different configuration of the particles of the air, which they can distinguish by the feel, as a blindman can
by

by use some colours ; at last I found the way to destroy them was, to visit them very early in the morning, in copulation, when I found they had a stupor ; which put me in mind of that saying of Pliny, omne animal post coitum triste.

I have a clay so obstinate about my house, for a quarter of a mile's compass, and withal so flinty, that I am sure a mole could never come within that space, and yet, if a stick be put in any place, and stirred about, the worms will rise and come forth, for fear of the mole, which seems to be purely owing to the enmity God has set between the worm and the mole from the beginning ; for it must proceed from somewhat innate, that a creature, which had never, in the grounds here mentioned, experience of harm in this kind, should blindly use this stratagem.

It is a common proverbial saying of the countryman, that at whatsoever country-farm a colony of rooks plant themselves, and make a rookery, it is a sign of good luck, and good fortune attending that man ; and on men growing unfortunate, and low in the world, the rookery has been observed to forsake such farm : for both which observations some good reasons may be offered ; viz. it is certain where a man is a good husband to his land and improves it, the worms also (a great food of these creatures, especially at some times of the year) multiply, and grow also to a much greater bulk and fatness ; the strength of land being as discernible by the large size of worms as from the growth of plants, and the beetle kind, on whose grubbs or maggots, therefore called rook-worms, the rooks do greatly feed, (as is apparent by their following the plough) do not only grow in such ground much fatter and larger, but those flies of the beetle kind, by the wisdom God has given them, do covet and choose to nest their fly-blow in such land as will best nourish and provide for them ; and the same instance of the wisdom of these creatures may be given in many like cases ; but, where an ill husbandman comes, the contrary to this soon comes to pass, upon which, no wonder if they say, let us go hence.

Upon viewing a farm in the Isle of Wight, to purchase it, we were afraid the farmer, according to the liberty he had by his lease, would have ploughed up the cow-lease ; farmer Collins said, if it was his he should hardly do it ; for, said he, good sweet cow-pasture ground, that has laid to grass a long time, is (in the Isle of Wight) very subject to the worm, which will eat up the corn ; it was a surprize to me to hear him say so, and therefore I inquired more particularly about it ; he said, the worm was very small, with a black head, like a fly, and when their wheat, about March, should promise exceeding well, it would die away on a sudden ; take up such green wheat by the root, and just
above

above the root and grain, within the earth, one may observe the stalk almost bit in two, and very commonly the worm upon it, and fresh ground is very subject to it, for the two or three first crops; I asked him if it ever fared so with their barley; he said, he never knew the barley to receive damage by it, but he had known the peas receive the same damage as the wheat. Mr. Rowler, an experienced yeoman, was present, and confirmed what Collins said.

Rook-worm.

§. 11. If ground be infected much with rook-worms, ploughing it up will cure it of them for some years.

Of the eggs of insects.

§. 12. I was at lord Pembroke's, and his lordship was discoursing about insects and their eggs, and propagation; he said, that many of their eggs which were laid late did lie out all the winter, and were not brought to perfection till spring; therefore it is observed, that, where there is a cold winter, there is a less increase of those insects.

Nut-maggot.

§. 13. The wisdom of God is very manifest in that contemptible insect we call a maggot, and in the fly that blows it in the nut: I do not remember that ever I saw two maggots in a nut, though most nuts in a bunch are faulty where one is so; it seems the maggots of the whole bunch are the blowing of one and the same fly, and that all the nuts of the same bunch would have been blown, if some accident had not disturbed the fly at the time of her incubation, for that a flesh-fly does at the same time lay many eggs is certain: again, it may seem strange, that one and the same fly should discern (it being an act of almost the same instant of time) where she blowed her maggot, so as not to lay another in the same nut; yet it seems stranger, that every other fly should discern where a former had blown a maggot, so as to avoid laying her fly-blow on the same nut; otherwise it would afterwards happen that many maggots would be in the same nut, and the provision of maintenance fall short: where the fly-blow is injected, when the nut is very small and tender, a canker grows over and closes, and consists of a rotten substance; and here it shews wisdom also in a maggot, that it can discern that easier place of entrance.

Caterpillars.

§. 14. I observed this day (the 11th of August) a multitude of young caterpillars on the leaves of my turnips half-grown; all the said half-grown leaves they had almost eaten up: note, the summer being very hot from April to this day, I conclude the latter brood of autumn was ripened also the same year, the eggs of which would otherwise have laid in the ground till next winter, these will be destroyed the next cold rains: from hence I conclude we shall have the fewer insects next year: it was a new thing to me at this time of the year to meet with such an enemy.

I observed

I observed this year (1709) in my walks among apple-trees and codling-hedges, that some apple trees were smitten with the blight, as the country people call it, when their leaves are eaten up with the caterpillar, whilst I observed that the rest were under a flourishing and green verdure, and untouched by the caterpillar; and I was told by the owners that such trees were most years so smitten; this occasioned some speculation and scrutiny, but I soon judged the reason of it; for I perceived a difference in the colour and shape of the leaves, between the blighted and unblighted trees, and upon enquiry found them to bear different fruits, and, if of the same sort there were any blighted (which really happened when others escaped) I found, by reason of the different ages or unthriving condition of these trees, they had put out their leaves earlier or later than the others, and soon perceived that some trees, by bearing sweeter leaves than others, were more suitable to the tooth of the caterpillar, or, by bearing earlier or later, were more suitable as well as more tender at the time the caterpillar was to be fed, and that such fly laid her eggs on such trees (by the wisdom appointed such insects by providence) on which the worm (i. e. the caterpillar) when hatched and grown to maturity, might have it's best maintenance.

§. 15. A notable fellow (though a labourer only) in husbandry, ^{Caterpillars and flies.} drove a yoke of oxen from the neighbourhood in Wiltshire, where I have concerns (viz. Bradford and Trowbridge:) I walked him about to shew him my corn, and an occasion offered to discourse on peas: I asked him if they were not often eat up by a caterpillar in Wiltshire; he said, in case the peas grew into a good halm, and blowed well, they never doubted a good crop of peas in their neighbourhood, for he never knew peas hurt by caterpillars in their country; but about fourteen years ago there was a winged fly, a sort of locust, which did them damage: I replied, I supposed they sowed peas so early as to escape the danger of the caterpillar by their forwardness before that insect came; he said, that was not his meaning, but the true reason for the escape of the peas, about them, was, because so many elms, maples, and oaks grow about their grounds, which the fly (the parent of the caterpillar) who knows the tooth of her brood, prefers before the pea, and in the leaves of the said trees lays her eggs: I take notice of this, because it is agreeable to my own observation in former papers; and here the hand of God is very wonderful, to instruct the butterfly to choose such plants, to lay it's brood in, as are best suited for their nourishment, whereas the butterfly judges not of it, nor chooses it, by taste, leaves of plants not being the food of those flies, but the juices of flowers and honey-dews.

§. 16.

Grafs-
louse or
locust.

§. 16. The green-louse or locust falling on the broad-side of the pea-kid, and thereupon the grain not thriving, seems an argument that the sap, which nourishes the pea withinside, is conveyed to the grain, and strained through the fibres of the kid; for otherwise there is no reason why the pea should suffer by this, seeing the spine, to which the pea adheres by a thread, is preserved entire, and is joined to the main stalk; through this therefore the sap might be conveyed directly, and without any prejudice to the pea, were it not first to be strained through the fibres of the flat side of the kid.—This to be referred to what Malpigiuss has said of the sap's circulating through the leaves of the fruit.

The 13th and 14th of June, in pulling up wheat in ear, and fowthistles, I did observe among the upper part of the roots of most of the wheat and fowthistles, knots or clusters of grafs-lice, or green locusts (though these appeared whitish, being underground, and as yet but just come to their shape) and amongst most of these clusters I observed a fly at her incubation, which seemed very turgid of a whitish matter, she being then blowing these insects; her wings were black, and the fly was plainly the same as the locusts, only it had wings: I found at no root more than one fly.

Cuckow-
spit.

§. 17. On May the 22d was the first cuckow-spit I had observed, which was on a woodbind joint; till within a day or two of that time there had been no rain or dews all April and May, and so whatever insects of that kind were laid in the joints of plants could not live, but must be scorched up.

In the history of Works of the learned, for April 1707, I find Monsieur Poupart has given an account of the cuckow-spit, or spring froth; he says, as soon as the little creature comes out of it's egg, it goes to a plant, which it touches with it's fundament, and fastens there a white drop of liquor full of air; it drops a second near the first, then a third, and so on, till it covers itself all over with a scum or froth; this froth keeps it from the heat of the sun, or spiders that would suck it; note, this is not agreeable to my observation made in another place, nor can I agree with Mr. Poupart; for it is nothing but the nightly dew, which falls on the fork, or joint of the plant, which the little insect with his proboscis, as with a bellows, works into froth.

Of the fly
in apple
blossoms,
&c.

§. 18. Being acquainted that a great blight was upon the apples, where I observed no leaves eat up by the caterpillar, I judged such blight must be of another sort, and upon inquiry (when none of the apples were bigger than gooseberries, and the more backward much less) I found this blight was on the blossoms; for I found the blossoms had been closed up, and a cement bound the rims of their leaves together, and in the hollow inclosure was a fly, brown, and of a hazle colour, of hard wings like the beetle

beetle kind, of legs not shelly like theirs, and more nimble, of a neck as big as horse-hair, and as long, near, as his body, at the end of which he bore a very small head between two slender horns: where these blossoms were scorched up by the sun and looked black, by reason of the time which had passed since their more early blowing, there I found the fly perfect, as before described; but in those blossoms whose leaves were less dried, scorched, and sun-burnt, which I took to be blossoms of more backward trees, there I found the fly as yet imperfect and unripe, with a yellow soft skin and helpless, but in a quick motion of it's body, it's legs and wings being as yet swathed up in this outward coat, which was by heat to ripen and crack: I perceived, by the degrees of the forwardness and backwardness mentioned of this insect, that the fly which blowed them must have several days for reigning, to do this mischief, distant in time from each other: it was no cobweb as I could find, that cemented these leaves together as above-mentioned; but I conceive it to be done by the heat of the sun drawing away the tenuous parts from the dew of the flower, whereby the gummy substance quickly joined these leaves: it may be the fly took a blighting mildew air for the doing it: I believe this mischief was done before the blossom opened itself fully, because the closure and figure of it was in all like a blossom whose leaves close at top before they are expanded. When the insect grows to maturity, he eats a hole and goes forth: a vast miscarriage fell on the fruit this way, more than in all other ways besides; I found it the same in all gardens and orchards: note, the costermongers and cyder-men may enrich themselves by an early foresight of this, by buying up the apples; for the scarcity is to be foreseen before the flower is full blossomed, whereas we do not usually understand this mischief till it is obvious to every eye.



CON.

Explanation of Terms in Husbandry, used in the foregoing Observations.

A.
AFTERMASS. Aftermath; lattermath, second crop of grafs mowed in autumn.

Ana. Of each an equal quantity.

B.
Brashy. Full of small stones.
Barton. The yard, the farm-yard.
Burnbeak, burnbate. To cut up the turf, and burn it in hillocks on the land.

Brit. To shed, to fall.
Backside. Farm-yard.
Bennets, beats. Spiry grafs running to seed.
Benneting-time. When the pigeons eat the grafs-seeds.

C.
Cotyledones. Rinds, husks.
Chitt. To sprout out, to grow.
Chafe-row. In planting quicksets a single chafe is a single row; a double chafe means another row planted below the first, not directly underneath the upper plants, but under the middle of the intermediate spaces.

Chiffum. To put forth roots, to grow.
Cues. Shoes for oxen.
Chocky. Chalky, dry.
Couples. Ewes and Lambs.
Cow-leafe. See Leafe.

D.
Declivous. Shelving, sloping.

E.
Earth. To one, two, three earths; to plough the ground once, twice, or thrice; to sow after one, two, or three ploughings.

Edge-grown. Coming up uneven, not ripening all together.
Erthe. Stubble.
Elm. See Helm.

F.
Fallows-stale. Ground that has been ploughed some time, and lies in fallow.

Flue. Weak, sickly.
Finnowy, vinnowy, vinnewed, vinney. Mouldy.
Foliomort, fillimot. Colour of dead leaves. Raddish yellow.
Fusty. Musty.

G.
Gripe. Armful, from Gripe.
Grip. To lie in grip; to lie on the ground, before it is bound up in sheaf.
Grip. To grip, or grip up; to take up the wheat, and put it into sheaf.

Gnash. Crude, raw.
Grete. Mold.

H.
Hulls. Chaff, the hull, the rind.
Helm. Halm, or straw prepared for thatching.
Helm. To helm, to lay the straw in order for thatching.
Heirs. Young trees in coppices.
Hayn, or hayn up. To hedge in, to preserve grafs grounds from cattle.

Heal. To cover in; to heal seed with harrows, to cover it in.
Hee-grafs. Stubble of grafs.
Hog-sheep. Young sheep.
Hog-fold. Fold of young sheep.
Hint. To lay up; to put togethes.
Horfe-leafe. See Leafe.

I.
To joist. To take in cattle to keep at a certain price per head or score.

Idiosyncrasy. A peculiarity in nature or constitution. A temperament whereby an animal hath

hath a peculiar inclination to, or aversion against, some particular things.

K.

Knot-fine. Very fine. To knot fine, to turn up fine under the plough.

Knotted sheep. Sheep without horns.

Kittle. Subject to accidents, uncertain.

L.

Lugg. A pole in measure, 16½ feet.

Leafe, lea, lay, ley. Grassy ground, meadow-ground, unploughed, and kept for cattle.

Linchets. Grass partitions in arable fields.

M.

Mores. Roots.

More-loofe. Loofe at root.

Mamocks. Leavings.

Malt-rashed. Overheated, burnt.

Meliorate. To enrich, to make better.

Mixen. Dung, dunghill.

Muck. Dung.

O.

Oughts. Leavings.

Oils. Barley oils, the beard or prickles.

P.

Præcocious. Early ripe, forward.

Pitch. To waste, sink in flesh.

Pur-lamb. Male-lamb.

Peal. Loofe its hair.

R.

Rath-ripe. Early ripe, rather, sooner.

Rashed. See Malt.

Rime. Hoar-frost.

Rowet, rowen. Winter-grass.

Rafty. Rusty.

S.

Sull.

Spalt. To turn up; it spalts up from below the staple, i. e. the

bad ground turns up in ploughing from below the good mold, which is difficult to be avoided when the land is ploughed dry.

Suant. Kindly, even, regular. Probably from the French word *Suivant*.

Shutes. Young hogs, or porkers, before they are put up to fattening.

Stale-fallows. See *Fallows*.

Soboles. Buds for the next year's increase.

Succedaneous. Substitute to, or supplying the place of something else.

Sheep-slate. Sheep-walk, sheep-leaf.

T.

Tine. Tooth or spike. To give two tinings, three tinings, &c. to draw the harrows over the ground twice or thrice in the same place.

Tilt or Tilth. See *Earth*. To give land one, two, or three tilts, is the same as to plough to one, two, or three earths.

Tilt or Tillage. To be in good tilt, is to be in good order, or in good tillage.

Tillow. To spread, shoot out many spires.

Trig. Firm, even.

Thorough. To go thorough, not to prove with young.

Tupp. Ram.

Tupping-time. Ramming-time.

Thief. Young ewe.

V.

Vetches-goar. Early ripe, or summer vetches.

Viliorate. To make worse, impoverish.

Vinnow. Mouldiness.

W.

Woodfeer-ground. Loofe, spongy ground.

Warp. Miscarry, sink her calf.

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