

A sample of biscuit-meal analysed by me had the following composition :

Moisture	8.70
Oil	1.61
Albuminous compounds (flesh-forming matters) ..	10.12
Starch, dextrine and sugar	76.90
Cellulose (woody fibre)58
Mineral matters (ash)	2.09
	100.00

Rice-meal.

Rice-meal varies much in composition, for the commercial article sold under that name contains variable, and often large proportions of the husk of rice, which possesses little or no nutritive properties.

A sample of rice-dust lately analysed by me had the following composition :—

Moisture	8.83
Oil and fatty matters	9.50
*Albuminous compounds (flesh-forming matters) ..	12.75
Starch, mucilage and digestible fibre	50.69
Woody fibre (cellulose)	10.14
†Mineral matters (ash)	8.09
	100.00
*Containing nitrogen	2.04
†Containing silica	3.17

Rice-dust contains a good deal of a nicely-tasting yellow oil, which no doubt adds much to the fattening properties of rice-meal; but the price at which this meal is usually sold in the market, in comparison with the more nutritious barley-meal, is far too high.

AUGUSTUS VOELCKER.

12, Hanover Square, London,
December, 1864.

XI.—*On Cross-Breeding in Horses.* By W. C. SPOONER.

It is now nearly five years since I discussed the subject of cross-breeding in the pages of this Journal, vol. xx., with more particular reference to the breeding of sheep; my paper excited some little attention, and I had no reason to complain of the criticism it received. In the mean time, I have seen no cause to doubt the truth of the principles then advocated, or the facts adduced in their support. I propose, therefore, at the present time, to show the applicability of those principles to

the horse, more particularly the saddle-horse, and I hope to illustrate this branch of the subject with equally strong examples. Amongst the points I sought to establish were the following:— That the influence of the male or female parent is not capricious; but yet not always alike: in the majority of instances the male parent governs the size and external shape of the offspring (particularly in the back and hind-quarters), whilst the female influences the constitution, the nervous system, and often the head and fore-quarters—the case being, however, occasionally reversed. That this combination, which may be more of a mechanical than a chemical union, by no means implies such an equal division of influence, as the mingling of two fluids, in which case the offspring would be unlike either parent, but a *juste milieu* between the two, and there could be no handing down of type from one generation to another. It is rather such a fusion of two bodies into one that both defects and high qualifications are passed on from parent to offspring with a sort of regular irregularity, resembling the waves of the sea—each parent having the remarkable power of propagating ancestral peculiarities, though latent in itself. Thus it is that strong characteristics are handed from one generation to another; so that if we seek by careful selection to remove a defect or propagate a good quality, we may calculate that a large number, perhaps the majority of the offspring, will meet our wishes, and by weeding out the remainder and pursuing this course for several generations we may accomplish our design. This view will further explain how it is that defects not seen in the first cross, being kept down as it were by the superior influence of the improving parent, re-appear in the next generation, and serve to deter timid breeders from continuing the experiment, or arm the opponents of crossing with strong but fallacious arguments against going beyond the first cross.

I pointed out that, owing to the superior influence of the male parent, the effect of the first cross in sheep was very considerable, bringing greater size, often longer wool, earlier maturity, and a propensity to fatten; or, in other cases, superior quality of mutton. Many persons who go thus far are deterred from going any farther by the very numerous failures which result from pairing together animals of the first cross, and consider that pure breeds only should be perpetuated; I adduced, however, various examples to show that crossing might be carried much farther, even to the extent of establishing altogether a new breed, possessing qualifications which, although derived from them, yet neither of the parent breeds alone exhibited. I instanced the cases of the Improved Hampshire, the New Oxfordshire, and the Shropshire, and more particularly the flocks of

Mr. Humphreys, as affording successful illustrations of the practice.

Special reference was made to Mr. Humphreys, who, starting with two of Mr. Jonas Webb's best prize Southdown rams, kept steadily to sires of his own stock, occasionally purchasing fresh Hampshire ewes, until in the course of 20 years he had established a first-rate breed, all of which were descended on one side from Mr. Jonas Webb's Southdowns. This example, as well as that of Mr. Rawlence of Wilton, who now scarcely ranks second to Mr. Humphreys, seems to show that the use of males and females possessing a similar amount of breeding is much more to be depended on than the system pursued by others who cross with the Sussex when their sheep are getting too strong or coarse, and with the old Hampshire when they are getting too small.

I now further propose to inquire whether this system, which is so successful with sheep, is one altogether to be condemned with *horses*; always assuming that cross-breeding, to be successful, must be undertaken with a distinct and defined object, and assigning the highest praise and the first rank to those who maintain intact the purity of our best established breeds.

An opinion is very commonly entertained that there are only two pure breeds of horses in this country (ponies excepted), viz., the thorough-bred and the heavy cart-horse,—all the rest being but modifications of these races in various degrees. It is, however, probable, that long before either of these extremes were known among us there existed a native breed of a very useful kind, pure examples of which are now scarcely to be met with. The *pack*-horse with his drooping hind-quarters, good shoulders, strong fore-legs, and sure action, existed in England for centuries before the Barb and the Arab were imported for the chase or the race-course by the Stuarts, or the introduction of carriages had led to the use of Flanders mares brought from the neighbouring continent; these heavy horses, with their high action, slow but sure and staunch, being naturally much prized for helping the ponderous coach out of the deep ruts of the high roads or along the miry lanes. The heaviest of the race were greatly in demand not only for tilling the strong lands but for drawing the cumbrous road-waggon before even the six-mile-an-hour luggage-van was introduced as a novelty and an innovation. I have before me one of Morland's striking sketches which reminds me forcibly of my boyish days, when the slow but sure approach of one of these ponderous vehicles with its eight or twelve ton load, heralded perhaps by a cloud of dust ever stirred up by the heavy feet of the ten or twelve massive animals that moved it onward at the rate of some

two miles an hour, never failed to command attention. It was a sight to behold these leviathans settle into their work after a short respite in the midst of a steep hill; the burly waggoner, too heavy to walk, and scorning to ride in his waggon, was mounted on one of those strong sure-footed ponies, usually white or pie-bald, which have long since disappeared. A crack from his long whip would send in to the collar with a 20-horse power the ten hairy-legged but powerful brutes whose broad backs were rendered still broader in appearance by the absence of tails, for each horse was docked close to the stump, under the absurd idea that their strength would thereby be increased.

It is difficult to imagine that this waggon, which seemed to the people of the day to be one of the institutions of the country, was itself formerly looked on as a newfangled novelty, which superseded the once universal, now well-nigh forgotten pack-horse.

There are but few specimens remaining of the pure pack-horse breed which has been quite neglected and overlooked by agricultural societies; and, consequently, whilst the mares have for a while proved valuable for breeding half-bred hunters with the thorough-bred horse, the males have been gelded and used up. This original or ancient race has no doubt been modified considerably in size, according to the fertility of the soil on which it might be raised; being sometimes developed into the strong upstanding harness-horse, and at others dwindling down to the plain but useful galloway, as seen in many remote districts, and particularly in the little horses used in the Irish cars. The Welsh pony and the Clydesdale cart-horse, the latter enlarged by rich pasturage and perhaps a cross, probably represent the opposite extremes of this same breed.

In less civilised ages the most useful horse was that which could most readily be adapted to all purposes; and there is no good reason why, even in modern days, the more ancient breed, equally pure and more serviceable than the blood-horse or dray-horse, should be altogether neglected, not only by our sporting men, but by the patrons of our agricultural societies; particularly since magnificent hunters have been the result of the cross between the thorough-bred horse and the old pack-horse mare. It will be useful to point out the peculiarities which distinguish the two breeds, with a few explanatory remarks on the component parts of the animal which by their varying proportions constitute those peculiarities.

The skeleton is formed of bone, which owes its solidity to the fact that it is composed of one-half or upwards of earthy matter, so deposited in cartilaginous cells as to render the bones strong and resisting, and adapted not only to support the weight of the animal, and to protect from injury the vital organs, but to serve

as a framework for the attachment of muscles, sinews, and ligaments. The bones of the limbs are for the most part cylindrical, and motion is effected by means of joints at the extremities of the bones, which are secured by powerful non-elastic ligaments. The bones are much smaller in the thorough-bred than in the cart and intermediate breeds, though generally more compact, and the joints also are by no means so wide, but admit of more longitudinal motion. With this diminished size there is, of course, less surface to sustain the weight of the body.

The sinews resemble the ligaments in appearance, and like them are non-elastic; they are attached to the bones, and serve to communicate motion to them from the muscles to which they are joined or from which they appear to spring. Both ligaments and sinews are smaller in the thorough-bred than in other horses. The muscles and the flesh are the same, and are the seat of the motive power, motion being produced by the contraction of the fibres of which the muscles are composed. The strength is the result both of the size and the number of fibres, whilst the extent of motion depends on the length of the muscles and their fibres. Of course the length of the bones corresponds to that of the muscles, and although the joints' in the thorough-bred have less surface, they admit of more motion.

The pack-horse may be thus described:—The prevailing colours of the breed were bay and brown, which, with the usual accompaniments of black legs, denoted a good and hardy constitution, yet other colours, such as greys and blacks, were to be found occasionally. Among the chief peculiarities were the good and flat fore-leg with its well developed back sinew or flexor tendon, the good and sound foot, and capital shoulders and forehead. The neck muscular, but not thick and heavy, was fairly arched, and the head, of moderate size, was well set on. This form was accompanied, as we might expect, with good and safe action in the walk and trot; the horse rarely stumbled, and only fell from overwork and exhaustion. Whilst the heavier and coarser specimen of this breed was capable of carrying his five-hundredweight load throughout a long journey, the lighter and more active was used as the ordinary saddle-horse or even as the hunter of the day. Many of these animals were extraordinary trotters, and, as good trotters are generally good walkers likewise, the quality was greatly prized and encouraged; and thus a race of trotters was bred which, no doubt, were the ancestors of the celebrated American trotting-horses, such as the "Tom Thumbs" of later days. Although these horses were deep in the chest and ribs, the hind-quarters were comparatively inferior, the hips were often ragged, the tail set on low, and sometimes the hocks were rather too straight. The celebrated trotting-horses of Norfolk were evidently

not true pack-horses, although perhaps allied to them : they had, no doubt, a touch of Spanish blood and possibly of the Thoroughbred.

Let us now, as a contrast, glance at the peculiarities of the thorough-bred horse. Racing, no doubt, existed in this country long before, but received a new impetus from the introduction of the Barb, the Arabian, and the Turk. The sires which were at first imported, quickly established the great superiority of the Eastern blood as regards speed, and when mares followed at a later date in smaller numbers, they no doubt still further added to the speed of the English racehorse.

The modern blood-horse is of much greater average size than the Arab or the Barb either of the present or the past; and a doubt exists whether this is entirely due to selection and nurture, or in part to the early crossing with the native mare; in any case, it cannot be denied that every thorough-bred horse in the kingdom, from the highest to the lowest, is to the extent of more than nineteen-twentieths descended from the Eastern horse. This foreign influence was not, however, derived from one strain only, for the pedigree of 'Eclipse' himself shows that besides his descent from the Darby *Arabian* and Godolphin *Barb*, he had five or six crosses of the *Turk*; and we have a strong conviction that the improved native horse, made up of the ancient British, the Spanish, and the Barb, is entitled to some share in the honours of his parentage. Be this as it may, the present English thorough-bred horse has proved himself faster than any of the breeds from which he is sprung; and although many doubts have been cast of late on his powers of endurance in comparison with the smaller horse of some fifty years ago, and the practice of training and racing has been severely criticised, yet there is good reason to suppose that our first-class winners are as stout as most of those which have preceded them.

The thorough-bred English horse, in common with the Arabian, possesses no doubt more muscular vigour, as well as nervous energy, than any other kind of horse.* In addition to this he

* From time to time it has been suggested, with the view of improving our breed of thorough-bred horses, and particularly their staying qualities, to resort again to the original or parent breeds; but not to mention the ill-success of such attempts when made, it must be evident that the tendency of this cross would be to diminish the size and to shorten the stride, and probably to render the action too high; we can therefore scarcely expect breeders for the turf to adopt the advice. At the same time it must be acknowledged that the Arab has been more successful with half-bred and under-bred mares than the third-class cast-off racer, inasmuch as with undeniable bottom there has been a hardier constitution, better fore-legs, and higher action from this cross. Where the dam has been of sufficient bone and size, many good hunters and handsome harness-horses have been so bred, and still more frequently capital ponies and galloways; indeed, this is one of the best modes of improving the breed of ponies. Arabs have, in

has a deep chest capable of admitting the large amount of air which the demands of the system require under severe exertion. By natural conformation and by artificial training all superfluous weight is removed, and thus he is capable of covering more ground in his stride, and of repeating these strides more frequently than any other horse, as well as of continuing his extreme efforts for a longer period without tiring. The heart and the brain of such a horse are comparatively larger than in other breeds, the bones, though smaller, are more compact, the skin of a thinner and finer texture, and the blood-vessels more developed. These advantages, however, are not without certain drawbacks. The delicacy of the skin causes the animal to be extremely susceptible of cold, he is consequently less hardy and requires more food to keep up the animal temperature, so that it is difficult to keep flesh on a thorough-bred horse unless he is kept warm; moreover, the carcass being smaller, the stomach and intestines are not so large, and consequently the food must be more concentrated and nutritious to keep up this supply of warmth.

The difference as respects hardiness is strikingly shown between the foal of the cart-mare and the thorough-bred. Whilst the former is strong, sturdy, and fleshy, the latter is comparatively puny, thin, and susceptible of the least cold; the former, by means of the dam's milk, can be kept in first-rate order, whilst the latter requires artificial assistance as soon as it can be rendered. The fact is that the digestive apparatus is more powerful in the one than in the other—it can assimilate more nutriment from nutritious food, and subsist on rough diet on which the other would starve. This it is which renders it so expensive to rear the blood-colt, and this distinction prevails throughout life, and extends in a lesser degree to the half-bred, as compared with the cart-horse. The thorough-bred has yet other faults; as a rule, he is slighter and weaker in the fore-legs, he goes closer to the ground, is often a bad walker, and an indifferent trotter, and is more liable to stumble and fall than the coarse-bred horse. How can it be otherwise? He is bred to win a race, from parents who have been winners; the elevated and rounded action that makes a good hack or charger, would shorten his stride and impair his chances; although if he has good legs and sufficient size and substance, the very fact of his being too slow for racing ought to be rather a recommendation as a hunting-stallion than otherwise, yet who would give him credit for stoutness if he had never been fortunate enough to win a race; or what chance would he have for a prize at our agricultural shows when judged by

proportion to their size and weight, larger bone and sinew than the majority of our thorough-breds, and I have often observed their beneficial influence in the second and third generation both with hunters and other horses.

those who can recognise at a glance a Derby favourite, or the winner of the St. Leger?

The term *stoutness* in racing phraseology means endurance connected with speed; it has nothing to do with size and weight, as a tyro might suppose: a great horse is often speedy but a craven at heart, whilst most of the stoutest race-horses of the last century were little more than galloways in size, and such too are the untiring Arabs of the Desert. No judge, therefore, can tell a stout horse by his appearance—it is necessary to know his performances before this can be determined; for, however perfect the symmetry and powerful the frame, if he is only good for a mile he is not stout.

The improvement effected in the size and probably in the speed of the thorough-bred horse is no doubt very great, and every year produces some wonderful examples of first-class winners; yet I will venture to say that nowhere else throughout Nature where the same care and vigilance is bestowed on the rearing of animals, are the blanks so many and the prizes so few. To justify this perhaps startling assertion, let us endeavour to trace the career of the, say, fifteen hundred or more thorough-bred foals which are annually dropped. These foals are reared from mares of undeniable pedigree, and for the most part of good size, very many among them being winners. The majority are begotten by first-class horses, who have either been great winners themselves or have beat great winners before they have themselves broken down, or, better still, have proved themselves the sires of great winners as well as winners themselves. Both care and expense are lavishly bestowed on the fifty or sixty sires, the two thousand brood-mares, and also on the foals themselves as soon as they are dropped. The dam's milk is sustained with the most nutritious food, and the foal is fed with the best as soon as it can masticate. It is an error to suppose that either the mare or the foal is pampered or enervated by undue care; the well-kept paddock affords every facility for taking exercise, and those who have witnessed the sprightly and incessant gambols of the young animal will acknowledge that the muscles and sinews of the thorough-bred foal are called into play much more than those of the cart-horse. Yet, with all this care, what becomes of these costly toys? The greater number go into training at two years old or earlier, no small percentage having previously disappeared from disease or accident, and very many succumb to the numerous maladies and mishaps that occur in the training-stable. After this ordeal the trials begin; and then some are condemned as too slow and others as too small, some are mercifully shot out of the way, others submitted to the auctioneer's hammer, and many

a colt that has cost 200*l.* to rear is sold for less than 10*l.*, and perhaps is dear at the price. The majority thus sold are colts and fillies that have never raced, many have given way in the joints or sinews, whilst some are rejected for their shortcomings in the actual race as two-year-olds, although many a horse which was unsuccessful at that age has proved a prize-winner afterwards. It is difficult to say how many of those foaled actually make their appearance on the race-course, but the difference in numbers between the entries and the starters for the Derby will afford some slight criterion. At all events, a little reflection will satisfy us that the number of first-class, or even second-class, horses annually brought to maturity is very small, and justify our assertion that the blanks far outnumber the prizes.

How can we explain such a falling off, that the offspring probably to the extent of 70 per cent., should prove inferior to both the sire and dam? The answer may be found in the fact that although our first-class race-horses are large and powerful animals, yet they are descended from ancestors considerably smaller than themselves, and Nature makes a constant effort to return to the original type. But for this natural law there is no telling what size our thorough-bred horses might reach, for the constant effort of the breeder is to raise large colts, and it is almost an axiom with many men that although a good *little* horse is all very well, a good *big* horse is a great deal better. In fact, the little horses, which are sometimes greater winners, are rather low than small, and usually have considerable length of muscle as well as depth of chest and substance, to compensate for their want of height. When, therefore, there are such constant efforts to outstep Nature, we cannot wonder that failure should be so frequent a result.

There is a striking contrast between Derby horses and their numerous relations who figure at country races, and when the short racing-career of these large colts is over and they are devoted to the stud it is astonishing how large they become and how much they girth.* They look the very incarna-

* Although as a rule half-bred and three-parts-bred horses have more bone, and are larger in the girth than thorough-breds, yet the latter increase surprisingly in girth when thrown out of training and devoted to the stud. My friend Mr. Barrow, Veterinary Surgeon, of Newmarket, has kindly furnished me with the measurements of a number of first-class stud-horses now under his care at Newmarket. Amongst others "Longbow," "Toxophilite," "Thunderbolt," and "Muscovite," all of whom were upwards of 16 hands, and exceeded 6 feet in girth, and measured on the average 8 inches round between the knee and the fetlock. The chest of the thorough-bred is always comparatively deep and capacious, Mr. Barrow considers that the capacity of the chest increases after serving mares and from wearing no rollers, or anything to interfere with the proper expansion of the chest. It must be borne in mind that the horses here mentioned are peers of their order.

tion of vigour and of strength, and it is probably their look that induces so many breeders to think that from such a sire any amount of substance can be secured which can reasonably be expected in the weight-carrying hunter. They forget, however, how large a percentage of their progeny are but "weeds," even when these sires are put to picked thorough-bred mares; and how very rarely the services of a horse of this stamp can be secured for half-bred mares. The great bulk of travelling thorough-bred stallions must necessarily be third-class horses, long in the carcass, long in the legs, weak in the sinews, unfit for any other purpose than the stud; and such are the horses that assist in deteriorating our breed of saddle-horses, and render horse-breeding so frequently unprofitable.

Let it not, however, be supposed that I undervalue the importance of "blood" in the hunter, the hack, and the harness-horse; I only dispute the doctrine that we should rely mainly or solely on the sire for its introduction, and then only for the first cross. It is a well-established fact, that the Eastern blood amalgamates with the native breeds of the country extremely well; it can be traced in the form, and still more in the courage and endurance, even in the third and fourth generation.

I must now recall attention to the general principles of cross-breeding, viz., that while the male governs the size (not mere height), the vital functions and the nervous system are influenced most by the female. If there be any truth in this doctrine, it must be as essential to attend to the pedigree of the mares as to that of the sire. But here all is left to chance; and whether she is taken from the plough-tail, the van, or the omnibus, no matter, so long as the sire is thorough-bred. Let us consider how the system works on some of our best mares. A farmer has a valuable mare that has been tested by many an arduous run. She is by a thorough-bred horse out of a half-bred mare, and, valuable as she is, she is a shade too light, or, at any rate, would be worth more money if she were equal to a little more weight. He is induced to put her to a thorough-bred horse, and the progeny is, of course, seven-eighths thorough-bred, but, according to my experience, mostly an unprofitable weed. We might go a step further back, to the stronger half-bred mare, and trace the process of deterioration farther; but the final issue is the same—the propagation of a race of weeds. This is the real root of the evil which is affecting our breeds of horses,—an evil not to be remedied by the abolition of two or three year old races, or by the substitution of longer distances, or by any of the many suggestions with which, when political intelligence flags, our daily papers teem. Races for two-year-olds may be objectionable or otherwise, and eight-mile gallops may be excellent or

cruel; but, so long as racing is supported by the public as a pastime, the former will not be abolished nor the latter restored.*

Do away with the excitement of the struggle, and by greatly lengthening the race render its finish the slowest part of the contest, and people will be contented to read the result in the newspapers at home. Let us suppose that the racing of two-year-olds was altogether abolished, and that the Derby was contented for by four-year-olds, what would be the result? The expense of keeping racehorses would be enormously increased, perhaps to the extent of 100,000*l.* per annum. And after all, even if these innovations could be introduced, they would altogether fail in their professed object—that of improving the stoutness of the thorough-bred horse.†

We frequently hear of horses that are very speedy for a mile, but fail altogether in a longer race. Now, on what does this want of stamina or stoutness depend? and, secondly, can it be discovered or ascertained by the external conformation of the animal? The speed of the horse depends on the length of the stride, and the frequency or rapidity with which these strides can be repeated, and in proportion to these efforts is the demand made on the organs of respiration and circulation and on the nervous system. Excessive speed is, therefore, in itself one cause of its short duration, inasmuch as it exhausts the vital powers. In many cases the locomotive and vital powers may not be well balanced: the former may be those of a first-class, and the latter those of a second-class animal. To a certain extent this want of bottom can be ascertained by the conformation, but to a certain extent only. If the horse is very leggy, light in the carcass, and narrow or deficient in depth of chest, the probability is that he is speedy, but not enduring. Sometimes, however, an animal shows none of these faults of form, and yet, though speedy for a

* The system of racing at two years old, whilst it is always trying and often fatal to the fore-legs and joints of the young animals, does not appear to be injurious to the *constitution*; for we have numerous instances of famous stud-horses living to a good age, although they have raced thus early. That stout and successful sire the "British Yeoman," the winner of the first prize at the Royal Agricultural Society's show at Chelmsford in 1856, fourteen years previously had won four large stakes as a two-year-old, and the following year ran fourth for the Derby.

† If some of our stoutest thorough-breds have been discarded in consequence of their not being speedy enough to win short races, what has become of these horses, whose services would have been so valuable for half-bred mares? I rather believe that speed and stoutness are mostly combined in great winners, as in "Eclipse" and "King Herod" of old, and, at the present day, in "Stockwell" and "Blair Athol," the latter of whom unquestionably won his great races by his stoutness, for he was probably equalled in speed for half the race by several of his competitors. Surely the St. Leger, and other still longer races, must in nine years out of ten be won by stout horses, and as such horses are always used for the stud afterwards, they must have handed down to their posterity their stoutness as well as their speed.

mile, is unable to "stay." The cause is here, no doubt, beyond our ken; though it is, no doubt, due to deficiencies in the vital and nervous systems, and especially to the latter. To discover its existence, we presume, is the object of the advisers of four and eight mile races.

In the absence of proof, we much question whether the first-class racehorses of the present are inferior in endurance to those of former days. Why should they be so? They are descended from the best mares and the best horses, which have no doubt handed down with their speed that endurance and strength of constitution which contributes so much to make a winner. Want of endurance is not the defect of this race; put a feather-weight on the back of a weed, and in a light country he will probably beat the most valuable half-bred hunter, even in a long run; and yet with all this he is nearly valueless.

Next to the very first-class racehorses—the twenty prizes amongst a thousand blanks—there is no kind of horse of which this country has such reason to be proud as the half-bred, three-parts, and seven-eighths bred hunters, the highest combination in nature of strength and speed. Deriving speed and courage from their Eastern progenitors, bone and substance from their northern ancestors, and action in all their paces from the blending of the two races, they are nearly perfect and decidedly most generally useful.

When a breed of sheep or of bullocks has reached this point, we seek to perpetuate their excellences by consorting parents who on both sides possess them, avoiding, of course, too great consanguinity. We do not resort, as a rule, again and again to the original breeds from whence the improvement has been built up. Why, then, should horses be an exception to this rule? Why, although the mares of this stamp are considered well adapted for breeding, are the males condemned to be castrated, as unfit for that purpose? By such practice we not only lose the services of the males in transmitting their good qualities, but deprive one-half the mares of the opportunity of breeding animals as strong and valuable as themselves. The practice is, no doubt, in many respects a matter of convenience; for weight-carrying hunters are more tractable, and always, as geldings, command good prices; whilst it is hard to compete with the constant supply of ready-made stallions—good, bad, and indifferent—from racing stables, so long as their friends and owners can persuade breeders of horses and agricultural authorities that the goodness of the fore-legs is of little account, or that a bad thorough-bred stallion is better than a good half-bred.

Referring again to the general principles which have been laid down respecting the influence of either parent on the off-

spring, and considering that the temper, nervous system, vital powers, and constitution, usually follow the dam, if the question be put, "Given a certain amount of breeding, which side would you prefer it to come from?" we unhesitatingly say, if it cannot be had from both sides, by all means let us have it from that of the dam, that her courage, nervous system, and vital powers may be, if possible, joined with the great bone and sinew of the coarser sire. If this system were more frequently pursued, we might breed weight-carrying horses from well-bred though rather light mares, and sometimes even from the best of the three and four year old mares cast out of the racing stable as not being good enough. By such means our cavalry would be far better mounted than at present, and we might, without difficulty, retain just as much breed as is requisite and desirable.* I do not, however, recommend such violent crosses as that of the cart-stallion with the thorough-bred mare, though not unfrequently successful; or the reverse case, which, with a few noted exceptions, produces more failures.

As examples are always more telling than precepts, I propose to adduce a few instances of successful breeding with half-bred horses and well-bred mares.

To begin with my own experience. I rode a mare for some twelve years without her making a mistake; she was good in all her paces, a fair hunter, an excellent jumper, and a capital hack. She was bred by my father out of a threeparts-bred mare (a good hunter) by a young half-bred horse, pedigree unknown or forgotten. Her dam afterwards bred three other colts by thorough-bred sires, none of which proved of any value. They could not carry weight, and none of them paid the expense of breeding.

2. A rather heavy but active and useful cart-mare, belonging to the same owner, bred two colts by thorough-bred horses, neither of which repaid expenses: they had the bodies of the dam and the legs of their sires.

3. One of my friends had, some years since, a splendid trotting mare that he justly regarded as a pearl of great price, for she had

* An inspection of our cavalry regiments will strikingly illustrate the evils of the present system. I had an opportunity a twelvemonth since of looking over a rather large number of cast cavalry-horses offered for sale by auction in a garrison town, and found that nineteen out of twenty were extremely faulty. In most, although the carcasses were sufficient, the legs were totally unfit to carry the weight a cavalry horse is called upon to sustain. Crooked legs, weak sinews, deficient bone, small joints, sickle hocks, the evident result of the union of the two bodies of a thorough-bred horse and a coarse or cart mare, was almost the universal rule; and they presented a strong contrast to the animals that in my experience used to be cast some thirty years ago when half-bred stallions were far more numerous than at present, and horses were bred from parents possessing on both sides the qualifications sought to be perpetuated.

substance, showed plenty of breed, and was good in all her other paces as well as the trot. After some years she was devoted to the stud, and bred five foals, the first by a good half-bred horse and the others by different thorough-bred horses. Her first foal showed much more substance than any of the others, made a good price, and is a valuable animal at the present day. Not one of the others repaid expenses; one proved a clever animal for a light weight, but none possessed sufficient substance to be anything like as valuable as the mare.

4. Another of my acquaintance some years since had a small but very neat mare almost thorough-bred. He put her to a large Yorkshire trotting stallion, and sold the produce at three years old for sixty pounds; when afterwards he put her to thorough-bred stallions the stock were all deficient in substance, and consequently unprofitable.

5. A farming friend had a capital fast mare, somewhat small, and rather more than half-bred; he put her to the last-named stallion, about onefourth-bred: the produce, a mare now in my possession, is very clever and somewhat larger than her dam. Though too hot for the hounds, she is a capital hack as well as an invaluable harness-mare. I consider this to be a successful example of breeding from two parents, both well, but neither thorough-bred. The dam of my mare was next put to a thorough-bred horse, and produced a foal which had not nearly the value of the first, gave out in the fore-legs, and was last seen in a London cab. The sire referred to invariably got good animals when put to well-bred mares, and useful ones when coarser mares were employed.*

6. Another of my acquaintance some years since gave 50*l.* for a mare apparently threeparts-bred, which now in her old age is such a model of symmetry that she attracted my special attention when recently exhibited at a local show. She proved to be a good hunter for an average weight, but before she could establish her character, became lame, was devoted to the stud, and has bred many colts. One of these, by a thorough-bred horse, became a very clever and valuable hunter for a moderate weight; the other colts were mostly by a light and rather leggy but very active

* This horse was the son of "Performer," and the grandson of "Old Pretender," by "Fireaway" (celebrated trotting stallions of their day), out of a threeparts-bred mare, having the strains of "Forester" and "Hambletonian." "Old Pretender" trotted 15 miles within the hour, with 15 stone on his back, whilst "Fireaway" did 2 miles in 5 minutes. It is matter of very great regret that this breed of horses has not been kept up in all its integrity, and that trotting-matches have been allowed to sink into disreputable and low hands. Probably the cruelty that was often connected with these time-matches, in which the same horse was backed to go, say, from London to York, or to Exeter, in some short time, led to their being discountenanced by the more respectable lovers of the horse.

Suffolk cart-horse, with good flat fore-legs and good feet. The oldest of these, which promised to be a capital jumper and a good weight-carrying hunter, was bought by a farmer (a heavy weight in the hunting-field) for 50*l.*, and after exhibiting his qualifications in a good run, was resold for 100*l.* on the same day. The new owner, hearing afterwards that he was got by a cart-horse, felt somewhat disgusted and parted with the horse for 80*l.* to a dealer, who very soon disposed of him for double this sum. The other two colts by the same horse are very promising. Although such a strong cross as this is not to be recommended, it is worthy of note as an example of the powers of the mare to transmit her qualities of speed and endurance to her offspring, so as to render them good hunters.

7. A late master of hounds in a neighbouring county rode for some years a threeparts-bred stallion, that besides being a first-rate hunter was also used somewhat extensively as a stud-horse. His stock was almost universally good and remunerative to the breeders.

8. To these examples may be added some strong cases, kindly communicated to me by Mr. H. Overman, of Weasenham, Norfolk:—

“H. K. S——, Esq., of W——, Norfolk, had two horses of extraordinary good qualities as weight-carrying hunters; they had great pace and endurance, and were good performers. He rode them in Norfolk, Northamptonshire, and Leicestershire, and refused 700 guineas for the two. Their dam was a thoroughbred mare that ran well in the Oaks, and their sire was a half-bred cart-horse and hackney, with fine shoulders, good action, strong loin, deep girth, and good thighs and legs.”

9. Mr. Overman adds: “I used the same horse to two mares of my own, one a well-bred Irish mare. She threw a filly, which I sold for 100 guineas, and has since made nearly 200. The other mare was threequarter-bred, and she threw a colt which turned out one of the best performers I ever saw. I sold him to H. B——, Esq., of Norwich, for his brother in Surrey for 130 guineas, and 400 guineas have since been refused for him.

10. “One of the best horses now in Lord H——’s hunting-stables was by a Norfolk hackney out of a half-bred hunting-dam. We find in Norfolk if we put our Norfolk hackney to a well-bred mare with size, she is sure to throw a good animal. ‘Tom Moody,’ the property of Mr. J——, of Hopton, was not thoroughbred, neither was Mr. Goold’s ‘Shackaback;’ and these two horses are the sires of scores of good and valuable horses in this county.”

He adds: “The late Mr. Theobald, of Stockwell, in Surrey, always said that it was much better to put the hackney horse to

the blood mare than to adopt the reverse plan; the former course being almost sure to bring a good animal. A blood mare, the property of an uncle of mine, bred seven foals by hackney and cross-bred horses, and all proved animals worth a good deal of money."

My purpose in adducing these examples is to show that useful horses almost always, and valuable ones very frequently, can be bred as hack, hunters, and carriage-horses by using the half or threeparts-bred stallion with well-bred mares, so as to secure a sufficient amount of substance to carry weight. Not that we can thus breed horses of greater value than by using the thoroughbred stallion with suitable mares, for we can scarcely have too much breed, provided we have sufficient substance; but by following the system recommended, if we do not succeed in getting higher prices, we shall at any rate have fewer failures.

We have seen that with regard to sheep at least three different and valuable breeds have been inaugurated by cross-breeding, careful selection, and constant weeding; and the prevailing opinion is, that these possess certain desirable qualifications which render them more profitable than their parent races. Still there are those who deny this, and contend that there are pure breeds of sheep that can supply every requisite. Be that as it may, the case is much stronger with regard to the horse; for there is no one who would contend that the qualifications of a first-class weight-carrying hunter can be met with in any one pure or original breed, or that it can be otherwise secured than by the well-assorted alliance of blood and bone. Surely, then, if with sheep we can succeed in the course of twenty years in establishing a distinct breed, we can with equal or greater ease establish a breed of horses that will support with ease a six-foot guardsman with his heavy accoutrements, and dash into the charge with all the speed and spirit induced by the influence of a full equivalent of blood derived from both parents. The French are already trying this system; and if we are remiss, will in a few years surpass our cavalry in its most essential characteristic. There can be no reason why the defects which crop out after the first cross should not be as readily extinguished in the horse as in the sheep.

It is as well to notice, that valuable as is the Norfolk trotting stallion, when put to well-bred mares for breeding hacks, he is as a rule too deficient in size to get dragoon-horses, or those weight-carrying hunters which have been the glory of our land.

One argument adduced by the advocates of the universal employment of the full-blood sire is somewhat plausible, and has not perhaps been sufficiently disposed of. They say, it is desirable to have a pure-blood on one side at least, so that defects apper-

taining to the progenitors, but not apparent in the parents, may not, as in mixed pedigree, reappear in the offspring. This argument is good to a certain extent, but it applies equally to each parent, and if it can be dispensed with in the case of the mare in order to secure size and bone, it may also be given up for equal advantages in that of the sire, who would not have been devoted to the stud unless in addition to his pure lineage on one side, he had derived from the other some rare hunting qualifications and sterling merits which it would be most desirable to perpetuate.

CONCLUSIONS.

We have endeavoured in our preceding remarks to establish the correctness of the following points:—

(a) That the use of the thorough-bred horse or mare has greatly improved the coarser bred in speed and in bottom. That the blood has amalgamated exceedingly well with other breeds, and that the good results of even one cross only has been seen in various degrees and for several generations.

(b) That the effect of crossing with the thorough-bred is to increase the supremacy of the nervous and the muscular systems, and is more particularly shown in the fuller development of the thighs, the hind-quarters, and the elongation of the muscles generally. But that with these advantages the bones, joints, ligaments, and sinews are smaller and less powerful, and the action, although quickened, is rendered lower and less safe. The ability for jumping and for carrying heavy weights without injury to the joints and sinews, is greatly diminished. The skin is also rendered thinner and more liable to abrasion, the carcass smaller, and there is a diminished capability for putting on flesh.

(c) That so long as suitable mares with sufficient substance can be procured, the breeder of hunters should, on the rare occasions when they are offered, avail himself of the services of a first-class thorough-bred stallion, or even one of the second class, provided he has hunting qualifications,—good substance, or good high action in the trot or walk.

(d) If, going a step further in the same direction, the breeder seeks to put the female progeny to the blood-horse, he will most frequently fail; the offspring becoming too light; whilst if he had availed himself of the half-bred or three-parts-bred stallion (the grandson of a great racehorse), his stock having the same amount of breeding as the dam, would have afforded him a fair chance of realising a high price, and failing this, a comparative certainty of a fair sale for the cavalry, or for the general market.

(e) Having duly recognised the claims of thorough-bred horses of the first and second class, we can only advise, with regard to the third and inferior classes, that their services be altogether dispensed with, their place being taken by three-fourths, or half-bred stallions, possessing bone, substance, and good hunting qualifications. And it is such animals as these that deserve encouragement from our great Agricultural Societies.

For the encouragement of horses of this stamp we should be glad to see prizes offered for the best seven-eighths, three-fourths, and half-bred stallions, so that the owners of promising horses might be induced to delay the operation of castration until the animals had undergone the ordeal of the show-yard, and the prize-winners might be launched into the world with the Society's approval. Some of the prizes for ponies might well be dispensed with to provide money, if it be wanting, for this more important purpose. At any rate, it may be hoped that the Council of the Royal Agricultural Society will remove the impediments which shut out such a horse as "British Statesman," the first-prize winner at Battersea, and the second at Leeds, from competing at Newcastle among the stallions for breeding-hunters. The flaw in his pedigree, one-eighth, gave him, no doubt, more bone, sinew, and substance generally, and rendered him fit to carry an extra stone in weight, qualifications which doubtless gained him the prize of 20*l.*, offered by the gentlemen hunting the North Staffordshire hounds, for the best stallion for hunting horses.

This suggestion is not meant to imply that prizes for thorough-bred stallions should be dispensed with: on the contrary, if the state of the Society's funds permit, separate prizes should be offered for thorough-bred sires, adapted—

1. For getting Hunters;
2. For Carriage Horses;
3. For Park Horses, Chargers, or Hacks.

Prizes in each of these classes would then be assigned to animals differing much in character, but no longer, as at present, to the best racehorse, or according to the rather puzzling and peculiar condition of the prize-sheet, "to the horse best calculated to perpetuate the breed of the sound and the stout thorough-bred horse for general stud-purposes." Such a horse must unquestionably be neither more nor less than the sire of the greatest racehorses of the day.

But if this is too wide range for an Agricultural Society, the Managers of the Islington horse show may take this hint into consideration.

Those of our readers who were present at the splendid exhibition of thorough-bred stallions in the Agricultural Hall last summer, must have been struck with the great variety that

obtains in the shape and action of the thorough-breds then exhibited, and might, without any assistance from the judges, point out the particular horses with suitable characteristics for each of the several purposes above mentioned. "Caractacus" and "Nutborne" may be taken as correct examples of the true *race-horse*. The sprightly "Neville," with his splendid knee-action, may be regarded as the proper sire of the charger and the park-hack, whilst the powerful "Warlike," with his compact frame, is the very type of a weight-carrying hunter, so far as a blood-horse can be one. "Newcastle," the favourite of the judges, might put in a claim either as a hunting-sire for a moderate weight, or, with his fine action and good legs, as the sire of a charger or park-hack; and he probably gained his honours because he was thought to combine best in his own person the several and diverse qualifications required by the conditions of the prize-sheet. There were also some fine showy animals, with long arching necks and grand action, that might properly be considered as suitable sires for high-bred carriage-horses.

XII.—*Report on the Royal Veterinary College.*

THE Governors of the Royal Veterinary College have the pleasure of transmitting to the Council of the Royal Agricultural Society the Annual Report for the past year.

The Governors can assure the Council that the same means which they have hitherto found effective for imparting to the students in the College scientific information upon the diseases and treatment of cattle, sheep, and pigs, as part of the regular education that the College affords, have been perseveringly and successfully carried out.

Four lectures per week, in addition to demonstrations and practical instruction, have been delivered by the Professor of Cattle Pathology. The arrangement pursued in these lectures is scientific, and, as far as the means at the disposal of the Professor permit, practical and demonstrative.

The Governors have sought further opportunities for illustrating disease, and would willingly connect the education afforded by the College more closely with the practical teaching of Cattle Pathology, which can be obtained only in the country; hitherto the Governors have been compelled to rest satisfied with the inculcation of scientific knowledge illustrated as far as the opportunities of the College would admit, but to leave the general application of this knowledge to be more largely studied elsewhere.