THE

FARMERS'

MEDICAL DICTIONARY,

FOR THE

DISEASES OF ANIMALS.

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BY

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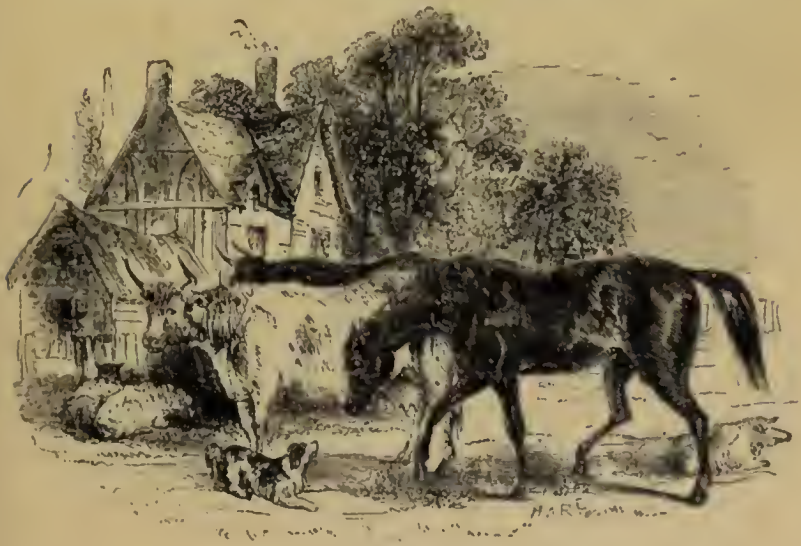

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PREFACE.

THIS little work (arranged for facility of reference as a Dictionary) contains the recipes for the cure of the diseases of domestic animals, long successfully employed, in an extensive practice, in the south of England. The chief labour of the Editor, has consisted, in arranging and selecting those that appeared to be the most certain, to be serviceable to the Farmers of his country. To them the work is dedicated; and a long experience of the kindness of those great cultivators assures him, that they will extend to it much more than a sufficient patronage for any little degree of usefulnesss, it may be found capable of rendering.

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&c. &c.

A.

ABSCESS. The treatment of an ordinary abscess is very simple: as a general rule, the matter should be evacuated as soon as discovered. Let a broad-shouldered lancet be used, and let the opening be made sufficiently large; and, what is of still more consequence, let it be at the lowest part of the tumour, in order that the cavity may be completely and constantly drained. The general practitioner has some scruple about making an artificial opening, often for good reasons. His patients dread the lancet more than a tedious cure; while the skin is thinner, and consequently the natural outlet is sooner formed. But in the horse, and the dog, and still more in the ox, the skin is thick, its removal proportionally

slow, and the natural process is both tedious and painful. It is, therefore, better both for the animal and his owners, to have an artificial outlet made for the matter as soon as the abscess is brought to a head, either naturally, or by the application of a bran poultice. Little more is necessary than to keep the part clean; trim the hair from the edges of the orifice, and inject into the wound a little tincture of myrrh and aloes. Let no pretender stuff the cavity with a candle, or tent of tow, or rowels, or any thing else. All these interfere with nature's operations, prevent the escape of the matter, produce fistula, and other evils, often far more serious than the original abscess. If the cavity do not fill up so readily as might be expected, allow the animal a little more nourishing food than that recommended for invalids; and inject once, or even twice a-day, a little of the following mild caustic wash,—half-ounce of blue stone, dissolved in half-pint of water.—*Farmers' Encyclopædia.*

ABSORBENTS. In veterinary medicine, those drugs are termed absorbents that are given internally for the purpose of neutralising any acid formed in the stomach and bowels, in consequence of impaired digestion. Prepared chalk is generally used for this purpose. Those medicines are likewise termed absorbents which are applied externally for absorbing moisture. Armenian bole, calamine, flour, &c., are employed in this way. They are sometimes dusted between folds of the skin when galled, and raw from friction, blisters, or grease. They are

likewise useful in canker of the horse's foot, foul in the foot of cattle, foot-rot in sheep, and sores between the toes of dogs; and they are beneficial in some forms of mange, and in staying bleeding.—*Farmers' Encyclopædia.*

ACIDS—Are most commonly composed of some one or two simple substances combined with oxygen, but there are acids which do not contain oxygen: for instance, the muriatic acid is composed entirely of hydrogen and chlorine. Vegetable acids abound in most plants: thus, the *acetic acid* (*vinegar*) is found in the chick pea, in the elder berry, in the date, palm-tree, and in numerous others.

Benzoic Acid.—This acid is found in benzoin, balsam of Tolu, storax, &c.; and in marjoram, clary, chick pea, Tonkin bean, &c.

Citric Acid has been found in oranges and lemons, cranberries, the hip, the onion, &c.

Gallic Acid abounds in the barks of many plants, as the elm, oak, chestnut, common ash, &c.

Malic Acid is the only acid existing in the apple, barberry, plum, sloe, elder, service, &c. It is found with the citric acid in the gooseberry, currant, cherry, strawberry, raspberry, &c.; combined with lime it is found with the house-leek, wake robin, &c.; and with potash and lime in rue, garden purslane, spinach, lilac, mignionette, &c.

Muriatic Acid, or *Spirit of Salts*, is composed of chlorine, 36 parts, and hydrogen, 1 part; it is used as a caustic wash.

Nitric Acid, or *Aqua-fortis*, is used as a

caustic wash; it is composed of nitrogen, 1·75 parts, and oxygen, 5·00 parts.

The *Oxalic Acid* is found combined with potash in the *Oxalis acetosella*, or wood sorrel (whence its name), and many other plants; united with lime, it is detected in the root of the rhubarb, in parsley, fennel, squills, &c.

The *Prussic*, or *Hydrocyanic Acid*, exists in laurel leaves, peach blossoms, bitter almonds, flowers of the sloe, leaves of the bay-leaved willow, &c.

Sulphuric Acid, or *Oil of Vitriol*, is sometimes used as a caustic wash for sores; it is composed of sulphur, 100 parts, and oxygen 150 parts.

Tartaric Acid is commonly procured from *tartar*, or tartrate of potash, (whence its name). It has been detected in many plants, such as in grapes, bilberries, the Scotch fir, couch grass, dandelion, &c.

The composition of the principal of these acids is very similar, as will be readily seen from the following table:—*Johnson's Farmers' Encyclopædia.*

	Hydrogen.	Carbon.	Oxygen.
Acetic acid	6·35	46·83	46·82
Oxalic acid	0·214	33·222	66·534
Tartaric acid	3·951	36·167	59·882
Citric acid	3·800	41·369	54·831
Benzoic acid	5·16	74·41	20.43
Gallic acid	5·00	56·64	38·36

ÆGYPTIACUM, OR ÆGYPTACUM—Is commonly used for canker, or ulcers in the mouths of animals. It is prepared as follows—Powdered verdigris, half an ounce; honey, two

ounces; vinegar, eight ounces. Boil slowly in an earthen pipkin for ten minutes.

AGE OF ANIMALS. The age of animals is ascertainable by various modes: that of a horse may be ascertained by his mouth, and the examination of his teeth, till he is seven years old, after which the usual marks commonly wear out. The teeth are usually forty in all; of which twenty-four are double teeth, and, from their office, denominated grinders, four tushes, or corner teeth, and twelve fore-teeth.

The first, or foal-teeth, which generally begin to show themselves a month or two after foaling, are twelve in number, six above and six below, and are easily distinguished from the teeth that come afterwards, by their smallness and whiteness, having some resemblance to the incisors, or fore-teeth of man.

When the colt is about two years and a half old, he commonly sheds the four middlemost of his foal-teeth, two above and two below; but sometimes none are cast till near three years old. The new teeth are readily distinguished from the foal-teeth, being much stronger, and always twice their size, and are called the nippers or gatherers, being those by which horses nip off the grass when they are feeding in the pastures, and by which, in the house, they gather their hay from the rack. When horses have got these four teeth complete, they are reckoned to be three years old.

When they are about three and a half, or in the spring before they are four years old, they

cast four more of their foal-teeth, two in the upper and two in the lower jaw, one on each side the nippers, or middle teeth; so that when you look into a horse's mouth, and see the two middle teeth full-grown, and none of the foal-teeth, except the common teeth remaining, you may conclude he is four that year, about April or May. Some, indeed, are later colts, but that makes little alteration in the mouth.

The tushes appear near the same time with the four last-mentioned teeth, sometimes sooner than these, and sometimes not till after a horse is full four years old; they are curved like the tushes of other animals, only in a young horse they have a sharp edge all round the top and on both sides, the inner part being somewhat grooved and flattened, so as to incline to a hollow.

When a horse's tushes do not appear for some time after the foal-teeth are cast, and the new ones come in their room, it is generally owing to the foal-teeth having been pulled out before their time, by the breeders or dealers in horses, to make a colt of three years old appear like one of four, that he may be the more saleable; for when any one of the foal-teeth have been pulled out, the others soon come in their places; but the tushes having none that precede them, can never make their appearance till their proper time, which is when a horse is full four, or coming four; and therefore one of the surest marks to know a four-year old horse is by his tushes, which are then very small, and sharp on the top and edges.

At the time when a horse comes five, or rather in the spring before he is five, the corner teeth begin to appear, and at first but just equal with the gums, being filled with flesh in the middle. The tushes are also by this time grown to a more distinct size, though not very large: they likewise continue rough and sharp on the top and edges. But the corner teeth are now most to be remarked; they differ from the middle teeth in being more fleshy on the inside, and the gums generally look rawish upon their first shooting out, whereas the others do not appear discoloured. The middle teeth arrive at their full growth in less than three weeks, but the corner teeth grow less fast, and are seldom much above the gums till a horse is full five; they differ also from the other fore-teeth in this, that they somewhat resemble a shell; and thence are called the shell-teeth, because they environ the flesh in the middle half-way round; and as they grow, the flesh within disappears, leaving a distinct hollowness and openness on the inside. When a horse is full five, the teeth are generally about the thickness of a crown-piece above the gums. From five to five and a half they will grow about a quarter of an inch high, or more; and when a horse is full six, they will be near half an inch, and in some large horses a full half-inch above the gums.

The corner teeth in the upper jaw fall out before those in the under, so that the upper corner teeth are seen before those below; on the contrary, the tushes in the under gums come out before those in the upper.

When a horse is full six years old, the hollowness on the inside begins visibly to fill up, and that which was at first fleshy grows into a brownish spot, not unlike the eye of a dried garden-bean, and continues so till he is seven; with this difference only, that the teeth are gradually more filled up, and the marks or spots become fainter, and of a lighter colour. At eight, the mark in most horses is quite worn out, though some retain the vestiges of it a longer time; and those who have not had a good deal of experience may sometimes be deceived by taking a horse of nine or ten years old for one of eight. It is at this time only, when a horse is *past mark*, that one can easily err in knowing his age; such practices are used to make a very young horse or colt appear older than he really is, by pulling out the foal-teeth before their time, which may be discovered by feeling along the edges where the tushes grow, for they may be felt in the gums before the corner teeth are put forth; whereas, if the corner teeth come in some months before the tushes rise in the gums, we may reasonably suspect that the foal-teeth have been pulled out at three years old.

It is not necessary to mention the tricks that are used to make a false mark in a horse's mouth, by hollowing the tooth with a graver, and burning a mark with a small hot iron; because those who are acquainted with the true marks will easily discover the cheat by the size and colour of the teeth, by the roundness and bluntness of the tushes, by the colour of the false mark, which is generally blacker, and

more impressed than the true mark, and by other circumstances which denote his advanced age.

After the horse has passed his seventh year, and sometimes at six, nothing certain can be known by the mouth. It must, however, be remembered, that some horses have but indifferent mouths when they are young, and soon lose their mark; others have their mouths good for a long time, their teeth being white, even, and regular, till they are sixteen years old and upwards, together with many other marks of freshness and vigour; but when a horse comes to be very old, it may be discovered by several indications, the constant attendants of age; such as his gums wearing away insensibly, leaving his teeth long and naked at their roots; the teeth also growing yellow, and sometimes brownish. The bars of the mouth, which in a young horse are always fleshy, and form so many distinct ridges, are in an old horse, lean, dry, and smooth, with little or no rising. The eye-pits in a young horse are generally filled up with flesh, look plump and smooth; whereas, in an old one, they are sunk and hollow, and make him look ghastly. There are also other marks which discover a horse to be very old. as grey horses turning white, and many of them being all over flea-bitten, except their joints. This, however, happens sometimes later, and sometimes sooner, according to the variety of colour and constitution. Black horses are apt to grow grey over their eye-brows, and very often over a great part of their faces; and all

horses, when very old, sink more or less in their backs.

Age of Neat Cattle. The age of *cows, oxen,* and *bulls* is known by the teeth and horns. At the end of about two years, they shed their first fore-teeth, which are replaced by others, larger, but not so white; and before five years all the incisive teeth are renewed. These teeth are at first equal, long, and pretty white; but as the animals advance in years, they wear down, become unequal and black. These animals likewise shed their horns at the end of three years; and they are replaced by other horns, which, like the second teeth, continue. The manner of the growth of these horns is not uniform, nor the shooting of them equal. The first year, that is the fourth year of the animal's age, two small pointed horns make their appearance, neatly formed, smooth, and towards the head terminated by a kind of button. The following year this button moves from the head, being impelled by a horny cylinder, which, lengthening in the same manner, is also terminated by another button, and so on; for the horns continue growing as long as the animal lives. These buttons become annular joints or rings, which are easily distinguished in the horn, and by which the age of the creature may be easily known; counting three years for the point of the horn, and one for each of the joints or rings.

Age of Sheep. The age of these animals is known by their having, in their second year, two broad teeth; in their third year, four broad

teeth; in their fourth year, six broad teeth; and in their fifth year, eight broad teeth before. After which, none can tell how old a sheep is while their teeth remain, except by their being worn down.

About the end of one year, rams, wethers, and all young sheep, lose the two fore-teeth of the lower jaw; and they are known to want the incisive teeth in the upper jaw. At eighteen months, the two teeth joining to the former also fall out; and at three years, being all replaced, they are even, and pretty white. But as these animals advance in age, the teeth become loose, blunt, and afterwards black. The age of the ram, and all horned sheep, may also be known by their horns, which show themselves in their very first year, and often at the birth, and continue to grow a ring annually to the last period of their lives.—*Complete Farmer, Johnson's Farmers' Encyclopædia.*

ALBUMEN—Is the name given by chemists to the substance, an impure viscid liquid variety of which forms the *white* of an egg. This white is composed chiefly of albumen mixed with some mucus, soda, and sulphur. When heated to 165 deg., it coagulates into a white solid mass; but when mixed with ten times its weight of water, it no longer is coagulated by heat. It is composed of—

	Per Cent.
Carbon . .	52·883
Oxygen . .	23·872
Hydrogen . .	7·540
Azote . . .	15·705

Albumen (which is nearly identical in composition with the gluten of vegetables) is one of the most important and common of all the animal substances. It abounds in bones, muscle, the membrane of shells, &c.; and, according to the experiments of Hatchett, cartilage, nails, horns, hair, &c., are almost entirely composed of it.—*Farmers' Encyclopædia.*

ALCOHOL—Is the name first given by the alchemists to the liquid obtained by the distillation of wine, beer, and other fermented spirits; it is met with in commerce, combined with varying proportions of water, as rectified spirit, it is transparent, colourless, of a strong, agreeable, penetrating taste; it does not freeze, even by exposure to the most intense cold: it is very volatile, boiling at 176 deg. of Fahrenheit, and in a vacuum at 56 deg. It is composed of—

	Per Cent.
Hydrogen	13·70
Carbon	51·98
Oxygen	34·32
Port wine contains of Alcohol about	21·40

It is found in varying proportions in various fermented liquids.

Madeira	19·34
Sherry	18·25
Claret	12·91
Red Champagne . . .	11·30
White Champagne . .	12·80
Burgundy	14·53
Raisin	25·77
Grape	18·11
Currant	20·55
Gooseberry . . .	11·84
Elder	9·87

	Per cent.
Cyder	9·87
Perry	9·87
Brown Stout	6·80
Ale	8·88
Brandy	53·39
Rum	53·68
Hollands	51·60

The spirits distilled from different fermented liquors, says Davy, differ in their flavour, for peculiar odorous matters or oils rise in most cases with the alcohol. The spirit from malt usually has an empyreumatic taste, like that of oil formed by the distillation of vegetable substances. The best brandies seem to owe their flavour to a peculiar oily matter, formed probably by the action of tartaric acid upon alcohol; and rum derives its characteristic taste from a principle in the sugar-cane. The cogniac brandies contain prussic acid.—*Chem. Phil.* 135, *Farmers' Ency.*

ALE. The brewing of beer is an operation of which the young farmer may be glad to receive some information; most modern treatises upon brewing are founded upon the little tract of Child, who long since told the young beginner in the plain language of the practical brewer:—"The tubs and vessels intended for use, must be carefully inspected, and proved to be free from dirt or taint, as the least defect of that nature may distaste a whole brewing.

"The mash-tub should be particularly attended to; and a wisp of clean hay or straw put over the end of the vessel in the inside, to prevent the malt running off with the liquor.

The malt being emptied into the mash-tub, and the water brought to boil, dash the boiling water in the copper with cold water sufficient to stop the boiling, and leave it just hot enough to bite smartly upon your finger: a few trials will enable any person to be exact upon this head. Brewers use a thermometer: their first mash is usually taken at 180 hot, and the second 190 hot; but as few persons will have opportunity, or afford expense, to purchase a brewing thermometer, the foregoing rule will be found sufficiently instructive, by a little practice, always remembering to draw off your second mash somewhat hotter than the first. The water being thus properly brought to a temper by the addition of cold water, lade it out of your copper over the malt, till it becomes thoroughly wet, mashing it well, to prevent your malt clotting; when the water goes on too hot, it sets the malt, and closes the body of it; and when that happens, it is difficult to recover it, which can only be done by adding cold water.

"By setting the malt is to be understood, its closing the body of the grain, instead of opening it so as to dissolve in the liquor. Cover up your mash-tub close, to compress the steam, and prevent the heat from evaporating: in small quantities this should carefully be regarded, in larger ones it does not signify so much.

"Let your wort stand after mashing an hour and a half or two hours, then let the liquor run off into a vessel prepared to receive it; if at first it runs thick or discoloured, draw off one

or two pails full, and pour it back again into the mash-tub to refine again till it runs clear.

"In summer it will be necessary to put a few hops into the vessel which receives the liquor out of the mash-tub, to prevent its turning sour, which the heat of the weather will sometimes endanger. Let your second mash run as before, and let the liquor stand an hour and a half, then run it off; but never let your malt stand dry: keep lading fresh liquor over it till the quantity of wort you wish to get is extracted, always allowing for waste in the boiling. The next consideration is boiling of the wort. The first copper-full must be boiled an hour. The hops are now to be boiled in the wort, but to be carefully strained from the first wort, in order to be boiled again in the second; 8 lb. is the common proportion to a quarter of malt, but in summer, the weather being hotter, the quantity must be varied from 8 lb. to 12 lb. according to the heat of the air. After the wort has boiled an hour, lade it out of the copper and cool it, keeping it as thin as possible to cool it quicker; in summer it should be quite cold before it is set to work; in winter it should be kept till a small degree of warmth is perceptible by the finger. When properly cooled, set it to work: add yeast in proportion to your wish to bring it forward. If you want it to work quick, add from one gallon to two; but observe, porter should be brought forward quicker than any other liquor except two-penny; let it work till it comes to a good deep head. Your liquor is now fit for barrelling, which

must be done carefully; fill your barrels full, and let the yeast work out, adding fresh liquor to fill them till they are quite full, and have done working; then bung your barrels, but keep a watchful eye upon them for some time, lest the beer should suddenly ferment again, and burst them, which is no uncommon accident where due care is not taken: heat of summer, or sudden change of weather, will occasion the same misfortune, if your barrels are not watched and eased when they require it by drawing a peg."

Mr. Gray has given the proportions of malt used in the preparation of various kinds of beer as follows:—

Table Ale.—Very pale malt 12 quarters, mashed at three times with 46, 32, and 32 barrels of water, boiled with hops 62 lb., set with 114 lb. of yeast, cleaned by the yeast head being beat in and left to work out, produced 100 barrels, or 4 four gallons of ale from each gallon of malt. *Table Beer.*—Malt 8 bushels, hops 8 lb., sugar 8 lb. (burnt), spanish liquorice 8 oz., treacle 10 lb., produced 10 barrels; that is five times the malt.

Ale.—With pale malt 14 quarters, mashed three times with 28, 18 barrells of water, boiled with 112 lb. of hops, set with 36 lb. of yeast, cleaned with 4 lb. of salt, produced 84 barrells, or 1 gallon 1 pint of ale from each gallon of malt. Burton ale yields about 8·88. Edinburgh 6·20. Dorchester 5·56 of alcohol per cent.

Draught Porter.—Pale malt 7 quarters,

amber malt 6 quarters, brown malt 3 quarters, mashed at twiee, with 56 and 48 barrells of water, boiled with 113 lb. of Kentish hops, set with 80 lb. of yeast, salt 4 lb., and flour ½ lb., produeed 56 lb. of porter, or 3½ gallons of porter from eaeh gallon of malt. A third mashing of the same grain produeed 20 barrels of table beer. London porter yields about 4·2 per eent. of aleohol.

Bottling Porter. — Pale malt 4 quarters, amber malt 3 quarters, mashed at three times, with 25, 12, and 12 barrels of water, boiled with 100 lb. of ordinary Kentish hops, set with 52 lb. of yeast, and salt 2 lb., produced 34 barrels, or 1½ gallons of porter from eaeh gallon of malt. *Brown Stout*—Yields about 6·8 per eent. of aleohol.

Devonshire White Ale.—Pale ale wort 25 gallons, hops 2 handfulls, yeast 3 lb., groats 6 or 8 lb.; when the fermentation is at its height, bottle it in strong stone half-pint bottles, well corked, and wired—it effervesees when opened. —*Gray's Supplement to Pharm.*

As many farmers will be glad to assist their poor labourers in the attempt to brew their own table beer, I will here insert a reeipe, published by the Labourers' Friend Soeiety, in whieh only eleven gallons of water are employed, and this I shall do in their eorrespondent's own words (*Hints to Labourers, p.* 17). He says, "I would reeommend all the malt and hops to be put into the boiler together, with two-thirds of the treaele; but instead of putting with it eleven gallons of water, I would only put seven.

I then boil it altogether for two hours, the time specified, stirring it frequently during its boiling. At the expiration of the two hours I then remove it in a bucket to the cooler, and strain it, —malt, hops, and liquid,—through a hair sieve. When the liquid has all passed through the sieve, I take the malt and hops a second time to the boiler, and with the remaining four gallons of water and treacle I have a second boiling for half an hour; I then remove it to the cooler as before, and strain it a second time until all the liquid has passed the sieve; the wort then being sufficiently cooled, I put into it half-a-pint of fresh barm, and stir it well together. When it is well mixed I cover the cooler with an old sack, and in about four hours there is a fine head to it; I then let it remain for six hours longer before I turn it, first taking off the head of barm; it soon after begins to work very nicely through the head of the cask, and in six or eight hours more, the working is finished, and you can slightly bung it. I would recommend the cooler to be placed under cover as soon as the barm is put in and stirred, that it may forward the process of working. I will now give a statement of the expense in making it, and the after profits thereon, sincerely wishing the poor labouring man may be enabled to brew his own table beer, and thus be kept from the beer-shop.

FIRST EXPENSE.	s.	d.
One peck of the best malt	1	10½
Half a pound of Farnham hops	1	0
Three pounds of treacle	1	1½
Half-a-pint of barm	0	2
Coals	0	4
	4	6

PRODUCE.	s.	d.
Seven gallons of beer at 1s.	7	0
Two quarts of ditto ditto	0	6
One quart of barm	0	8
	8	2

ALOES—Is the inspissated juice or extract of several varieties of aloes. It is largely imported from Bombay and from Barbadoes, and formerly from the Island of Socotorah, hence the names of the varieties of commerce. Its colour is brown, its odour peculiar and somewhat aromatic; it consists of extractive and resin, and is nearly soluble in boiling water, but the solution as it cools deposits flakes of resin. It is a warm stimulating purgative, stimulating the larger intestines, and should be administered with caution. — (*Brande Dict.*) "It is," says Professor Youatt, "the best, and almost the only purgative on which dependance can be placed in the treatment of the horse; but with cattle or sheep it is always uncertain in its effect, and sometimes appears to be nearly inert. Six ounces have been given without producing any appreciable effect. The Barbadoes aloes should be selected for the horse; and it is best administered in a solution formed as follows:—two ounces of aloes, one ounce of gum arabic, put these into one pint of boiling water, stirring the mixture occasionaly during the day, then add two ounces of tincture of ginger. The

dose is from half-a-pint to a pint of the solution. Tincture of aloes, with myrrh, is thus formed—to eight ounces of powdered aloes, and one ounce of powdered myrrh add two quarts of rectified spirits of wine and two quarts of water, shaking the mixture daily for a fortnight. This is an excellent application for recent wounds—for foul wounds add an equal part of solution of chloride of lime.—*On Cattle, p.* 578.

ALTERATIVES — Are those medicines which operate without producing very decided evacuations. For the sheep, mix together one ounce of Ethiop's mineral, two ounces of nitre, four ounces of sulphur, give about two drachms daily till the animal is cured. For the cow the dose is from half an ounce to an ounce daily. For the horse the dose is from one ounce to one ounce and a half, made into a ball with soft soap. If there is any tendency to grease, add to each ball one drachm of finely powdered resin. In cases of weakness, two drachms of gentian powdered, and one drachm of ginger powdered.

ALTERATIVE BALLS, see BALLS.

ASTRINGENT BALLS, see BALLS.

ALUM—Is a salt composed of

Alumina	10·76
Potassa	9·95
Sulphuric acid . . .	33·74
Water	45·55

Alum has a sweet and astringent taste. It dissolves in five times its weight of water at the temperature of 60°. It is a powerful styptic (astringent applicable to stop bleeding).

For a Horse.—Two drachms added to a pint of warm milk forms alum whey, often employed in cases of exeessive scouring. It is, however, more valuable as an external application for cracked heels, for grease, and for swelled legs, accompanied by exudation of moisture (two drachms dissolved in a pint of water).

For Cattle.—In scouring or in the purging of calves: to the alum whey, add a drachm of powdered ginger: if the purging is excessive, add a scruple of opium.

For Sheep.—Although it is sometimes used in cases of scouring for lambs, yet a cordial compound as follows is much better. Sheep's cordial:—Prepared chalk four ounces, powdered ginger, two drachms, powdered canella bark eight drachms, laudanum one ounce, water one pint; mix and give two or three tablespoonsful for dose once or twice a day.

ANIMALS, THE DISEASES OF. Although since the establishment of the Veterinary College very considerable advances have been made towards the more successful treatment of the diseases of animals, yet it is only very recently that the general attention of the farmers of England has been directed to the subject; few, in fact, of these are aware of the aggregate value of the horses, the eattle, the sheep, and the other live stock, which now tenant our islands. The ealeulation of Mr. M'Culloch makes the horses of Great Britain amount to between 1,400,000 and 1,500,000; the cattle to 5,100,000; and the sheep to 32,000,000.

The amount of live stock sold at Smithfield in the last nine years, as given in the subjoined table, will afford some idea of the great value of a portion only of the domestic animals of our country (*Johnson and Shaw's Farmers' Almanac*, vol. ii., p. 216) :—

	Beasts.	Sheep and Lambs.	Calves.	Pigs.
1835 ..	172,919	1,647,316	24,853	43,134
1836 ..	158,438	897,068	22,981	34,224
1837 ..	179,761	1,540,666	20,259	36,325
1838 ..	183,617	1,467,574	15,705	45,283
1839 ..	188,535	1,464,383	18,576	51,740
1840 ..	180,041	1,521,093	14,194	50,314
1841 ..	175,318	1,444,597	16,287	50,461
1842 ..	188,157	1,636,826	19,296	39,213
1843 ..	188,268	1,854,320	18,876	36,320

And if the public are, generally speaking, but little acquainted with the value of these noble races of domestic animals, to a still greater extent are they unacquainted with the amount of the annual mortality which, through neglect, or ill-treatment of their diseases, or the incurable nature of them, so materially thins the ranks of these invaluable tenants of the farmers' lands. As information on this head can hardly be too much diffused, in order to excite still greater exertions towards the prevention of so great a national loss, I will here collect together a few facts from my note-book, bearing on the question.

According to Mr. Youatt (*Cattle*, p. 2), one-tenth of all the lambs and sheep of our island die annually of disease ; of cattle one-fifteenth of their number die annually by inflammatory fever and milk fever, red water, hoose, and

diarrhœa. Of the great amount of property thus lost of which very few persons are aware, he gives the following calculation : — " 160,000 head of cattle are sold in Smithfield alone, without including calves or the *dead market*— the carcasses sent up from various parts of the country. If we reckon this to be a tenth part of the cattle slaughtered in the United Kingdom, it follows that 1,600,000 cattle are sent to the butcher every year, and, averaging the life of the ox or the cow at five years, the value of British cattle, estimated at £10 per head, will be £80,000,000 sterling. 1,200,000 sheep, 36,000 pigs, and 18,000 calves, are also sent to Smithfield in the course of a year, and if we reckon these to be one-tenth of the whole number, and allow only two years as the average duration of the lives of sheep and pigs, and value the calves at £2 10s. each, the pigs at £2, and the sheep at £1 10s., we shall arrive at the additional sum of nearly £40,000,000 ; so that we may safely compute the actual value of cattle, sheep, and swine, to be nearly £120,000,000 sterling."

If, therefore, one-fifteenth of all the cattle of England are annually lost by disease, more than £5,000,000 worth of cattle thus perish every year, and with these also die of disease about £3,500,000 worth of sheep.

" No general fact appears better established in hippopathology," observes Mr. Percival in his excellent work on the disorders of the horse, " than that disease is the penalty that nature has attached to the domestication of the horse.

So long as the unbroken colt remains at grass, or in the straw yard, even though he be houseless and shelterless, little apprehension is entertained about his health ; no sooner, however, does the time arrive for his domestication, than from the day, nay from the very hour, when he becomes stabled, do we begin to look for his 'falling amiss;' and so prepared for this event do we feel in our own mind, that, should the animal escape all ailment during this probationary stage of his life, we are too apt to regard him as a fortunate exception to what seems to be established as the law of nature."

Mr. Percival has given the following table, showing the ages at which horses appear most disposed to certain diseases :—

Diseases.	Patients under 5 years old.	In their fifth year.	Above 5, and under 10.	Above 10, and under 20.	20 and upwards.	Totals.
Of the lungs, ..	170	50	20	50	10	300
Of the bowels,..	10	20	40	70	20	160
Of the brain, ..	4	2	5	14	2	27
Of the eyes,....	30	10	70	35	5	150
Totals, ...	214	82	135	169	37	637

Of the 637 cases brought under medical treatment, 134 had a fatal termination. The deaths, therefore, were at the rate of 21.03 per cent. In 300 pulmonary cases, 77 died, or 25.66 per cent.

Of 118 cows that died in various grazing districts of England, in the six months from May 3, to November 3, 1844, the cause of death, as recorded by various medical men, who

for a particular purpose made their returns, was as follows :—

Pleuro Pneumonia	72
Accidents	9
Blackwater	1
Colds or Inflammation	2
Constipation of the Bowels	2
Constipation of the Manifolds	2
Decay	3
Diarrhœa	1
Hoven	3
Hoose	1
Inflammation (undefined)	1
Inflammation of Liver	1
Inflammation of Bowels	1
Loin fallen	2
Milk Fever	5
Poisoned	1
Rheumatic Fever	1
Water on the Brain	2
Paralysed Stomach	2
Shute	1
Quinsey	1
Cancer	1
Doubtful	3
Total	118

Of the *causes* which are productive of the most fatal diseases of live stock, very little is known ; the most common definitions being mere substitutions of unmeaning words for unknown phenomena. That great good, however, may be effected in the prevention of disease by the more careful and the more watchful treatment of live stock, is pretty certain ; for instance, the ill effect of rapid transitions in the temperature of the air in which domestic animals are placed, and of ill-treatment, is much more considerable than some persons are wil-

ling to believe. The natural habits, too, of different varieties of the same class of animals differ very materially. In small, and in thoroughbred horses, the pulsations of the heart are about 40 to 42 in a minute. In the cart-horses of the farm, they do not amount to more than 36. When they are treated ill, or even when spoken roughly to, their circulation is increased, say ten pulsations per minute. The natural circulation of the sheep is about 70 per minute. The average pulse of a full-grown ox, in a state of health, in England, is about 40. This would seem to increase, however, with the temperature of the county in which he is placed. Dr. James Smith (*Jour. Agriculture*, vol. ii., p. 92,) finds that in the climate of Louisiana, the pulse of the ox, when in its natural state, is from 68 to 75, rising on the slightest excitement to 80. This may explain the difficulty they find in that country of acclimating the ox, an obstacle not found in the case of the horse, who in the warm climate of Louisiana is acclimated with considerable facility.

That the effect of cold is exceedingly prejudicial to the fattening of animals, every farmer is aware; warmth, cleanliness, and quietude, every owner of live stock, who has paid the slightest attention to the subject, readily allows to be highly conducive to the health of the horse and the ox. To the pig the same remark applies. It is found that the pigs whose styes have a southern declination thrive much better than those placed in a colder aspect; they can

hardly perhaps be kept too warm and too clean. And the more recent experiments of Mr. Chitden and others have proved that the domestic sheep is not an exception to the rule: and thus sheltering of sheep, on an extensive scale, may, it seems, be profitably accomplished.

The effect of feeding sheep with turnips, under varying circumstances, has been examined by Mr. John Morton and Dr. Lyon Playfair, with their usual scientific skill. Five lots of sheep were selected of five each; each sheep was allowed one pint of oats per day, and as many Swedes as they could consume. Lot 1 was fed out of doors; 2 in an open shed; No. 3 in an open shed, but the sheep *divided* from each other *singly;* 4 in a *close* shed, in the *dark*; No. 5 in a *close* shed, in the *dark*, and separated as lot 3. The following were the results of the experiment, which began Nov. 18, 1842, and terminated March 9, 1843 (*Agr Gaz.*, vol. i., p. 59):—

Lot.	Swedes eaten.	Increase in weight for each 100 lbs. of roots eaten.
1	1,912 lbs.	1·20 lbs.
2	1,394 „	2·00 „
3	1,238 „	1·10 „
4	886 „	3·18 „
5	886 „	2·40 „

"I have found," says Mr. James Purvis (*Trans. High. Soc.*, p. 399, Jan., 1845), "after several years' experience, that the best mode of wintering half-bred or Leicester hogs, and lambing ewes on smooth ground, where the climate is indifferent, is to have sheds with

large yards attached to them. A shed of one hundred feet in length, and fourteen in width, having a back wall six feet high, of dry stone harled with lime, and a pillar in front of stone and lime, and small trees laid across the shed for joists covered with branches, and thatched with a stack of straw, together with a court fronting to the south, of one hundred feet square, fenced on the east and west sides with a dry stone dyke six feet high, and in front with a four feet wall, and all coped with turf, will contain 300 hogs. A turnip house of forty feet in length, and fifteen feet in width, should be constructed at one end of the shed, stretching along one of the side walls of the court, and an apartment for the shepherd at the end of the house, twelve feet long and fifteen feet in width. In highland districts where food and shelter in winter are difficult to be obtained, the only remedy is plantation stalls, and the sowing of whin and broom edges."

Facts like these can hardly be too frequently recalled to the remembrance of the great and enlightened farmers of England; for of many sources of improvement to which these direct their attention, they alone can avail themselves, so far at least as the *prevention* of disease is concerned, and the improvement of the food of live stock. It is also in their power, by the encouragement they afford to the veterinarian, to do much in the discovery of improved modes of *curing* the disease to which domestic animals are exposed; and to encourage them in this noble effort let the farmers remember the vast

progress which has been made in the treatment of the disorders of animals since the days of Leonard Mascal, who, although perhaps the first veterinarian of his age (he was the royal farrier to James I.), yet, in his work called "The Countryman's Jewel; or, The Government of Cattle," gravely recommends, for the cure of the bloody flux in beasts, the following treatment: "Ye shall take but a frog, and cut off his left leg, and so put him alive in the beast's mouth; but then you must have ready a handful of salt, mixed with a pint of good strong ale, and so soon as you can after the frog, give the beast to drink, and make him swallow all down together."—*Farmers' Mag.* v. xi., p. 109.

APOPLEXY — Is a complaint to which over-fed, fat *horses* are the most commonly subject. It is caused by a determination of blood to the brain. The horse falls, and often dies immediately. The only chance of saving the animal is by copious bleeding. "Take at once," says Mr. Youatt, "from eight to ten quarts, and from a vein in preference to an artery. Remove the dung from the lower intestine with the hand, and give a strong dose of physic." This may consist of the following purging drench :—

Barbadoes aloes, 1 ounce,
Epsom salts, 6 ounces,
Water, 2 pints;

mix these together for use. Assist the operation of those in need by clysters of warm water.

Apoplexy or Staggers in Cattle.—Bleed from four to six quarts, according to size and strength, and if not relieved in two or three hours, bleed again till the beast is faint. The following drench must be given :—

Epsom salts, 1½ lbs.
Linseed oil, 1 pint,
Warm water, 3 pints ;

and repeated every six hours with only half the quantity of salts and oil, till they are well purged; after which the following drench may be given twice a day :—

Tartar emetic, 2 scruples,
Powdered nitre, ½ ounce,
Gruel, 3 pints ;—mix for use.

Apoplexy or Staggers in Sheep.—Bleed copiously (about a quart), and afterwards give the following drench :—

Purging Drench—
Epsom salts, 2 ounces,
Linseed oil, 2 ounces,
Warm gruel or water, 4 ounces ;

to be repeated in six hours, if the bowels are not well opened ; afterwards give the following fever drench once or twice a day :—

Tartar emetic, 10 grains,
Nitre, 2 drachms,
Gruel, 2 ounces ;—mix for use.

Apoplexy or Staggers in Pigs.—Bleed and afterwards open the bowels with Epsom salts and sulphur.

AZOTE, or NITROGEN.—This gas constitutes 79·16 per cent. of the air we breathe ; it is known only in the state of gas. Azotic

gas is invisible and elastic, and has no smell; its specific gravity is 0·969. Animals cannot breathe it; when they are placed in a jar of it they die as rapidly as if immersed in water; neither will it support combustion. It unites with oxygen in various proportions, thus—

Part.		Parts.		
1·75	azote and	2	oxygen	forms nitrous gas.
1·75	„	5	„	nitric acid, or aquafortis.
1·75	„	4·178	„	nitrous acid.

Azote abounds in animal substances, for it forms 16·998 per cent. of gelatine; 15·705 per cent. of albumen (white of egg), &c., and these are commonly present in all animal substances. Azote unites also with hydrogen gas, and forms the volatile alkali, ammonia.

Azote exists also in gluten; and wherever this substance is present in vegetable matters, there, in consequence, azote is to be found, but otherwise it does not often enter into the composition of vegetable substances. And yet it is worthy of remark, that although azote cannot be regarded as a direct food of plants, yet most of those substances which contain it are exceedingly grateful to plants, such as ammonia, saltpetre, animal matter, &c.; and again, vegetables certainly emit, and probably inhale, this gas.—*Farmers' Ency.*

ATMOSPHERE, THE. Its influence on the health of animals. The elastic invisible fluid, which, to a considerable height surrounds our globe is denominated the atmosphere. It is composed chiefly of two simple or undecomposed gases, viz., azote, or nitrogen, 79·16;

oxygen 20·82. It contains also about 1-1000th of its weight of carbonic acid gas, or fixed air, and a considerable portion of aqueous vapour. The average proportions in which these exist in the atmosphere are—

Air,	97·9 per cent.
Watery vapour,	1· „
Carbonic acid gas,	1· „

The influence which the atmosphere exerts upon the health of domestic animals, is a question seldom considered by the farmer, and still more rarely regarded in his practice. It is hardly ever, indeed, that the keeper of live stock avails himself of the facts which the long-continued and laborious efforts of men of science have demonstrated. Yet these great benefactors of the cultivator have shown very clearly that the most profitable management of all animals cannot be attained without a due regard to the medium in which they are placed—that in fact the temperature, the purity of the air, and even the light in which they are dwelling, must all be carefully regarded by those who would obtain from them the maximum advantage. A few facts in illustration of these truths, therefore, may not be unserviceable to the farmer. Of the advantages of pure air to domestic animals, fresh facts are every year produced, tending to show its importance to their health. It is to this source that is attributed by medical men the origin of the extensively fatal pulmonary complaints to which stall-fed cows are subject. In the recent "Report of the Poor Law Commissioners on the Sanitary Condition of the

Poor," p. 103, it is remarked—"The spread of the knowledge of the fact that animals are subject to typhus consumption, and the chief of the train of disorders supposed to be peculiarly human, will, it may be expected, more powerfully direct attention to the common means of prevention. The following extract from a report on the labours of the Board of Health at Paris will show the effect of bad ventilation on cattle:—'The *epizootic* are, in many respects, less serious than the epidemics; nevertheless, as they often affect the animals which serve for the nutriment of man, and that, apart from this consideration they may have grave consequences for the public health, they have constantly engaged the care of the council. In 1834, an *epizootic* was reported to the administration which prevailed among the cows of the communes round Paris, and which caused a great mortality. The researches of the council established that this *epizootic* was only a chronic disease, a true pulmonary phthisis, to which has been given the name of *pommelière*, and by which the greater part of the cows had been attacked which fill the stables of the milkmen of Paris and its environs. According to the council, the principal cause of the evil was attributed to the vicious regimen to which this species of animals is subjected. It is known that they pass a part of the year in stables perfectly closed, in which the space is not proportioned to the number of inmates, in which the vitiated air renews itself with extreme difficulty, and in which the heat is sometimes suffocating.

It is known, also, that they pass suddenly from the food of the stable to pasture, and that in this change they go from the hot and humid atmosphere of the stable to a sudden exposure to the continual variations of the external air. This alternation of food and of heat and cold operates as a powerful cause of disease. But as the evil does not announce itself in a violent manner, as its progress is not very rapid, as there is even a period in the disease in which the animal is disposed to get flesh, the cow-feeder, who knows to what point to keep her, sells her when she is ready to calve. It is in a radius of thirty leagues from the capital that cows of this kind are purchased by the jobbers, who supply the milkmen of Paris. With these last they still hold out a certain number of years, if they are properly cared for, but in general they are kept in stables which are neither sufficiently large nor sufficiently airy, where they are exposed to the same causes which gave birth to the malady. The phthisis arrives insensibly at its last stage, and carries off every year from Paris and its neighbourhood a great number of these cows.' A similar discovery was only lately made as to the effect of defective ventilation on the cavalry horses in some of the Government barracks in England; and it is stated that a saving of several thousand pounds per annum, was effected by an easy improvement of the ventilation of the barracks near the metropolis. An agriculturalist had a large number of sheep housed to feed them on mangel wurzel, but a great number of them sickened and died,

and he declared that it was the food which had killed them. A veterinary surgeon, however, who happened to be aware of the consequences of defective ventilation pointed out the remedy —a better ventilation for the sheep, which were overcrowded. The defect was remedied—the sheep ate well, and throve upon the mangel wurzel."

The decided ill effect of confined air is more *rapidly* apparent in the case of the smaller animals; for instance, the fact of the pernicious effect of offensive smells on the small graminivorous birds, and the short duration of their lives in close rooms, and densely populated districts is attested by the bird fanciers of London. "It is known," says Dr. Arnot, "that a canary bird, suspended near the top of a curtained bedstead in which people have slept, will generally, owing to the impurity of the air, be found dead in the morning; and small close rooms in the habitations of the poor are sometimes as ill ventilated as the curtained bedstead."—(*First Report on the Health of Large Towns*, p. 61.) In respect of cattle, the slaughtermen have decided reasons for the conclusion that it is the effluvium of the place which causes them to lose their appetites. —*Report of Interment in Towns*, p. 10.

The temperature and purity of the atmosphere in which horses are kept is a question equally seldom regarded; or, if considered at all, is generally arranged in a way certain to produce ill effects. "The temperature of the stable," says Professor Youatt, in his excellent treatise on the Horse, "should, during the

winter months, never exceed ten degrees above that of the external air, and during the rest of the year should be as similar to it as possible. It is not so generally known as it ought to be, that the return to a hot stable is quite as dangerous as the change from a heated atmosphere to a cold and biting air. Many a horse, that has travelled without injury over a bleak country, has been suddenly seized with inflammation and fever when he has, immediately at the end of his journey, been surrounded with heated and foul air. It is the sudden change of temperature, whether from heat to cold, or from cold to heat, that does the mischief, and yearly destroys a multitude of horses. The stable should be as large, compared with the number of horses which it is destined to contain, as circumstances will allow. A stable for six horses should not be less than forty feet in length, and thirteen or fourteen feet wide. If there be no loft above, the inside of the roof should always be plastered, to prevent direct currents of air and occasional droppings from broken tiles; and the heated and foul air should escape, and cool and pure air be admitted, by elevation of the central tiles; or by large tubes carried through the roof, with caps a little above them to prevent the beating in of the rain; or by gratings placed high up in the walls. These latter apertures should be as far above the horses as they can conveniently be placed, by which means all injurious draught will be prevented. If there is a loft above the stable, the ceiling should be plastered in order to prevent the foul

air from penetrating to the hay above, and injuring both its taste and its wholesomeness; and no openings should be allowed above the racks, through which the hay may be thrown into the rack, for they also will permit the foul air to ascend to the provender, and, in the act of filling the rack, and while the horse is eagerly gazing upward for his food, many a grass-seed has fallen into his eye, and produced considerable inflammation; while at other times, when the careless groom has left open the trap door, a stream of cold air beats down on the head of the horse. The stable with a loft over it should never be less than twelve feet high, and proper ventilation should be secured either by tubes carried through the loft to the roof, or by gratings close to the ceiling. These gratings or openings should be enlarged or contracted by means of a covering or shutter, so that during spring, summer, and autumn, the stable should possess nearly the same temperature with the open air, and, in winter, a temperature not more than ten degrees above that of the external atmosphere. A hot stable has, in the mind of the groom, been long connected with a glossy coat. The latter, it is thought, cannot be attained without the former. To this we should reply that, in winter, a thin, glossy coat is not desirable. Nature gives to every animal a warmer clothing when the cold weather approaches. The horse acquires a thicker and a lengthened coat, in order to defend him from the surrounding cold. Man puts on an additional and a warmer covering, and his comfort is increased

and his health preserved by it. He who knows anything of the horse, or cares anything for his enjoyment, will not object to a coat a little longer and a little roughened, when the wintry wind blows bleak. The coat, however, need not be so long as to be unsightly; and warm clothing, even in a cool stable, will, with plenty of honest grooming, keep the hair sufficiently smooth and glossy to satisfy the most fastidious. The over-heated air of a close stable saves much of this grooming, and therefore the idle attendant unscrupulously sacrifices the health and safety of the horse. Of nothing are we more certain, than that the majority of the maladies of the horse, and those of the worst and most fatal character, are directly or indirectly to be attributed to the unnatural heat of the stable, and the sudden change of the animal from a high to a low, or from a low to a high temperature."—(*Youatt's Horse*, p. 346). The effect of temperature on the wool of sheep is remarkable; when they are removed from a warm to a colder climate, the wool produced becomes coarser, until at last it degenerates into hair. The hair of other animals is effected in a similar way. Those which produce in Russia and other northern portions of the world the richest furs, are found in the warmer climates with a thin and worthless covering of hair.

If, however, the horse is too often subjected to a temperature, for the sake of his coat, much too elevated, the ox and the sheep are as frequently kept in a medium far too low for their most profitable increase in fatness. The cause

of cold retarding the fattening of animals is well explained by Dr. Lyon Playfair.—*Jour. Roy. Ag. Soc.*, vol. iv., p. 215. See FOOD.

Even light exerts a very considerable influence upon the health of animals. Every horse-dealer is aware how rapidly a horse kept quietly in a dark stable gets into condition; a blind horse generally carries a good coat. Mr. Ward, an eminent surgeon, remarks on this head (*Report on State of Health in Large Towns*, p. 41):—"During a practice of thirty years in a densely populated neighbourhood, my attention has been repeatedly drawn to the influence of light, not only as a most efficient means of preventing disease, but likewise as tending materially to render disease milder when it occurs, and more amenable to medical and other treatment. Dupuytren, I think, relates the case of a lady whose maladies had baffled the skill of several eminent practitioners. This lady resided in a dark room (into which the sun never shone) in one of the narrow streets of Paris. After a careful examination, Dupuytren was led to refer her complaints to the absence of light, and recommended her removal to a more cheerful situation. This change was followed by the most beneficial results; all her complaints vanished. Sir James Wylie has given a remarkable instance of the influence of light. He states that the cases of disease on the dark side of an extensive barrack at St. Petersburg have been uniformly for many years, in the proportion of three to one to those on the side exposed to strong light. The experi-

ments of Dr. Edwards are conclusive. He has shown that if tadpoles are nourished with proper food, and exposed to the constantly renewed contact of water (so that the beneficial respiration may be maintained), but are entirely deprived of light, their growth continues, but their metamorphosis into the condition of air-breathing animals is arrested, and they remain in the form of large tadpoles. Dr. Edwards also observes that persons who live in caves and cellars, or in very dark and narrow streets, are apt to produce deformed children; and that men who work in mines are liable to diseases and deformity beyond what the simple closeness of the air would be likely to produce."

"My advice," he adds, "to young people who are about to marry, and can afford only one or two rooms, is to choose the largest room they can find, and in which they can obtain the greatest quantity of solar light; the amount of disease in light rooms, as compared with that in dark rooms, being infinitely less."

From these slight notices of the influence of impure air, neglected temperature, and of light upon animals, the accomplished farmer may perhaps be led to still further investigations in a field of research so important, yet so imperfectly explored. And, moreover, he may not perchance feel disinclined to conclude that, as he has long and successfully reaped an abundant reward from paying the most careful attention to the temperature and to the atmosphere in which his field crops are placed, so it is not unlikely that, by only similar care with

regard to his domestic animals, an equally profitable harvest might be gathered.—*Farmers' Mag.* vol. xxii.

B.

BACK SINEWS, SPRAIN OF. — The best treatment of this complaint is, first bleed from the plate vein, by which means the blood is drawn from the inflamed part. Next local by applications of hot water to the back of the leg, frequently repeated, and a dose of physic. At the same time use a bandage; keeping it moist with a lotion composed of—

Sal ammoniac,	4 ounces.
Powdered nitre,	4 „
Vinegar,	1 quart.
Water,	4 pints.

Mix for use.

BALLS—Are by far the most common, and perhaps the most convenient mode of administering many kinds of medicine. Balls should never weigh more than 1½ or 2 ounces, and be not more than 3 inches in length, and 1 inch in diameter, otherwise they will pass with difficulty through the gullet. The balls most commonly employed are thus prepared—

Alterative Ball.

Powdered nitre	3 drachms.
Sulphur	2 „
Black antimony	2 „
Powdered carraway seeds	2 „

Treacle or soft soap sufficient to form a ball.

Another Alterative Ball.

Tartar emetic	1	drachm.
Powdered ginger	2	,,
Castile soap	2	,,
Powdered gentian	2	,,

Treacle or soft soap sufficient to form a ball.

Alterative Tonic Ball.

Powdered nitre	2	drachms.
Sulphur	2	,,
Black antimony	1	,,
Barbadoes aloes	1	,,
Powdered ginger	2	,,

Treacle sufficient to form a ball.

Astringent Ball.

Powdered opium	½	drachm.
,, ginger	2	,,
,, cassia	2	,,

Treacle sufficient to form a ball.

Cordial Ball.

Carraway seeds powdered	4	ounces.
Aniseed powdered	4	,,
Coriander seed powdered	4	,,
Powdered ginger	2	,,

Treacle sufficient to form into balls; 1½ oz. for a dose.

Cordial Diuretic Balls.

Carraway seeds powdered	4	ounces.
Aniseed powdered	4	,,
Coriander seed powdered	4	,,
Powdered ginger	2	,,
Yellow resin	1	,,

Treacle or soft soap sufficient to form into balls; 1½ oz. for a dose.

Cough Ball.

Asafœtida	1	drachm.
Camphor	1	,,
Powdered squill	½	,,
Castile soap	2	,,

Treacle sufficient to form a ball.

BALLS.

Diuretic Balls.

Castile soap	4	ounces.
Nitre	2	„
Resin	1	„
Powdered aniseed	4	„
Oil of juniper	½	„

Treacle or soft soap sufficient to make eight balls.

Farcy Ball.

Blue vitriol	1	drachm.
Gentian powder	2	„

Linseed meal and treacle sufficient to form a ball.

Fever Ball.

Tartar emetic	1	drachm.
Nitre	3	„

Linseed meal and treacle sufficient to form a ball.

Mange Balls.

Powdered black antimony	2	ounces.
„ Nitre	2	„
„ Resin	1	„
„ Gentian	2	„
Castile soap	2	„

Treacle or soft soap sufficient to make eight balls.

Mercurial Ball.

Calomel	1	drachm.
Barbadoes aloes	6	„
Powdered ginger	2	„

Treacle sufficient to form a ball.

Physic Ball.

Barbadoes aloes	5 to 8	drachms.

(According to size and strength of horse.)

Powdered ginger	2	„
Castile soap	1	„

Treacle sufficient to form a ball.

Tonic Ball.

Blue vitriol	1	drachm.
Powdered cascarilla bark	2	„
„ Gentian	2	„

Treacle sufficient to form a ball.

Worm Ball.

Emetic tartar	1 drachm.
Powdered ginger	1 „
Sulphur	½ ounce.

Soft soap sufficient to form a ball.

Cough Ball for Dogs.

Dover's powder	1 drachm.
Nitre	1 „
Sulphur	3 drachms.

Teracle sufficient to make 6 or 8 balls.

Worm Balls for Dogs.

Calomel ..... 1 to 4 grains.
Powdered jalap .. 5 „ 20 „
Butter sufficient to make a ball; to be given fasting.

Alterative Balls for Dogs.

Flour of sulphur	12 ounces.
Powdered Nitre	2 „
Ethiops mineral	1 „

Treacle sufficient to make a mass.

Give a piece the size of a nut to a walnut, according to the size of the dog.

Tonic Balls for Dogs.

Powdered gentian.....		2 ounces.
„	Cinchona bark.....	1 „
„	Camomile flowers ..	1 „
„	Ginger	½ „

Treacle sufficient to make a mass.
Give from ½ to 1½ drachms for a dose.

Physic Balls for Dogs.

Barbadoes Aloes.....	2 ounces.
Powdered Ginger	2 drachms.
Calomel	2 „

Treacle sufficient to make a mass.

The dose, 10 grains to 1 drachm, according to the size of the dog

BARLEY. 1000 lbs. of two-rowed barley, according to Professor J. F. Johnston, produce,

when reduced to ashes, the following substances :—

	Grain.	Straw.
Potash,	2·78 lbs.	1·80 lbs.
Soda,	2·90 „	0·48 „
Lime,	1·06 „	5·54 „
Magnesia,	1·80 „	0·76 „
Alumina,	0·25 „	1·46 „
Oxide of iron,	—	0·14 „
Oxide of Manganese,	—	0·20 „
Silica,	11·82 „	38·56 „
Sulphuric acid,	0·59 „	1·18 „
Phosphoric acid,	2·10 „	1·60 „
Chlorine,	0·19 „	0·70 „
	23·49 „	52·42 „

Traces of eubic petre, or nitrate of soda, is also commonly found in barley.

BEE'S WAX. Bee's wax is used in the composition of most ointments; but owing to the high priec, yellow resin is frequently substituted. According to the experiments of Gay Lussac and Thenard, 100 parts are composed of—

Oxygen,	5·54
Hydrogen,	12·67
Carbon,	81·75

BASILICON. *Black Basilicon* is composed of—

Bee's wax, 8 ounees,
Yellow resin, 8 ounces,
Pitch, 8 ounces,
Black resin, 8 ounees,
Sweet oil, 20 ounees;—melt by a gentle heat.

Yellow Basilicon is composed of—

Bee's wax, 8 ounces,
Yellow resin, 8 ounees,
Burgundy piteh, 8 ounees,
Horse turpentine, 3 ounces,
Sweet oil, 20 ounces;—melt by a gentle heat.

Yellow Basilicon, sold by druggists, is formed of—

Yellow resin, 8 ounces,
Bee's wax, 8 ounces,
Olive oil, 16 ounces.

Melt the resin and wax together, and add the oil whilst hot, and strain through a sieve.

BEANS. 1000 parts of the field bean, contain, according to Professor J. F. Johnston, when dried in the sun—

	Field Bean.	
	Seed.	Straw.
Potash,	4·15	16·56
Soda,	8·16	0·50
Lime,	1·65	6·24
Magnesia,	1·58	2·09
Alumina,	0·34	0·10
Oxide of iron,	—	0·07
Oxide of manganese,	—	0·05
Silica,	1·26	2·20
Sulphuric acid,	0·89	0·34
Phosphoric acid,	2·92	2·26
Chlorine,	0·41	0.80
	21·36	31·21

BEER, see ALE.

BENZOIC ACID, see ACID.

BLACKING—May be made as follows:—

Bone black, 1 lb.
Oil of vitriol, ½ ounce;—mix them together, and add,
1 ounce gum tragacanth,
2 ounces neat's-foot oil,
1 lb. treacle,
3 pints stale beer, or common vinegar.

BLACKING—For Harness:—

White wax, 6 ounces,
Black resin, ½ ounce,
Spirit of turpentine, 4 ounces;—liquify with gentle heat, and add—

Powdered indigo blue, ¼ ounce,
Sulphate of zinc, ½ ounce,
Ivory black, ½ lb.
Spirit of turpentine, sufficient to form a paste.

BLACK LEG, see BLACK QUARTER.

BLACK OILS. These are prepared as follow :—

Spirit of turpentine, 1 pint,
Rape oil, 2 pints.

Mix them together in a stone jar, and add gradually two ounces of oil of vitriol; when cool, add half an ounce of oil of thyme.

BLACK QUARTER. (Quarter Evil—Quarter Ill—Black Leg—Blood Striking—The Blood Joint Felon, or Inflammatory Evil.) Inflammatory fever is known by various names in different parts of the kingdom, according to the symptoms it betrays during its progress. It occurs most commonly in young stock, especially with those who are thriving the best. The symptoms are—extension of neck, eyes red and protruding, breath hot, muzzle dry, the pulse from sixty-five to seventy in a minute, the flanks heave, the animal moans, the appetite is gone. Death often ensues in twenty-four hours, or even less. In the majority of cases, the animal becomes lame, hence the term *joint murrain, or quarter evil.* If the disease progresses, the loins and back become very tender, swellings about the shoulder ensue, attended with a crackling noise; putrefaction has, in fact, commenced. Sometimes hard patches of apparently dead skin make their appearance, this indicates that sloughing has began of a

nature remarkable for its rapidity: this is *black quarter* rapidly spreading. Ulcers next appear chiefly about the mouth; a discharge of offensive bloody matter from the mouth ensues.

The best treatment, is copious bleeding to as great an extent as the animal will bear without falling; then immediately administer strong purgative doses, containing a pound and a half of Epsom salts, diluted in, say three pints of warm gruel, or warm water, and add a pint of linseed oil; if this does not operate in six or seven hours, give another dose containing one pound of Epsom salts, and, if that does not produce any effect, give doses of half a pound each every six hours. In need, again bleed when the animal has purged and the pulse is reduced. Insert setons in the dewlaps, and give, two or three times a-day, the following sedative medicine:—

Digitalis, ½ drachm.
Emetic Tartar, 1 drachm.
Camphor, 1 drachm.
Nitre, ½ ounce.
Gruel, 2 pints.

The prevention of this disease is far more successful in general than its attempted cure—occasional doses of physic, the wearing of a seton, and frequent careful examinations by the owner or bailiff, "are worth," says Mr. Youatt, "the whole Veterinary Pharm."

Blood, Black Quarter, or Inflammatory Fever in Sheep.—Bleed from the jugular vein till the sheep staggers or falls, and give the following drench:—

Epsom salts, 2 ounces.
Linseed oil, 2 ounces.

Gruel, four ounces, or sufficient to dissolve the salts, and repeat every three or four hours, till the bowels are well relieved; then give the following fever drink twice a-day:—

Tartar emetic, 10 grains.
Camphor, 20 grains.
Nitre, 2 drachms.
Gruel, a wine glass full.

BLACK WATER. "The disease commonly called Red Water, Brown Water, Black Water, Moor Ill, &c.," remarks Mr. R. Thomson, of Auchterarder, "is most prevalent in old foggy pastures. It is seldom seen in hill pastures, or in new-sown pastures, in which there is abundance of clover; but it sometimes happens at the stall, where the animal has no other allowance than straw, turnips, and potatoes. It usually makes its appearance after a few days of rain followed by cold dry weather. As the disease appears at times in all situations, it is difficult to trace its cause, which may be the nature of the pasture, or the state of the weather, or both combined. It attacks every breed and kind of cattle. The first symptom is the appearance of something like blood mixed with the urine. So trifling is the complaint in some instances, that no inconvenience seems to be felt by the animal, which eats and drinks as usual, chews the cud, and is free of the disease in a few days. In such cases, a natural diarrhœa comes on, to which the cure may be attributed. In general, however, the disease is not observed until the animal refuses food, sepa-

rates from the rest of the herd, appears dull and heavy, and manifests great languor and apathy. The ears droop, the urine is of a reddish or brownish colour, and, if it be a milch cow, the milk is often similarly tinged. The pulse ranges from 60 to 70; there is obstinate constipation of the bowels: the urine is discharged in moderate quantity, and apparently without pain. After copiously bleeding, give Epsom salts, one pound, in two quarts of water, repeated every six hours, in half-pound doses, until the bowels are relieved. If relief is not afforded, the pulse begins to sink, and if a little blood be drawn at this time, its surface assumes a brownish colour; the eye appears of a yellowish brown tint; the urine acquires a darker hue; the animal refuses to rise; the pulse sinks; the legs, tail, and horns turn cold; and the animal dies, to all appearance perfectly exhausted, although it has manifested no symptoms of acute pain during the course of the disease.

"There are two diseases which in their symptoms bear some resemblance to moor-ill in cattle, viz., inflammation of the kidneys, and inflammation of the mucous membrane of the bladder or urethra, which often happens at calving. In this case, the urine, which is discharged with pain, is mixed with blood, but not so intimately so as the coloured urine in moor-ill, and has generally more or less mucus mixed with it. Inflammation of the kidneys in cattle is comparatively rare. I have seen only one well-marked case, which terminated

fatally. The animal experienced considerable pain upon pressure being applied to the region of the kidneys. The urine was small in quantity, and nearly as thick as blood; the pulse 90, and very hard. As the disease advanced, the urine became black and fetid. The animal all along exhibited symptoms of excruciating pain, until death terminated its sufferings. Post-mortem examination disclosed extensive inflammation of the peritonæum. The abdominal cavity contained a large quantity of dark-coloured fetid fluid; the fat surrounding the kidneys, as well as the kidneys themselves, was in part gangrenous; and the fat generally exhibited a yellow colour, as is usual in cases where death terminates inflammatory diseases." —*Trans. High. Soc.*, vol. ix., p. 9.

Red Water in Sheep—Water-braxy.—Bleed freely, and give the following drench:—

Epsom salts, 2 ounces,
Linseed oil, 1 ounce,
Warm water, 4 ounces;—mix for a dose.

Half the above for a lamb. The belly should be well fomented with hot water.

BLADDER. The diseases of the bladder in horses or in cattle can hardly be well treated but by an experienced veterinary surgeon, capable of distinguishing the symptoms of Inflammation of the Bladder from Inflammation of the Neck of the Bladder. The best course to be adopted in inflammation of the neck of the bladder is very copious bleeding, with a dose of opening physic. (This may be composed of Barbadoes aloes, in powder, 6 to 8

drachms; powdered gum arabic, 1 ounce; dissolved in a pint of water.) If this plan does not give relief, a drachm of powdered opium may be given, either in gruel, or in a ball, about every two or three hours; and the reduction of the spasm may be further promoted by applying a blister over the affected part.

BLEEDING. This operation is best performed by non-professional persons with a fleam, and this instrument is perhaps the safest in their hands. The jugular vein is commonly selected; the point of the fleam is held over the vein, into which it is struck by a smart blow with a bloodstick. The point chosen is about two inches below the place where the two portions of the jugular vein unite at the angle of the jaw. "The horse," says Professor Youatt, "should be blind-folded on the side on which he is to be bled, or his head turned well away; the hair is smoothed along the course of the vein with the moistened finger, then with the third and little fingers of the left hand, which holds the fleam, pressure is made on the vein sufficient to bring it fairly into view, but not to swell it too much, for then, presenting a rounded surface, it would be apt to roll or slip under the blow. The fleam is to be placed in a direct line with the course of the vein, and over the precise centre of the vein, as close to it as possible, but its point not absolutely touching the vein. A sharp rap with the bloodstick or the hand, on that part of the back of the fleam immediately over the blade, will cut through the vein, and the blood will

flow." (*The Horse*, p. 179.) Receive the blood into a vessel properly marked, so that the quantity taken may be exactly known. When a sufficient quantity of blood is taken, bring the edges of the vein together, pass a pin through them, and keep them together by a little tow, or a hair or two. In twenty-four or forty-eight hours, the edges of the vein will have united, and the pin may be withdrawn. Be careful to wipe the edges of the fleam quite dry, for a very small degree of moisture will cause it to rust.

Sheep—are generally bled from the cheek-vein, and the shepherd does this without assistance, using a lancet, and stopping the bleeding with a pin. The quantity of blood taken away varies with the nature of the disease, reference always being had to the smallness in quantity of the blood (in proportion to the size of the animal) which the sheep contains. The blood of a thin man constitutes about one-fifth of his weight; of a fat man, about one-tenth; of a horse, one-eighteenth; of an ox, one-twentieth; of a sheep in fair condition, one-twenty-second.

Cattle—are commonly bled from the jugular vein. The farmer may, for this purpose, use the fleam rather than the lancet: for in non-professional hands it is the safest instrument. It is well to make such an orifice as shall cause the blood to flow rapidly; for it is, as Professor Youatt remarks, more on the *rapidity* with which the blood is drawn, than on the *quantity* abstracted, that the benefit of bleeding depends. The bleeding, when inflammation is

considerable, should be continued until the pulse of the animal indicates that the circulation is reduced. The vein may be stopped, as with a horse, by a pin and some tow.

BLISTERS. A *Strong Liquid Blister* is composed of—

Cantharides bruised, 2 ounces,
Rectified spirits of wine, 8 ounces,
Oil of thyme, 2 drachms,
Soft water, 8 ounces.

Pour the water boiling hot on the cantharides, and let it stand all night; in the morning, add the spirits of wine and oil of thyme; let it stand fourteen days, occasionally shaking.

Liquid Sweating Blister—

Strong liquid blister, 1 ounce,
Spirit of turpentine, 3 ounces,
Spirit of sal ammoniac, 1 ounce;—mix.

To be rubbed on with the hand every morning, for twenty minutes, in Ring-Bone, Splints, Bone-Spavin, &c.

BLISTER OINTMENT—Is made of—

Fresh powdered Spanish flies, 2 ounces,
Lard, 8 ounces,
Spirit of turpentine, 2 ounces;—mix for use.

BLISTER FLIES (CANTHARIDES). Are chiefly imported from Astracan and Sicily. They should be dry, and free from mould and dust, of a strong nauseous odour, brilliant colour, and not mixed with other beetles, which is frequently the case to a great extent. They may be kept any length of time in a dry place, and secured from air; but they are liable, notwithstanding their acrimony, to

the attacks of small insects, which gradually reduce them to dust, without, however, materially affecting their activity.

BLUE VITRIOL. Sulphate of copper is a salt used very commonly in veterinary practice; it is composed of sulphuric acid 31.38, oxide of copper 32.32, water 36.30.

This is a powerful tonic, and has been employed in solutions successfully as a cure for the Glanders. It is uncertain, however, in its action in this respect, and should be used in combination with ginger and gentian, in doses of two drachms, not more than twice in the day. Dissolved in water, four drachms to a quart, it forms a mild stimulant; if two ounces are employed with the same proportion of water, it makes a gentle caustic for proud flesh or fungous matter. In the state of fine powder it is successfully sprinkled on the wound, in cases of canker in the foot. In fact, blue vitriol is the most valuable for external applications.

It is used in considerable quantities as a steep for wheat, to prevent bags or smut. The following is the best mode of using it:—"Dissolve 5 lbs. of blue vitriol (sulphate of copper: it is worth about 5d. per lb.) in 5 gallons of boiling water, then add the solution to 30 gallons of cold soft water. Place the whole in a tub. Dip the seed wheat, in a basket, into the solution for one minute. Drain. Turn the seed upon the floor. It will be ready for immediate use, except for the drill, for which it will be dry enough in twelve hours. This has been found an unfailing recipe, after nine years'

trial. No lime is needed. Neither the sacks or the drill are injured (*Per Mr. T. K. Thedam, Little Braxted, Essex.*")—*Johnson & Shaw's Farmers' Almanac*, vol. i., p. 358.

BOG SPAVIN. For this well-known disease in horses, a blister is the only means of cure. See BLISTER, LIQUID, SWEATING.

BOLE ARMENIAN. The colour of this mineral is a deep red, it is a mild astringent which is used in drenches. It comes from the Island of Lemnos, and is composed of—

Silica	47
Alumina	19
Oxide of Iron	5·4
Carbonate of Lime	5·4
Carbonate of Magnesia	6·2
Water	17

BOLTING FOOD. This is a bad habit, too readily acquired when horses feed together, out of the same manger. The remedy is to let each horse have a separate manger, so that the slow feeders shall have the same share as the quick. If, however, the horse is naturally greedy, let him have his corn mixed with chaff, let him be fed often, let the nose bag be with him when on a journey, let his teeth be examined and any unevenness removed, which may hinder him from properly grinding his food.

BONE SPAVIN. This very common disease of the hock joint, generally brought on by over work, by too great a pressure on the part, it is hardly necessary to describe, and it is the more needless since Professor Youatt, in his valuable work on the horse, p. 269, has already done it so well, and so elaborately. The remedy

is rest, or, at least, moderate work on soft ground —thus coach horses lame with a spavin, become cured of their lameness when put to the plough —and the bony deposit, or inflammation, may be removed by repeated blisters. It is only as a dernier resort that the hot iron should be applied.

BONES. Ox bones (and there is little difference in the composition of the bones of different animals) are composed of—

Cartilage	33·3
Phosphate of lime	55·35
Fluate of lime (Derbyshire spar)..	3·
Carbonate of lime (chalk)	3·85
Phosphate of Magnesia	2·05
Soda, with a little common salt ..	2·45

BOTTS—Are grubs, or caterpillars, which, in the spring, trouble horses. They crawl out of the anus, and attach themselves under the horses tail, and cause considerable uneasiness or tickling; they are not, however, otherwise prejudicial to the animal. They are the grub of a species of gad fly *(Œstus Equi)*, which in summer deposit their eggs on the knees and sides of the horse. These eggs in a few days are hatched, and the horse, in licking himself, bursts them. A small worm escapes, which, swallowed with the animals food, fastens on to the cuticular portion of the stomach, where it adheres until the following spring. At this time it disengages itself, passes out with the dung, hides itself in the ground, remains quiet for a few weeks, and then, assuming the form of a fly, again proceeds to deposit its eggs upon

the horse, and in this way the species is preserved.

To kill these bots, various plans have been proposed, such as the use of common salt in the horses food, or as a clyster, &c.; but, when once the worm has attached itself to the stomach of the animal, no medicine which can be safely administered will be likely to remove them.

BOWELS, INFLAMMATION OF. In cases of inflammation of the external and muscular coats of the bowels of horses, bleed copiously without delay till fainting is produced, and give the following drench:—

Barbadoes aloes, 4 drachms,
Powdered gum arabic, 4 drachms,
Boiling water, ½ pint.

Stir till dissolved, and add one pint of linseed oil, and repeat the dose in eight hours.

The belly should be stimulated with one of the following liniments, or a liquid blister:—

Liniment.

Strong spirits of hartshorn, 8 ounces,
Spirits of turpentine, 8 ounces; mix for use.

Mustard Liniment.

Mustard, ½ a pound,
Spirit of sal ammoniac, 2 ounces.

Water sufficient to make it the consistence of cream; to be well rubbed in with the hand.

The following fever ball may be given twice a-day:—

Powdered fox glove, ½ drachm,
Tartar emetic, 1 drachm,
Nitre, 3 drachms.

Linseed meal and treacle or soft soap sufficient to form a ball.

For inflammation of the mucous membrane of the bowels, produced from an over dose of physic, give the following drench.

Prepared chalk, 1 ounce.
Powdered bark, 2 drachms,
„ Opium, 1 drachm,
„ Ginger, 1 drachm,
Gruel, 3 pints; mix.

For inflammation of the bowels of cattle, bleed freely, and give the following drench:—

Purging Drench.

Epsom salts, 1 pound,
Boiling water, 1 quart; dissolve and add
Lindseed oil, 1 pint.

To be repeated in six hours, till the bowels are well relieved, assisting its operation by clysters of warm gruel.

For inflammation of the bowels, in dogs; bleed, afterwards put them into a warm bath, and give the following aperient mixture:—

Castor oil, 2 ounces,
Syrup of Buckthorn, 1 ounce; mix for a dose.

BRAIN, INFLAMMATION OF. Of the staggers in horses there are two varieties; the one called the sleepy or stomach staggers, from the dull, sleepy, staggering state of the patient; of this kind of staggers the origin is overfeeding, especially after long fasting. In the treatment, if it is possible, remove the contents of the overloaded stomach by the stomach-pump, then bleed, and give an opening ball. Mad staggers arise from inflammation of the brain; it most usually occurs in hot weather and in overworked fat horses. For this com-

plaint (the staggers in horses), bleed (according to the size, strength, and condition) to the extent of four to six quarts, and repeat this in six or eight hours, according to the urgency of the symptoms, and give the following ball:—

Barbadoes aloes, 8 to 10 drachms,
Tartar emetic, 1 drachm,
Calomel, 1 drachm,
Treacle sufficient to form a ball.

Assist the operation of the physic by clysters of warm water and linseed oil.

For inflammation of the brain, commonly called phrenzy or lough, in cattle;—bleed till the animal faints or drops, and repeat it in six hours if necessary, and give the following drench:—

Purging Drench.

Epsom salts, 1 pound.
Boiling water, 1 quart; dissolve and add
Linseed oil, 1 pint.

Mix for a dose and repeat every six hours till the bowels are well relieved. If the disease does not give way it would be advisable to apply a blister over the poll and on each side of the neck.

Inflammation of the brain in sheep; bleed freely from the jugular vein, and give the following drink:—

Purging Drench.

Epsom salts, 2 ounces,
Boiling water, 4 ounces; dissolve and add
Linseed oil, 2 ounces; mix for use.

BRAN. 100 parts of the ashes of the bran of wheat contain—

Soluble salts	44·16
Earthy phosphates	46·5
Silica	0·5
Metallic oxides	0·25
Loss	8·6

BREATHING, see FOOD.

BREEDING, IN AND IN. The breeding from close relations. "This plan," says Professor Youatt (*Cattle, p.* 525), "has many advantages to a certain extent. It may be pursued until the excellent form and quality of the breed are developed and established. It was the source whence sprung the cattle and the sheep of Bakewell, and the superior cattle of Colling; and to it must also be traced the speedy degeneracy, the absolute disappearance, of the new Leicester cattle; and in the hands of many an agriculturist, the impairment of constitution, and decreased value of the new Leicester sheep, and the short horned beasts. It has therefore become a kind of principle with the agriculturist to effect some change in his stock every second or third year, and that change is most conveniently effected by introducing a new bull or ram. These should be as nearly as possible of the same sort, coming from a similar pasturage and climate, but possessing no relationship, or at most a very distant one to the stock to which he is introduced. These remarks apply to all descriptions of live stock.—*Farmers' Encyclopædia.*

BREWING, see ALE.

BRITTLENESS OF HOOF. Mix together three ounces of oil of tar with six ounces of common fish oil: rub this well into the crust and the hoof.

For encouraging the growth of the hoof, an excellent stopping is made by mixing together one pound of marine salt with two pounds of

clay. This does not dry in the hoof as common clay will in warm stables.

BROKEN KNEES. Bathe the wounds well with warm water, so that no grit remains, and apply the following tincture:—

Œgyptiacum, ½ ounce,
Friars balsam, 1 ounce,
Tincture aloes and myrrh, 1 ounce; mix these together for use.

The knee of the horse should be bandaged.

BROKEN WIND. Broken wind is, according to Professor Youatt, the rupture or running together of some of the air cells of the lungs. It is commonly caused by over exertion, when the belly of the animal is full. And this exertion, when the belly by its great fullness presses heavily upon the lungs, need not be very considerable. Horses in the straw-yard, and even horses at grass, become broken-winded — facts well known to farmers. The best prevention is, feeding the horse, at least occasionally, with nutritious food, and by the avoidance of considerable exertion soon after he is fed, and long feats of any kind, for by being long kept from food the animal becomes voraciously hungry, and eats too largely, his belly is distended, the lungs are too much pressed upon, rupture of their air vessels takes place. It is useless to attempt the CURE of a broken-winded horse. This disorder may, however, be palliated considerably by attention to his food and water, and the work he performs.

BRONCHITIS—Or inflammation of the bronchial tubes. Bronchitis, says Professor

Youatt (*The Horse*, p. 189), is catarrh, extending to the entrance of the lungs. Its symptoms are, harder and more rapid breathing than in ordinary cases of catarrh, by wheezing and by the coughing up of mucous matter. Bleed according to the violence of the disease, and blister the brisket and sides with blister ointment well rubbed in, and give the following ball:—

Barbadoes aloes, 2 drachms,
Tartar emetic, 1 drachm,
Nitre, 4 drachms,
Sulphur, 2 drachms,
Treacle sufficient to form a ball;

And repeated till the bowels are acted on, which must be assisted by warm clysters frequently used; and the following ball given twice a-day:—

Tartar emetic, 1 drachm,
Powdered foxglove, ½ drachm,
Camphor, 1 drachm,
Nitre, 3 drachms,
Treacle sufficient to make a ball.

BRUISES, see KICKS.

BUTTER. The colour of butter is yellow, it possesses the property of an oil, and mixes readily with other oily bodies; it melts and becomes transparent at 96 deg. Fahrenheit, and if it is kept in this state for some time, it assumes exactly the appearance of oil, loses its peculiar flavour, and some curds and whey separate from it. Milk, in fact is composed of cream, curd, and whey. The cream and the milk are merely united mechanically, and when, therefore, the new milk is allowed to rest, the cream being

the lightest of the two rises gradually to the top; the curd separates from the milk, too, with the assistance of a very slight degree of acidity. Butter may be made by the agitation of either cream, or new milk; fresh cream is not commonly used, because it requires four times the churning that stale cream does.—(*Fourcroy, Ann. de Chém.*, tom. vii., p. 169.) The contact of the atmospheric air is not absolutely essential to the production of butter from cream, although the oxygen of the air is usually absorbed in churning; according to Dr. Young there is an increase in the temperature during the operation of four degrees. Butter-milk is merely milk deprived of its cream, in which it rapidly becomes sour, and the curdy or *cheesy part* is separated from the whey, or *serum*. Cream of the specific gravity 1·0244 was found by Berzelius to contain—

Butter, ...	4·5	parts.
Cheese, ...	3 5	,,
Whey, ...	92·0	,,

Curd, which is easily separated from creamed milk by rennet, has many of the properties of coagulated albumen; 100 parts contain, according to the analysis of MM. Gay Lussac and Thenard—

Carbon, ...	59·781	parts.
Oxygen, ...	11·409	,,
Hydrogen, ...	7·429	,,
Azote, ...	21·381	,,

Curd, adds Dr. Thomson (*System of Chem.* vol. iv., p. 499), as is well known, is used in

making cheese, and the cheese is the better the more it contains of cream, or of that oily matter which constitutes cream. It is well known to cheese-makers, that the goodness of it depends in a great measure on the manner of separating the whey from the curd. If the milk be much heated, the coagulum broken in pieces, and the whey forcibly separated, as is the practice in many parts of Scotland, the cheese is scarcely good for anything; but the whey is delicious, especially the last squeezed out whey; and butter may be obtained from it in considerable quantities. But if the whey is not too much heated (100 deg. is sufficient), if the coagulum be allowed to remain unbroken, and the whey be separated by very slow and gentle pressure, the cheese is excellent, but the whey is almost transparent and nearly colourless.—*Jour. de Phy.* 38—417.

Mr. J. Ballantyne found that the greatest quantity of butter from a given quantity of cream is obtained at 60 deg., and the best quality at 55 deg. in the churn just before the butter came; when the heat exceeded 65 deg., no washing could detach the milk from the butter without the aid of salt; but when a quantity of salt was wrought well into it, and the mass allowed to stand for twenty-four hours, and then well washed, the milk was separated. —*Trans. High. Soc.*, vol. i., p. 198.

On an average, four gallons of milk produces a pound of butter, and a good cow should produce six pounds of butter per week in summer, and three pounds in winter.—*Farmers' Ency.*

Milk and Butter produced by various Cows, from April to June, 17, 1841.—(*Jour. Royal Ag. Soc.*, vol. iv., p. 436.)

Cows.	Quarts milked.	Qts. set for butter.	Butter produced.	Proportion of butter in milk.
3 Galloways, after first calf, ...	1,134½	1,115½	117¼ lbs.	9½ qts. produced 1 lb. salt butter.
4 Kerrys, after first calf, ...	1,769	1,698	191 ,,	8⅞ qts. produced 1 lb. salt butter.
9 Ayrshire, six years old, ...	4,313½	3,086	302 ,,	10⅛ qts. produced 1 lb. salt butter.

—*Johnson and Shaw's Farmers' Almanac*, vol. ii., p. 47.

BUTTYR OF ANTIMONY—Or chloride of antimony, being composed of antimony 54·88, chlorine 45·12 *(Thomson's Chem.*, vol. iv., p. 554*)*. It is an exceedingly useful medicine, and, in many cases, such as corns, wounds in the feet, canker, &c., it is perhaps the best caustic in our possession.

C.

CALOMEL—Is frequently given to horses combined with aloes. It is a chloride, composed, according to Dr. Thomson, of—

Mercury, ... 15·25
Chlorine, ... 84·75.

CALVES, DISEASES OF. The common diarrhœa or scour in calves commonly arises from irregular feeding, or other bad management. The following mixture is an excellent remedy :—

Prepared chalk, 4 ounces,
Powdered canella bark, 1 ounce,
Laudanum, 1 ounce,
Water, 1 pint.

Mix these together, and give two or three

table spoonsfull, according to the size of the calf, twice or three times a-day.

Costiveness in Calves.

For this complaint dissolve from two to four ounces, according to age, of Epsom salts in two quarts of water, and inject into the stomach by means of the stomach pump, and, in need, repeat in half doses every four hours.

Canker in the Mouth of Calves.

For this affection give a dose of physic (Epsom salts), and use the following wash:—

Wash for Canker.

Mel ægyptiacum, 1 ounce,
Friars balsam, 1 ounce.
Mix and apply to the sores.

CANKER IN THE MOUTH, see CALVES.

CANKER IN HORSES FEET. After well paring the hoof, and destroying the fungus by means of the butyr of antimony, apply the following tincture:—

Friars balsam, 1 ounce,
Tincture of aloes and myrrh, ½ ounce. Mix these together.

CANKER OF THE EARS IN DOGS. The best application for the canker in dogs ears is an ointment made of—

Burnt alum in fine powder, 1 drachm,
White vitriol in fine powder, 1 drachm,
Spermaceti ointment, 4 ounces,
Rub them together for use.

CAPPED HOCK. This is an affection in horses commonly produced by a bruise, from a blow, or a kick. The application of repeated blisters is the only efficacious remedy. This should be attended to in an early state of the complaint.

CAMPHOR—Is chiefly obtained from the laurus camphora, or camphor laurel of Japan. It acts as a diaphoretic and sedative combined with antimony.

CAMPHOR LINIMENT, see LINIMENT.

CANTHARIDES. Spanish flies come principally from Sicily and Astracan. They are extensively employed in the formation of blisters, for which purpose they are excellent, powerful, and in effect active, yet never causing a blemish. Two ounces infused for several days in a pint of oil of turpentine forms a liquid blister; and this liquid blister, when mixed with four times its weight of common oil, forms a *sweating* oil.

CARRAWAY SEEDS—Are extensively used in veterinary practice, as cordials, and are, when powdered, used, in conjunction with purgatives, to prevent griping.

CARROTS—Are a well known root, extensively employed as an article of food; 10,000 parts, as they are carried from the field, contain, according to Professor Johnston,—(*Lec. on Agr. Chem.*, p. 322,)

Potash	35·83
Soda	9·22
Lime	6·57
Magnesia	3·84
Alumina	0·39
Oxide of iron	0·33
Oxide of manganese ..	0·60
Silica	1·37
Sulphuric acid	2·70
Phosphoric acid	5·14
Chlorine	0·70
	66·19

100 parts contain of—

Water	85·0
Husk, or woody fibre ..	3.0
Starch, Gum, and Sugar ..	10.0
Gluten, Albumen, and Casuni	2·0
Fatty matter	0·4
Saline matter	1·4

According to the calculations and experiments of the late Rev. W. Rham, 276 lbs. of carrots are equal in nourishment to 100 lbs. of good hay.—*Johnson and Shaw's Farmers' Almanac*, vol. i., p. 316. Davy found in 1000 parts of carrots, 98 of soluble or nutritive matter.

Carrots are excellent as food in many diseases of live stock, such as Chronic Cough, Broken Wind, Jaundice, &c., they are very useful as the ordinary food of the horse, sliced and mixed with chaff, say about half a bushel per day.

CASTOR OIL—Is expressed from the seeds of the odicinus communis, a plant indigenous to the West Indies and South America. That from the West Indian seed is the best for animals. As a purgative in veterinary practice, it is uncertain, unsafe, and costly. Linseed oil is a much better purgative, being safe and much less expensive.

CASTRATION—Is an operation, which the farmer will best consult his own interest, by committing to the veterinary surgeon. In sheep it is an operation usually performed before they are twenty-one days old; in cattle between the first and third months; in horses between the age of four and twelve months. In general

the earlier this operation is performed the better. The following directions which I abridge from those given by Mr. Spooner of Southampton, in his excellent work on the sheep. p. 450, contain all that need be said on the castration of lambs :—"A favourable day should be selected, dry, but neither hot nor cold ; if the flock is considerable, operate at different periods, by which they may be operated upon at the same—a fortnight is a very good age. It will also save trouble, and be as well to dock them at the same time. There are different methods of performing the operation, but the following, which we have generally practised, is as expeditious, convenient, little painful, and satisfactory as any :—

"The operator sits astride on a long stool, with one of the animal's hind legs under each thigh, the fore legs and head being held by an assistant, with the finger and thumb of the left hand he draws up the lower part of the scrotum or bag, and cuts off a portion of the skin with a sharp scalpel or knife. He then grasps the upper part of the scrotum, which forces the testicles forward, and with one incision separates the part which divides the testicles sufficiently to cause them both to escape from the bag. He then places the iron clams on the cords above the testicles and with a hot iron divides the cords, and the operation is completed. A little lard may be afterwards smeared over the parts afterwards to keep off the flies, &c. Before the operation is performed the bag should be examined to ascertain if any rupture exists,

in which case some of the intestines will have escaped into the scrotum. In such case the operation must be performed in a more careful and difficult manner. Four small slips of wood, about four inches in length, must first be provided. Two sticks of elder, cut in half will be most suitable, and it will be better if the pith is removed, and the vacancy filled with some caustic. One end of each pair must be fastened together with wax. The intestines should be gently forced up into the abdomen, at any rate as high as possible. An incision should then be carefully made over each testicle, and through the skin alone. The testicle with its coverings should then be pressed through the opening in the skin, which being held back the elder sticks, should be placed on the cord above the testicle, and one end having been previously united, the other should be brought together, and firmly tied by an assistant with waxed thread. The other testicle may then be operated on in a similar manner. Care must be taken that neither the skin nor any portion of the intestines be included in the wooden clams, and they must be pressed together as closely as possible. In the course of three or four days the lamb should be examined, and if the testicle has fallen off, or can be removed by the hand, the thread may be cut, and the clams removed."

"In castrating full-grown rams, it is better to take out each testicle separately, through an incision made into each compartment of the scrotum, and the same method may be adopted as practised with the horse."

CASTRATION OF COLTS. "If," says Professor Youatt, in his valuable work on the *Horse*, p. 227, "the colt is designed either for the carriage or for heavy draught, the farmer should not think of castrating him, till he is at least twelvemonths old, and even then the colt should be carefully examined. If he is thin and spare about the neck and shoulders, and low in the withers, he will materially improve by remaining unent another six months; but if his forequarters are fairly developed at the age of twelvemonths, the operation should not be delayed, lest he become heavy and gross before, and have a will of his own. No specific age then can be fixed, but the castration should be performed rather late in the spring, or early in the autumn, when the air is temperate and the weather dry. No preparation is necessary for the sucking colt, but it may be prudent to bleed and to physic one of more advanced age. In the majority of cases no after treatment will be necessary, except that the animal should be sheltered from intense heat, and more particularly from wet. In temperate weather he will do much better running in the field than nursed in a close and hot stable. The moderate exercise he will take in grassing will be preferable to perfect inaction. A large and well-ventilated box, however, may be permitted."

CASTRATION OF CALVES—Is generally best performed when the animal is between one and three months old, and the younger the animal is the safer will be in general the operation. That the animal should

be in perfect health seems the only care requisite. The old primitive mode of operating is still in use in various parts of the kingdom; this consists in tieing a piece of whipcord tight around the scrotum, by this means all circulation of the blood being prevented, the bag, with its contents, was either cut off on the second or third day, or it speedily dropped off.

"It is now, however, the general practice," says Professor Youatt, "to grasp the scrotum in the hand between the testicles and the belly, and to make an incision on one side of it, near the bottom, of sufficient depth to penetrate through the inner covering of the testicle, and long enough to admit of its escape; the testicle immediately bursts from its bag, and is seen hanging by its cord. The careless or brutal operator now firmly ties a small string round the cord, and having thus stopped the circulation, cuts through the cord half an inch below the ligature, and removes the testicle. He, however, who has any feeling for the poor animal on which he is operating, considers that the only use of the ligature is to compress the blood vessels, and prevent after hemorrhage, and therefore saves a great deal of unnecessary torture by including them alone in the ligature, and afterwards dividing the rest of the cord. The other testicle is proceeded with in the same way, and the operation is complete. The length of the cord should be so contrived that it shall immediately retract into the scrotum, but not higher, while the ends of the string hang out through the wounds. In the course

of about a week the strings will usually drop off, and the wounds will speedily heal. It will be rarely that any application to the scrotum will be necessary, except fomentation of it if much swelling should ensue.—(*The Horse*, p. 560.)

CATARRH (common), or HOOSE (common cold). This is a common complaint, much too often neglected till it degenerates into worse disorders.

For Cattle. In slight cases, house them, give them mashes, or a dose of physic. In more severe cases bleed, and after bleeding give —

Epsom salts, ½ a pound,
Ginger, 2 drachms,
Powdered aniseed, 2 ounces,
Gruel, 3 pints.

For epidemic catarrh or influenza, bleed from three to five or six quarts, and give the following purging drench :—

Epsom salts, 1 pound,
Powdered coriander seeds, 1 ounce ; dissolve in 3 pints of warm gruel.

Should the fever continue after the purging drench, the following fever drench must be given night and morning :—

Tartar emetic, 1 drachm,
Nitre, 4 drachms ; mix and give in a quart of warm gruel.

In a Horse is a disorder readily cured at the commencement of the attack. Give him additional warmth, some mashes, and a ball or two, each dose composed of—

Camphor, 2 drachms,
Tartar emetic, 1 drachm,
Powdered nitre, 4 drachms,
Linseed meal and soft soap sufficient to make a ball.

If the disorder increases, bleeding must be had recourse to. After a time when the fever has left, and the animal begins to recover, but is very weak, the following cordial may be given every day :—

Powdered nitre, 2 drachms,
„ Aniseed, 1 ounce,
„ Carraway seeds, 1 ounce,
„ Gentian, ½ ounce,
„ Ginger, 2 drachms ; boil ten minutes in a quart of ale, and give new milk warm.

CATARRH IN SHEEP. The best mode of treatment is to bleed and give the following drench :—

Epsom salts, 2 ounces,
Powdered aniseed, 2 drachms ; mix and give these in a little water or gruel.

If fever exists, the following fever drink may be given :—

Tartar emetic, 10 grains,
Nitre, 1 drachm ; mix and give it the patient in a little warm gruel.

CATARRHAL FEVER. This is sometimes called *Influenza, Epidemic Catarrh* distemper, &c. In horses its symptoms are in succession shivering, hot mouth, a hot skin, heaving of the flanks, with cough, the membrane of the nose, red, but less so than in inflammation of the lungs, attended with a discharge from the nose, which at first is watery, then thick, and lastly offensive; the horse swallows with difficulty, coughs, and becomes excessively weak. This is a complaint which in the hands of the veterinary surgeon requires much discrimination and attention. It occurs

chiefly in the spring and autumn. It is infectious; separate him therefore from all other horses. If attended to in the early stages of the attack, bleeding is commonly necessary, but this in moderation, rarely more than three or four quarts, and must be repeated if the pulse is increasing, and the legs getting cold. The bowels should be kept gently open; for this purpose give the following mixture:—

Barbadoes aloes, 2 drachms,
Gum arabic, ½ ounce,
Water, 1 pint, for a dose;

Assist its operation by clysters of warm gruel; repeat the physic in twelve hours if necessary. If the throat is sore a blister must be applied, composed of—

Powdered Cantharides, 1 ounce,
Resin ointment, 4 ounces; mix for use.

Hot mashes are generally excellent in this disorder, as promoting the discharge from the nose, and alleviating the inflammation of the throat and membrane of the nose. Let him be supported by every means in your power; tempt him to eat by carrots, bran, and malt mashes, and let him have a supply of gruel always in his box.

Then for cooling medicine may be given—

Fever Ball.

Camphor, 2 drachms,
Nitre, 4 drachms,
Emetic tartar, 1 drachm,
Soft soap sufficient to make a ball.

The disease, says Professor Youatt, with which catarrh fever is most likely to be con-

founded is inflammation of the lungs; and, as the treatment of the two is in some particulars so different, the farmer should be enabled readily to distinguish between them. If a little care be used this will not be difficult. The febrile nature of the pulse, the early discharge from the nose, the want of intense redness in the lining of the nose, the frequent and painful cough, the enlargement of the glands, and soreness of the throat, the rapid loss of strength, the sometimes constant, and at others variable, warmth of the legs, fidgettiness and bowing, will sufficiently distinguish catarrhal fever from the oppressed pulse, red nostrils, heaving flank, little cough, fixedness of limbs, and coldness of the extremities which accompany and characterise inflammation of the lungs." — *On the Horse* p. 191.

CHOKING—Or obstruction of the gullet. This is an accident most common in cattle, but it occurs occasionally with horses, and when it does happen is more often fatal with them than with cattle.

The horse, if feeding himself, will rarely attempt to swallow pieces of food too large to pass the gullet. Many cases, however, have occurred when grooms and other horsekeepers have attempted to pass eggs, and other improper substances, down the animal's throat, for the purpose of improving their coats, that they have stuck in the passage. In such cases, the common way to remove the obstruction was, and is still in many places, to pass a cart-whip, or cart-rope, or osier stick, or even a rack stave,

down the animal's throat. The best way, however, is to use a flexible tube, which may be had of Mr. Read, or any other respectable maker, an instrument which every farmer should keep by him. With this instrument, using it always remember *gently*, the obstruction may be generally removed; and if the obstructing matter can be felt externally, rubbing perseveringly with the hand will materially assist the operation, which may be farther aided by previously pouring near a pint of sweet oil down the throat of the animal. This accident most commonly occurs when cattle are first put on turnips, carrots, potatoes, &c.

CITRIC ACID, see ACID.

CLEANSING. The *after birth* or placenta should be discharged soon after the period of calving; in case this is delayed, a dose of physic may be administered, composed of one pound of Epsom salts, and two drachms of ginger in some warm water or warm gruel. Leave the calf with the cow for some time after it is born.

The following cleansing drink may be given with advantage:—

Cummin seed powder, 2 ounces,
Sulphur, 2 ounces,
Bay berries powdered, 1 ounce,
Turmeric, 1 ounce.

Boil these together for ten minutes, and give the drink when cool in some gruel.

CLYSTERS. Clysters are medicines introduced (commonly by a syringe) into the rectum of animals. The composition of the most common is as follows:—

Anodyne Clyster for Horses.

Laudanum, 1 ounce,
Gruel, 4 quarts.

This is very useful to stop purging, &c.

Stimulant Clyster for Horses.

Epsom salts, ½ pound,
Linseed oil, 8 ounces,
Water, 3 or 4 quarts.

Used to assist the operation of opening physic.

Clyster for Cows.

Epsom salts, 1 pound,
Linseed oil, 8 ounces,
Water, 3 or 4 quarts.

Very useful to assist the operation of physic drenches. Read's or Wright's syringes are the best instruments for administering clysters.

COLIC IN HORSES. Colic in some horses is easily excited; it arises from various causes, such as drinking cold water, sudden exposures to cold, too large a meal of green food, &c.

Colic Drink.

Laudanum, 1 ounce,
Spirits of sweet nitre, 2 ounces,
„ Turpentine, 2 ounces,
Linseed oil, 1 pint, mix.

Apply hot water by means of flannel to the belly, and the following clyster should be administered:—

Epsom salts, ½ pound,
Linseed oil, 4 ounces,
Water, 4 quarts; mix.

If these do not operate successfully in half an hour, bleed.

COLON. The length of the intestines of

an ordinary sized horse is about ninety feet. These consist of the small intestines, which are about thirty-six feet in length; and the larger intestines, twenty-four feet long. The colon is a portion of the latter, and is a very large intestine, being capable of holding about twelve gallons. It is here that, by the action of the lacteals, the chyle is principally absorbed from the food. From the colon the undigested remains of the food pass directly into the rectum, or straight gut, from whence it is evacuated by the animal.

CONTRACTED FOOT. This is an affection of the heels of the horse, not very common with farmer's horses, in spite of bad shoeing and neglected preparation of the foot. The cool soft earth on which these valuable horses do their work, the moist dews which saturate the early morning grass, or the straw of the farm-yard, keep their hoofs in a healthy natural condition. It is the stabled steed, the thorough-bred race-horse, who is the most subject to contracted heels, a complaint which may be alleviated, but is rarely cured. To effect this, the placing the animal in wet clay during the day-time, or turning him into a moist pasture, properly paring away the sole and the toe, lowering the heels, are amongst the best means of preventing or alleviating a tendency to contracted heels: a blemish, however, which, in the opinion of Professor Youatt and other excellent veterinary surgeons, is of far less importance, as affecting the value of the animal, than some persons believe.

CORDIAL BALL, see BALL.

CORIANDER SEED. This is a warm stomachic, frequently added to drenches of cattle, to prevent griping.

CORONET—Is that portion of the foot of the horse where the horn of the hoof unites with the skin of the pasterns.

COSTIVENESS IN CALVES, see CALVES.

COUGH, TREATMENT OF. The following ball may be given in this complaint:—

Gum ammoniacum, 2 drachms,
Powdered squills, 1 drachm,
Camphor, 1 drachm,
Soap, 2 drachms;—made into a ball with syrup.

Or,—

Gum ammoniacum, 3 drachms,
Powdered squills, 1 drachm,
" opium, ½ drachm,
Soap, 2 drachms;—made into a ball with syrup.

If the cough is very bad and painful, a moderate bleeding may be desirable.

CRIB-BITING—Is a morbid habit, which is acquired too readily by many horses, of biting the manger, and at the same time either expelling or sucking in air through the windpipe. It is an unsoundness in a horse, and is incurable. The results are, increased wearing of the teeth, spilling of the corn, and an increased tendency to colic. The horse may be stayed from cribbing by either wearing a strap tight around his neck, or wearing a muzzle of a peculiar construction, which, while it enables the horse to eat his hay and corn, prevents him from seizing hold of the manger.

CUD, LOSS OF—Is not a disease of itself,

but is usually a symptom of various disorders. The following drink may be given in cases of loss of cud, when no indication of any particular disorder is apparent :—

Epsom salts, ½ pound,
Gentian, powdered, ½ ounce,
Carraway seeds, powdered, 1 ounce,
Ginger, powdered, 2 drachms ;—mix, and give in warm gruel.

CURB—Is a bony excrescence, which often forms in the inner side of a horse's hind leg. It is a product of hard riding. Apply the following cooling lotion to reduce the inflammation, and afterwards apply a blister. If very lame, it will be advisable to give a dose of physic.

Cooling Lotion.

Sal ammoniac, 2 ounces,
Powdered nitre, 2 ounces,
Vinegar, 1 pint,
Water, 1 quart ;—mix for use.

D.

DAFFY'S ELIXIR—is composed as follows :—

Senna leaves, 12 ounces,
Guaiacum wood, 2 ounces,
Elicampane root, 2 ounces,
Aniseed, 2 ounces,
Carraway seed, 2 ounces,
Coriander seed, 2 ounces,
Stick liquorice, 2 ounces,
Raisins, stoned, 8 ounces,
Rectified spirits of wine, 3 pints,
Soft water, 3 pints.

Mix these together; and let the mixture stand fourteen days, occasionally shaking it. This is extensively used in some districts of England for calves and other animals, who are suffering from griping, &c.

The dose for a calf is two or three table-spoonsfull; for a horse, half a pint.

DIARRHŒA—Is the excessive discharge of fæcal matter. It arises from various causes, as from too much opening physic, poisonous plants, bad treatment, foul water, or from some peculiar state of the atmosphere. This may be treated as follows:—First give an aperient, either one pint of linseed oil or, in a quart of water—

Half a pound of Epsom salts,
Two drachms powdered ginger. Mix for a dose.

Afterwards give the following astringent:—

Prepared chalk, 1 ounce,
Powdered Catechu, 3 drachms,
,, Opium, ½ drachm,
,, Ginger, 2 drachms.
Mix, and give in a quart of warm gruel.

DISTEMPER IN DOGS. For the distemper in dogs, give the following emetic powder:—

Tartar Emetic. 20 grains,
Calomel, 20 grains,
Opium, 5 grains.

Mix them together, and give, in a peice of butter, from two to six grains according to size.

DIURETIC BALLS, see Balls.

DISTENTION OF THE RUMEN, OR GRAIN SICK. First use the probang, afterwards give a pint of linseed oil. The ope-

ration may be assisted by clysters of warm water. See Food, distention with, for sheep; and Hoven for cattle.

DOGS. Physic drench for dogs:—

Castor oil. 2 ounces,
Syrup of Buckthorn, 2 ounces.

Mix them together. Give one quarter to two ounces for a dose, according to size.

DOGS' EARS, see Healing Ointment.

DROPSY. In the horse it is an effusion of watery matter—is commonly the product of other diseases, or a general weakness—it occasionally supervenes after inflammation of membrane of the lungs (pleurisy). The following diuretic ball may be given:—

Powdered Resin, 2 drachms,
Castile soap, 2 drachms,
Sulphur, 4 drachms,
Powdered gentian, 2 drachms,
Oil of Juniper, ½ drachm.

Treacle sufficient to form a ball to be given once or twice a day. When great debility exists, a tonic may be added to the diuretic as follows:—

Tonic Diuretic Ball.

Powdered gentian, 2 drachms,
Ginger, 1 drachm,
Resin, 2 drachms,
Castile soap, 2 drachms,
Powdered Nitre, 3 drachms,
Oil juniper, ½ drachm,

Treacle sufficient to form a ball, to be given once or twice a day.

DYSENTERY OR SCOURING ROT. In cattle this dangerous and generally fatal disease arises from numerous causes difficult to

trace, and almost as difficult to guard against. The farmer describes its fatal nature when he observes of it that "*The animal is rotten.*" "There are," says Professor Youatt, "cases of recovery, but they are few and far between. In its treatment it is generally advisable to take a small quantity of blood, and an aperient, as a pint of linseed oil, or—

Epsom salts, ½ pound,
Powdered carraway seeds, 2 ounces,

To be given in a quart of gruel, afterwards the following astringent, night and morning:—

Prepared chalk, 1 ounce,
Powdered Catechu, 4 drachms,
„ Canella bark, 2 drachms,
„ Opium, 2 scruples,
„ Gentian, 2 drachms,
„ Ginger, 1 drachm,

Mix and give the above in thick gruel or linseed tea.

E.

EPIDEMIC CATARRH, see CATARRHAL FEVER.

EPIDEMICS. These diseases are most common in the domestic animals, amongst cattle and horses: sheep are much more exempt from these visitations. The appearances they present are so various, that I can only in this place refer my readers to the heads under which each complaint is described.

EPILEPSY, OR FITS. This is a complaint

in the horse which may arise from many causes, all, however, difficult to discover, and equally so to cure. The farmer will best consult the dictates of prudence by ceasing to either ride or drive a horse that has once had a fit.

For Epilepsy in the Cow. The same remarks, in general apply. The attack is the most frequent in young fat beasts, especially if they have been over driven or frightened. The best remedy is to either reduce the food of the animal, or to hasten its departure to the butcher.

In the Sheep—it is much more frequent than in either the horse or the cow. It occurs most frequently in young sheep, who are in good condition, both in the autumn and in the spring. The best treatment is to leave the action of the over-excited nervous energy to cease of itself. It is a disease which is apt to return, and is one which in some continental districts is productive of great loss to the stockowner.

EYE, INFLAMMATION OF—In horses, if proceeding from cold, give the following ball:—

Emetic tartar, 1½ drachms,
Nitre, 3 drachms,

Linseed meal and soft soap sufficient to form a ball; and frequently foment the eye with hot water.

If the inflammation does not abate, use the following lotion :—

Goulard's extract, 1 drachm,
Spirit of wine, 1 drachm,
Soft water, ½ pint.

Mix and bathe frequently with a small piece of sponge; or—

Goulard's extract, 1 drachm,
Laudanum, ½ ounce,
Soft water, ½ pint. Mix for use.

If the inflammation does not proceed from cold, we must bleed and give a dose of physic first, and then give the balls and use the lotion as recommended above, or the following lotion:

Purified white vitriol, 10 grains,
Soft water, ½ pint. Mix.

Inflammation of the Eye (Cattle).—Bleed, and afterwards give the following purging drench—

Epsom salts, 1 pound,
Carraway seeds, 1 ounce,
Water, 3 pints. Mix.

The eye to be fomented with hot water frequently, and afterwards use the following lotion:—

Goulard's extract, 2 drachms,
Laudanum, 2 drachms,
Water, 1 pint. Mix, and bathe with a piece of sponge.

When the inflammation has abated, use the following:—

Purified white vitriol, 10 grains,
Soft water, ½ pint. Mix for use.

EYES, WEAK, IN DOGS. The following wash may be applied for weak eyes in dogs:—

White vitriol, 8 grains,
Soft water, ½ pint.

Mix them together, and apply it with a piece of clean linen rag several times a day.

F.

FARCY. Is a disease of the absorbent vessels in horses, closely connected with, or one of the stages of, glanders; they commonly indeed run into each other. Its symptoms usually commence with buds or knots on the side of the face, inner part of the thigh, or on the neck. It developes itself, however, in a variety of ways, as by sudden and enormously swelled legs, swelled muzzle, disagreeable discharge from the nose, cracked heels, &c. It arises either from bad grooming, or from infection. Any cause which leads to glanders will produce farcy.

Its treatment is as follows:—Use a lotion, composed as follows:—

Blue vitriol, 1 ounce,
White vitriol, 1 ounce,
Water, 1 pint:—mix.

The ulcers to be bathed with this, night and morning; at the same time using the following balls,

Blue stone, 1 drachm,
Powdered gentian 2 drachms,
Liquoriee powder, 3 drachms,
Treacle sufficient to form a ball.

To be given once or twice a day. After giving the above two or three weeks, and without success, the following may be given,

Corrosive sublimate, 10 grains,
Gentian powder, 2 drachms,
Liquorice powder, 4 drachms,
Treacle sufficient to form a ball.

To be given every morning. If it produces purging or sickness, it must be immediately discontinued. If green food is not to be obtained, carrots should be given.

FAT, see FOOD.

FEET, INFLAMMATION OF. The symptoms as they arise in this complaint in a horse are, fidgettiness, shifting of the fore-legs, fever, anxiety, moaning, lying down, and remaining down. Bleed copiously at the toes; apply soft linseed meal poultices, covering the whole foot; often renew them, and remove the shoe, and pare the hoof as *gently* and thinly as possible; give him cooling medicine, a dose of which may be composed as follows:—

Camphor, 2 drachms,
Nitre, 4 drachms,
Emetic tartar, 1 drachm,
Soft soap, sufficient to make a ball.

In obstinate attacks, fresh bleeding must be resorted to; and if this avails not, about the third day a blister may be applied.

FEVER IN THE HORSE. This is often the commencement of an increased arterial action, which ends in some local affection. The horse becomes dull, has a starry coat, extremities cold, the pulse soft and quick, appetite bad, bowels costive.

After bleeding according to the urgency of the symptoms, give the following ball:—

Physic Ball.

Barbadoes aloes, 6 to 8 drachms,
Powdered ginger, 2 drachms,
Castile soap, 2 drachms,
Treacle sufficient to form a ball.

The patient to have bran mashes and warm water. The operation of the physic may be assisted by means of a clyster, composed of warm water, half a pound of Epsom salts, and half a pint of linseed oil. Afterwards the following fever ball, to be given night and morning:—

Tartar emetic, 1 drachm,
Camphor, 1 drachm,
Powdered nitre, 2 drachms,
Linseed meal, and treacle sufficient to form a ball.

FEVER IN CATTLE, see HOOSE, CATARRH.

FIBRIN—Is the clot, or fibrous matter, of blood which remains after being thoroughly washed in water. 100 parts are composed of—

Carbon	5·360 parts.
Oxygen	19·685 „
Hydrogen	7·021 „
Azote, or nitrogen . . .	19·934 „

FIRING. This painful operation the farmer will gladly leave to the veterinary surgeon. It is a barbarous practice, for which blistering may in most cases be readily substituted, and is one which the humane farmer will anxiously and studiously strive to avoid. In no case ought the firing to be allowed to penetrate through the skin.

FISTULOUS WITHERS—Require to be treated like Poll Evil, see POLL EVIL.

FITS, see EPILEPSY.

FLESH, OR MUSCLE. That of the ox was analysed by M. Bezzelius; he found in 100 parts—

Fibrin vessels and nerves	15·8	parts.
Cellular matter	1·9	„
Muriate and lactate of soda	1·80	„
Albumen. and colouring matter of the blood	2·20	„
Phosphate of soda	0·90	„
Extract	0·15	„
Albumen, holding in solution phosphate of lime	0 08	„
Water, and loss	77·17	„

The organic portion is composed of—

Carbon	54·12	parts.
Hydrogen	7·89	„
Nitrogen	15·67	„
Oxygen	22·32	„

FLUKE, THE—Is a small flat worm, resembling in shape that of the common flat fish. It is found in the ducts of the gall bladder of cattle and of sheep, often in those of healthy sheep, and is always found in those which have died of the rot; but, whether its presence is the cause or the result of the rot, medical men are not agreed. (See Rot.) It occurs in most chronic diseases of the liver.

FLOODING — Is a discharge of blood from the uterus of the cow, after calving. The only remedy is to apply cold to the loins; if in warm weather, a pound of saltpetre dissolved in a gallon of water will produce a very cold solution. If ice can be procured, equal parts of snow and ice, say equal parts of each, will produce a very intense cold. If the flooding still continues, raise the cows hind parts, give two drachms of opium every hour, keep the patient quiet, take away her calf.

FOUL FOOT, see Foot, Diseases of.

FOX GLOVE DIGITALIS PURPUREA. The leaves of this indigenous plant, when gathered, about the time it is coming into flower, dried, and reduced to powder, or made into a tincture or infusion, is one of the most valuable medicines in veterinary practice. Its effect is to lower the pulse in an extraordinary manner; it is, therefore, exceedingly useful in inflammatory complaints. The dose commonly given is—

Digitalis, 1 drachm,
Nitre, 3 drachms,
Emetic tartar, 1½ drachms,
Repeated two or three times a day.

FLY IN SHEEP. It is about the month of May that several varieties of flies first commence the deposition of their eggs on the wool of sheep. These are soon hatched; and, almost as soon as the maggots are produced, they begin to burrow into the sheeps skin. The head and tail are the parts most open to attack; the first from the bareness of wool, the second from the excrementitious matters adhering to the wool. For the head, if sore, after the maggots are killed, a plaister may be applied composed of two ounces of bees' wax and a pound of pitch spread warm on linen. In the destruction of the maggot, the following recipes may be employed:—

Ointment to Destroy the Maggot.
Strong Mercurial ointment, 3 ounces,
Yellow resin, 4 ounces,
Lard, 1 pound.

Melt the resin and lard together, when nearly cold stir in the mercurial ointment.

Many persons prefer a liquid: the following will be found useful, but very strong:—

Corrosive sublimate, ½ ounce,
Sal ammoniac, 2 ounces,
Boiling soft water, 2 gallons.

Rub the sublimate and sal ammoniac together, and gradually add the water till dissolved.

The common southern whale oil is a very good application to kill the maggot, and, when smeared over the wool, will prevent the fly from approaching. The following powder is an excellent preventative, and is sufficient to dress from thirty to forty sheep or lambs:—

Black sulphur, 2 pounds,
White Hellebore, ½ pound,
White lead, 1 pound.

Mix well together, and sprinkle on the sheep's back with a flour dredger. The best time to use it is early in the morning when the wool is damp.

The fly frequently attacks the head. The best remedy is to cap them.

FOOD OF ANIMALS. The correct knowledge of the mode in which the food of animals is employed in the production of flesh and fat is a theme which cannot but be highly interesting to the farmer. To enable my readers, therefore, to fully comprehend all that science has hitherto done in the illustration of these important operations of nature, I shall here insert by far the largest portion of two able lectures, by Dr. Lyon Playfair, "On the application of physiology to the rearing and feeding of cattle," (*Jour. Royal Ag. Soc.*, vol. iv., p. 215); and

this valuable essay I will illustrate by tables, &c., from the Prize Essay of Mr. Karkeek, on fat and muscle, (*Jour. Royal Ag. Soc.*, vol. iv., p. 245), and the works of other men of science.

"Vegetables," says Dr. Playfair, "derive their principal nutriment from the air. Many mineralogists class air as a gaseous mineral. Hence the vegetable kingdom may be said to derive its nutriment from sources entirely *inorganic*. Animals, on the other hand, subsist only upon *organic* matter, *i. e.*, upon substances which have at one time formed part of a living organised being.

"The primary nutriment of all animals consist of vegetable matter. The carnivora, indeed, live wholly upon flesh; but the animals which furnished this flesh derived their nourishment from plants. Hence these must contain substances adapted for the sustenance of the animal frame.

"All vegetable food has been found to contain a peculiar substance, which, though it differs in appearance and in form, according to the source from whence it is obtained, is in reality the same body. It has received the name of gluten or albumen, and is precisely identical, in chemical composition, with the albumen obtained from the white of an egg. This substance is invariably present in all nutritious food. Chemists were surprised to discover that this body never varies in composition: that it is exactly the same in corn, beans, or from whatever plant it is extracted. But their surprise was much increased when

they remarked that it is quite identical with the flesh and blood of animals. It consists, like the latter, of carbon, hydrogen, nitrogen, and oxygen, and in the very same proportion in 100 parts.

"By identity in composition is not meant a mere similarity, but an absolute identity; so much so, that if you were to place in a chemist's hand some gluten obtained from wheat flour, some dry albumen procured from the white of an egg, a fragment of the flesh of an ox or of a man, or some of their dried blood, and request him to examine their difference, he would tell you, strange as it may appear, that they are precisely the same, and that with all the refinements of his science he was unable to detect any essential difference between them. There is much difference, indeed, in external appearance and in structure, but in their ultimate composition there is none. To render this more obvious I subjoin the composition of these various substances, as obtained by different chemists, who executed their analyses without any knowledge of the results obtained by the others :—

	Gluten from flour. Boussingault.	Casein from peas. Scherer.	Albumen from eggs Jones.	Ox blood. Playfair.	Ox flesh. Playfair.
Carbon, ...	54·2	54·138	55·000	54·35	54·12
Hydrogen, ...	7·5	7·156	7·073	7·50	7·89
Nitrogen, ...	13·9	15·672	15·920	15·76	15·67
Oxygen, ...	24·4	23·034	22·007	22·39	22·32
	100·0	100·0	100·00	100·00	100·00

"These analyses do not differ from each other more than the analyses of the same substance

usually do. Thus we are led to the startling conclusion, that plants contain within them the flesh of animals ready formed, and that the only duty of animals subsisting upon them is to give this flesh a place and form in their organism. When an animal subsists upon flesh, we find no difficulty in explaining its nutrition; for the flesh being of the same composition as its own body, the animal, in a chemical point of view, may be said to be eating itself; nor, with a knowledge of this identity of vegetable albumen with flesh, is there any difficulty in comprehending the nutrition of vegetable feeders. *Plants*, then, in reality form the *flesh* of animals; and the latter merely appropriate it a place in their organism.

"The food of herbivorous animals contains other compounds, such as starch, sugar, and gum. From these the element nitrogen is absent, and hence they cannot of themselves form flesh. Indeed, in one sense, they cannot be considered as nutritious, for it is found that animals die when fed upon such food alone; yet constituents of plants destitute of nitrogen occur in the food of all vegetable feeders. For what purpose, then, are they designed?

"The average temperature of the bodies of our cattle is about 100 degrees, or more than 40 degrees higher than the ordinary temperature of this climate. Hence there must be some provision in the animal body to sustain the heat, which is absolutely necessary for the performance of the organic functions. The air, being so much colder than the body, must con-

stantly withdraw from it heat, and tend to lower its temperature. Whence, then, comes the fuel for the production of the heat?

"The fuel consists of those ingredients of food from which nitrogen is absent; they all contain carbon and the elements of water. We know that oxygen is continually inhaled in the air we breathe, and that it is never again expired as such. Expired air consists of carbonic acid, a gas composed of carbon and oxygen. In the body, therefore, the oxygen has united with carbon; *or it has produced the very gas which is obtained by burning a piece of charcoal in the open air.* Now the heat generated by the combustion of the carbon in the body must be exactly equivalent to that produced by burning the same amount in the atmosphere. Experiments have taught us that the average quantity of carbon in the food of an adult man amounts to 14 ounces daily. By the combustion of this quantity, 197,477 deg. of heat are produced (Liebig); and this is amply sufficient to account for the heat of the human body. The experiments of Boussingault show, that a cow breathes out about 70 ounces of carbon daily, and from this we calculate that 987,385 deg. of heat must be produced in the body of a cow in the space of twenty-four hours.* These calculations will at once prove that there is little difficulty in accounting for the heat of the animal body.

* This implies the union of 11 lbs. 10¾ oz. of oxygen with the carbon.

"But as the heat of the animal body is the same in all regions, it is obvious that the quantity of fuel (food) necessary to sustain the constant temperature of the body must vary according to the nature of the climate. Thus less food is required for this purpose in India, where the temperature of the external air equals that of the body, than in the polar regions, in which it is very many degrees lower. But a beneficent Providence has arranged the produce of different countries so as to meet the exigencies of the climate. The fruits upon which the inhabitants of warm countries love to feed, contain only twelve per cent. of carbon, while the train oil enjoyed by the inhabitants of arctic regions contains above seventy per cent. of the same element.

"'Were we,' says Liebig, 'to go naked like certain savage tribes, or if in hunting and fishing we were exposed to the same degree of cold as the Samoyedes, we should be able with ease to consume 10 lbs. of flesh, and perhaps a dozen of tallow candles into the bargain, as warmly clad travellers have related with astonishment of these people. We should then also be able to take the same quantity of brandy or train oil without bad effects, because the carbon and hydrogen of these substances would only suffice to keep up the equilibrium between the temperature of the external air and that of our bodies.'—*Dr. Gregory on Chemistry applied to Physiology and Pathology.*

"We often wonder how the Greenlander or Russian can relish train oil; we know perfectly

that our own organs of digestion would refuse to receive it; but the cases are very different. In cold countries the air is much condensed, for we are well aware that air expands by heat and contracts by cold. Hence the inhabitant of a cold region receives much more oxygen at each respiration than the inhabitant of a hot country, in which the air is expanded by heat. In a cold country, therefore, more carbon is necessary to combine with the excess of oxygen than in the hot country. As oxygen never escapes from the system after having entered it, except in union either with carbon or with hydrogen, anything which tends to increase the amount of oxygen inspired will occasion a greater consumption of food. Thus exercise increases the number of our respirations, and consequent supply of oxygen to the system; and the result is, that, after exercise, we consume more food than we should have done had we not received it. The only use of clothes, in the abstract, is to economise food. They assist in retaining the heat of the body, and render less food or fuel necessary for this purpose.

"In herbivorous animals the fuel used in the production of heat consists of sugar, starch, gum, and other ingredients of food, which do not contain nitrogen.

"In carnivorous animals, or those which live entirely upon flesh, the heat of their bodies is supported by the combustion of their own tissues. Hence it is that we see the hyena, pent up in the cage of a menagerie, move continually from one side of the den to the other.

These movements do not arise from an impatience of confinement, but from the necessity of sustaining the temperature of its body by the combustion of its tissues. Its continued motions accelerate the waste of its body, and introduce more oxygen into its system by the increased rapidity of its respirations.

"We have already explained that the heat of the animal body is supported by a combustion or union with oxygen, of those constituents of food from which nitrogen is absent. But we have not yet considered the nature of the forces which exist in the body, and produce its increase of mass as well as occasion that waste for the restoration of which food is taken. It cannot be to sustain the heat of the body alone that a supply of food is requisite, for there exist in it other substances unfitted for the support of respiration, except under peculiar circumstances. What, then, are the ruling forces in the body by which its substance is increased or destroyed?

"In every part of the animal organism resides the peculiar principle named Vitality. It is the cause of life, and is quite distinct from the divine essence—the mind. Vitality is a power subject to laws such as govern other forces in the material world. For example, we can act upon the vitality of the finger by a blister or a hot iron, and can thus increase or diminish its intensity.

"The purpose for which this mysterious principle is implanted in the organism of an animal is to protect the matter of which its

parts are composed from the action of the chemical forces. Matter is placed under the dominion of chemical affinity, whose constant aim is to produce new changes. It has a great desire to effect the total destruction of the Organic kingdom of nature, by making it pass into the Inorganic kingdom. Vitality is, therefore, implanted in the animal organism to stand in antagonism to this power.

"The object of vitality is, to sustain and increase the mass of the body in which it resides; the object of the chemical forces is, to detroy and waste that body. Vitality resides in every part of the fortress which it has to defend: the chemical forces are encamped in the atmosphere which everywhere surrounds it. In fact, the chemical power is the gas oxygen, one of the principal constituents of common air; and its affinity for the elements of organic matter is so great, that it constantly endeavours to destroy it.

"The whole life of an animal consists in a conflict of these rival powers—in the endeavour of vitality to sustain and increase—in that of chemical affinity to waste and destroy. In *health*, vitality possesses the ascendancy, and modifies the destructive efforts of the chemical powers. *Disease*, on the other hand, is a temporary conquest of the chemical over the vital forces, while *death* is the victory of the former, and annihilation of the latter.

"When the chemical power oxygen succeeds in effecting a waste of the body, it converts it into the elements from whence it sprung—into

carbonic acid, water, and ammonia. There are indeed intermediate compounds formed, but these are the final products of the decay of the body or of its parts; and they are the very substances upon which plants live; so that decay and death thus become the source of life. It is known that the vital forces decrease when the body is exposed to a certain degree of cold, and, when this is sufficiently intense, that they are either suspended or are altogether annihilated. But the chemical force oxygen is condensed or increased in its power by such agencies, and it therefore now reigns triumphant. Vitality (the cause of increase and of sustenance) being removed, chemical affinity (the cause of waste) acts upon those tissues which have been freed from the dominion of vitality, and effects their destruction. Hence it is that cattle do not fatten so well in cold weather as in hot. The chemical powers being now in the ascendant, prevent the increase of mass. We know, also, that the intervention of cold weather in summer either wholly arrests, or greatly retards the fattening of our cattle. But as the decrease of vitality has been occasioned by a diminution of the temperature of the body, it is obvious that, by an elevation of the temperature, vitality would be again enabled to resume its proper functions. It has been shown that the food of various countries is more or less combustible, according to the temperature of the climate; and proofs were adduced that the amount of the food consumed varied also according to the temperature. The

animal body is a furnace which must be kept up to a certain heat in all climates.* This furnace must, therefore, be supplied with more or less fuel, according to the temperature of the external air. If, then, in winter, we wish to retain the vital functions of our cattle in a proper degree of activity, we must keep up the heat of their bodies. This we may do in two ways. We may either add more fuel (food) to the furnace, or we may protect their bodies from the cold. Warmth is an equivalent for food, which may thus be economised. But I wish to give you facts, not assertions; and, as a proof of the view I have now given you, I will cite the following experiment which was made by the Earl of Ducie, at Whitfield Farm.

"One hundred sheep were folded by tens in pens, each of which was twenty-two feet in length by ten feet in breadth, and possessed a covered shed attached to it of twelve feet in length by ten feet in breadth. They were kept in these from the 10th of October to the 10th of March. Each sheep consumed on an average 20 lbs. of Swedes daily. Another hundred were folded in pens of a similar size, but without sheds attached. They were kept during the same time, and their daily consumption of Swedes amounted to 25 lbs. each. Here

* This is a homely and trite comparison, but a very perfect one. The body is the furnace—the food is the fuel—the excrements are the ashes—and the gases expired from the mouth are of the same composition as those which fly up the chimney of the furnace.

the circumstances were precisely similar with respect to exercise, the only difference being that the first hundred sheep had sheds into which they might retire, and thus be partially protected from the cold.

"This partial protection was equivalent to a certain amount of food, and consequently we find that the sheep enjoying this protection consumed one-fifth less food than those sheep which were left entirely exposed to the cold. In the last case the consumption of the additional food arose wholly from the necessity of adding more fuel (food) to the furnace of the body, in order to keep up its normal temperature. This was proved from the circumstance, that those sheep which enjoyed the protection had increased 3 lbs. each more than those left unprotected, although the latter had consumed one-fifth more food."

The effect of feeding sheep with turnips, under varying circumstances, has been still farther examined by Mr. John Morton and Dr. Lyon Playfair, with their usual scientific skill. Five lots of sheep were selected of five each. Each sheep was allowed 1 pint of oats per day, and as many Swedes as they could consume. Lot 1 was fed out of doors; 2 in an open shed; No. 3 in an open shed, but the sheep *divided* from each other *singly;* 4 in a *close* shed, in the *dark;* No. 5 in a *close* shed, in the *dark*, and separated as lot 3. The following were the results of the experiment, which began Nov. 18, 1842, and terminated March 9, 1843.—(*Agr. Gaz.*, vol. i., p. 59.)

Lot.	Swedes eaten.	Increase in weight for each 100 lb. of roots eaten.
1	1,912 lbs.	1·20 lb.
2	1,394	2·00
3	1,238	1·80
4	886	3·18
5	886	2·40

"I wish particularly to impress upon my readers that warmth is an *equivalent* for food, and that, therefore, food may be economised by protecting cattle from the cold. The honey stored up by bees is for the purpose of serving as fuel to keep up the heat of their bodies during the winter. Now it has been found that when two hives of bees are placed in one hive during winter, that they actually consume less honey than each hive would have done separately. (*Transactions of the Oxford Apiarian Society.*) You will easily perceive the explanation of this circumstance from the facts which I have already stated. Their close contiguity prevents a rapid escape of the heat of their bodies, and consequently less fuel (honey) is required to keep up the temperature. This case forms a very distinct proof that warmth is an *equivalent* for food.

"But I need only refer you to the results of your own experience; for every breeder of cattle must be aware, in the wintering of young stock, that they thrive better, with less consumption of food, when kept well sheltered from cold and wet.

"The assimilative power of the graminivora is enormous, and the quantity of food which they consume is proportional. In summer,

when the temperature of the air approaches more nearly to that of the body, the heat generated by the combustion of this food is more than is sufficient to retain the normal temperature of the system. Hence it is that we find oxen so much inconvenienced by hot weather, and that we observe them standing in streams of running water, or exposing themselves, with evident satisfaction, to a shower of rain. The cold water serves to carry off the redundant heat and, consequently, matter, from the body; for heat is produced by the combustion of matter. This practice, therefore, although agreeable to the cattle, can scarcely be a profitable one for the grazier.

"The air in summer being so much expanded by heat, much less air is taken into the system in an equal number of respirations than in winter—consequently less oxygen is consumed. But oxygen is the principal acting chemical force; it is, therefore, the cause of waste. The case of cattle now feeding is the very reverse of what it is in winter. In cold weather, the vital force (cause of supply) is reduced in energy, whilst that of the chemical force is augmented; but in summer the vital functions are elevated and the chemical powers depressed. Vitality, having now a diminished force in antagonism to its action, exerts all its powers in increasing the mass of the organs in which it resides; it therefore converts into blood all azotised parts of the food taken by the animal, except those which supply the small amount of waste. All the excess of blood is converted into flesh (*i. e.*

muscular tissue and cellular tissue). The animal now becomes fleshy and plump.

"The other constituents of the food, such as starch, sugar, and gum, are converted into fat, and deposited as adipose tissue. The cause of the deposition of fat is this—that sufficient oxygen does not enter the system to consume the food, or to convert it into carbonic acid and water; it is therefore only partially consumed, or, in other words, converted into fat (Liebig). Fat is not a part of the organism: it is a chemical compound, arising from an unnatural state. The fattening of cattle is similar to the growing of corn plants, or to agriculture generally. The object of agriculture is, to produce an artificial increase of some particular constituent of a plant, such as of gluten in the wheat. This we do by chemical means—by *manure*. The fattening of cattle is similar. Our object is to produce an unnatural increase of some particular parts of the body; and to do this we must put the cattle in an unnatural state.

"Fat is not an organ possessing shape; it is not a substance peculiar to the animal economy. We find the fat of beef and mutton in cocoa-beans, of human fat in olive-oil, of butter in palm-oil, and of horse fat and train-oil in certain oily seeds (Liebig.) In these the fat must arise, just as in animals, by the same chemical process of an imperfect transformation.

"The most favourable conditions to the developement of tallow are food destitute of nitrogen, warmth, and want of exercise. We shall

return to this subject again, but now may remark that warmth is perfectly indispensable to the production of tallow in an animal. Tallow is so easily consumed by the oxygen of the air that it is employed to produce animal heat, if there be any deficiency in this. Martell (*Trans. Linn. Soc.*, vol. xi., p. 411) mentions the case of a fat pig, which was overwhelmed in a slip of earth, and lived for 160 days without food; and was found to have diminished in weight during that time 120 lbs. Its fat had been consumed in supporting respiration, just as that of hibernating animals during winter. Motion also diminishes the tendency of an animal to fatten, by increasing the number of its respirations, and therefore by giving to the system an increased supply of oxygen gas, which consumes the tallow. Hence our practice of stall-feeding cattle. But, before entering into the discussion of practical points, let us fully understand the principles involved in fattening.

"First, then, let us inquire what are the phenomena which attend the production of motion in any animal. Liebig asserts, and we quite agree with him, "that every motion, every manifestation of force, is the result of a transformation of the structure or of its substance; that every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids; that every thought, every sensation, is accompanied by a change in the composition of the substance of the brain."

"I have already stated that there is a constant conflict in the body between the two antagonist powers, Vitality and Chemical Affinity. In the state of health, Vitality retains the ascendancy, and subdues the chemical powers; but this subjection is the result of much effort on the part of Vitality, for the strength of the rival forces is nearly equal. The moment, therefore, that Vitality leaves undefended a single point in the fortress of the body, that moment the chemical forces begin the work of demolition on the unprotected part. Thus, if Vitality be called upon by the superior power, Volition, to execute some purpose of its will—to move the arm, for example—the vitality residing in the muscles of the arm obeys this command, and occasions the desired movement. Before the production of motion, all its powers were exerted in preventing the encroachment of the chemical forces (*i. e.* of the oxygen of the air). But when it is employed in effecting a vital movement, such as that of the arm, it is no longer in a position to resist the attack of its antagonist power. This, therefore, immediately acts upon the muscles, which obey the will, destroys part of their substance, and occasions its separation from the tissues.

"Probably none of Liebig's theories may appear so problematical as that which asserts that every manifestation of force, however trivial, is accompanied by a change of matter in the body. Yet there is no theory which can be more easily proved by reference to experience.

You are well aware that poultry-feeders confine their poultry when it is necessary to fatten them quicky. The cruel practice of nailing the feet of geese to the ground during fattening is owing to the anxiety of avaricious feeders to prevent the expenditure of a particle of the food by the motion of the animal. The greatest part of the food consumed by an animal thus deprived of the means of motion goes to the production of fat. When pigs are put up to be fattened, they are removed from the yard in which exercise is permitted, and placed in a narrow sty, with little room to move. A small amount of the food being now expended in the production of motion, the pig rapidly increases in size.

"An excellent proof of this view has been kindly pointed out to me by Mr. W. Stace, of Berwick, near Lewes. The experiment was performed by Lord Egremont about the end of the last century, and is described in Young's Survey of Sussex in the following words:—

"'As there were some hogs that we wanted to keep over the summer, seven of the largest were put up to fat on the 25th of February; they were fatted upon barley-meal, of which they had as much as they could eat. Some days after, the observation of a particular circumstance suggested the following experiment: a hog nearly of the same size as the seven, but who had not been put up with them, because they appeared rather larger, but without weighing them, was confined on the 4th of March in a cage made of planks, of which one side was

made to move with pegs, so as to fit exactly the size of the hog, with small holes at the bottom to allow the water to drain from him, and a door behind to remove the soil. The cage stood upon four feet, about one foot from the ground, and was made to confine the hog so closely that he could only stand up to feed and lie down on his belly. He had only two bushels of barley-meal, and the rest of his food was boiled potatoes. They were all killed on the 13th of April, and the weights were as follows (8lbs. to the stone) :—

The hog in the cage, ...	13 st. 2 lbs.
The average weight of the other hogs, all of the same breed	11 st. 3 lbs.

The hog in the cage was weighed before he was put in: alive 11 st. 1lb.; he was kept five weeks, and then weighed alive 18 st. 3 lbs. He had two bushels of barley-meal, and about eight bushels of potatoes. He was quite sulky for the two first days, and would eat nothing.'

"This experiment forms an excellent illustration of the theory that force is produced by an expenditure of matter.

"When prizes formerly were given for animals overloaded with fat, without reference to symmetry of form, it was customary to feed the sheep in a narrow confined shed from which the light was excluded. The animals having no inducement to roam passed most of their time in sleep, and the food which they consumed served only to keep up the animal heat, and to increase the mass of the body.

"Mr. Childers has made some beautiful ex-

periments on this subject, the results of which have shown that sheep fed in sheds consume from one-fifth to one-half less food, and increase one-third more in weight, than those fed in the open field. (*Trans. Royal Agri Soc. of Eng.*, vol. i., pp. 170 and 407.) The cause of these results is twofold:—First, the sheep in the sheds are subjected to less motion, and therefore exhaust less food in its production, than those in the field; and, secondly, the sheep are kept warm in the sheds, and therefore expend less food for the support of animal heat than those exposed to a cold atmosphere in the open fields.

"We know how difficult it is to fatten oxen in June and July, when the flies annoy them, and disturb their repose. The food which they consume is exhausted in motion. This food, if the oxen were in a state of tranquillity, would increase the mass of the body. We know also that the harrassing and worrying of sheep by dogs is fatal to their fattening.

"There are numerous other proofs of our view. The Cornish miner, from the expenditure of force necessary in ascending and descending the ladder of his mine, together with the labour which he has to undergo whilst in it, is found in the evening to be several pounds lighter than in the morning. It is well known that the more bodily labour to which a man is subjected, the more food must he receive to supply the tissues wasted in that labour. In the late distress in Lancashire, the poor sufferers, who often were unable to obtain sustenance for

themselves and families, discovered, through the force of necessity, both the theories which we have endeavoured to expound, viz., that warmth is an equivalent for food, and that motion is always accompanied by a change of matter. We are informed by the daily press that whole families remained in bed for days together covered with as many clothes as their small stock could furnish. In this state the animal heat was artificially retained, and little matter being expended in motion, a small amount of food was sufficient to support the vital principle.

"In the Scotch prisons there are three rates of diet assigned to the prisoners. The first, or lowest rate, is given to prisoners of a sedentary occupation, such as woolpickers; weavers, carpenters, and blacksmiths get the third or highest rate. In the latter case, the force employed being greater than in the former, more food is necessary for the production of that force.

"A cavalry horse, in ordinary service is furnished with 8 lbs. of oats per diem; but when in active service, 10 lbs. of oats are given to it.

"The flesh of a stag hunted to death is unfit to eat, and is, when caught, in incipient putrefaction; because the force expended in running has occasioned a destruction of the tissues of the body. For a similar reason the flesh of a hunted hare is peculiarly tender; and it was a barbarous custom in former times to render bacon delicate by whipping pigs to death.

"Epilepsy is always accompanied by an exal-

tation of force, and hence we find that a patient suffering under that malady becomes rapidly emaciated; just as sheep do when afflicted with the same disease.

"In all these cases motion or force is produced without food, and therefore at the expense of the tissues of the body. Sportsmen who are accustomed to wander over the moors without food must have observed a sedimentary deposit in their urine. Exactly the same deposit (uric acid) takes place when a patient is affected with fever*. The cause is the same in both,—that in the absence of food the tissues of the body are transformed in production of force, and at the same time oxygen is not respired in sufficient quantity to convert the waste matter of the tissues into urea.† (Liebig.)

"*Food of Cattle.*—It has already been shown that there are two kinds of food. The first, which contains nitrogen, is exactly of the same composition as the principal tissues of the human body, and is the only substance which can supply the waste of these tissues. The second kind of food is that destitute of nitrogen, such as starch, gum, and sugar, all of which are destined for the support of respiration and consequent heat of the animal. The latter kind of food, when in excess, is converted into fat, but never into muscle. The increase

* Fever consists in an exaltation of force, and is generally with loss of appetite; the tissues must therefore furnish the change of matter necessary for the production of force.

† Urea is the usual state in which the waste nitrogenous matter of the body is expelled from the system.

of flesh in an animal consists in two changes of the matter of the food, without any alteration in its composition. The albumen or nitrogeneous constituent of the food is first converted into blood, without decomposition, and the blood is afterwards converted into flesh. In order to show that the transformation is actually effected without change, we refer you to the composition of albumen, blood, and flesh, as ascertained by the accurate analysis of different chemists:—

	Vegetable albumen.		Ox blood.		Flesh.	
	Scherer.	Mulder	Playfair.	Boeckman	Playfair.	Boeckman
Carbon, ...	55·160	54·99	54·35	54·36	54·12	54·18
Hydrogen, ..	7·055	6·87	7·50	7·67	7·89	7·93
Nitrogen,....	15·966	15·66	15·76	15·77	15·67	15·71
Oxygen, ...	21·819	22·48	22·39	22·20	22·32	22·18

"Now, as flesh can only be formed from substances of its own composition, the value of different kinds of food will vary according to the quantity of albumen contained in it. Boussingault many years since endeavoured to lay down the principle that the value of a particular kind of food depended upon its proportion of nitrogen.* This principle was rather arbitrary; because, although it may be true enough as far as regards flesh, it is quite erroneous as regards the production of tallow or the support of respiration. Boussingault's generalization arose from an ignorance of the functions of the constituents of food destitute of

* Annales de Chimie et de Physique, lxiii. 225.

nitrogen. Farmers have always been very anxious to obtain a correct list of the equivalent values of various kinds of food, but have never yet succeeded. Mr. Rham has compiled a list* from the experiments of the most distinguished agriculturists; but it is impossible to rely upon equivalents obtained by mere experiment. The reason for this assertion will be obvious, when it is considered that the quantity of food necessary to keep an animal in a certain state must vary according to the conditions in which it is placed, *i. e.*, according to the temperature to which it is exposed, and to the amount of exercise which it receives. In a hot day it will require much less food than in a cold. Equivalents of food may be correct, as far as the same animal is concerned, when it is placed in the same conditions; but they can be of little value as regards other animals, because, as we shall afterwards show, the size of the lungs of an animal occasions a great difference in the amount of food consumed.

"It is very important for us to know how much water each kind of food contains. Thus in giving a pig 100 lbs. of potatoes, we actually give it only 28 lbs., because 72 lbs. of this food consist of water. The following table, drawn up from analyses made by myself, exhibits the amount of dry organic matter contained in the most usual kinds of food:† —

* Journal R. E. Agric. Soc. vol. iii. p. 79.

† The analyses of swedes, turnips, mang l-wurzel, potatoes, and carrots are made upon samples procured from the field, and

		Water. lbs.	Organic Matter. lbs.	Ashes. lbs.
100 lbs. of peas	contain	16	80½	3½
,, beans	,,	14	82½	3½
,, lentils	,,	16	81	3
,, oats	,,	18	79	3
,, oatmeal	,,	9	89	2
,, barleymeal	,,	15½	82½	2
,, hay	,,	16	76½	7½
,, wheat-straw	,,	18	79	3
,, turnips	,,	89	10	1
,, swedish turnips	,,	85	14	1
,, mangold-wurzel	,,	89	10	1
,, white carrot	,,	87	12	1
,, potatoes	,,	72	27	1
,, red-beet	,,	89	10	1
,, linseed-cake	,,	17	75½	7½
,, bran	,,	14	81	5

"In estimating the equivalent value of various kinds of food, we must take into calculation the amount of water contained in them. Mr. Rham states* that 100 lbs. of hay are equal to 339 lbs. of mangel-wurzel; but in 100 lbs. of ordinary hay there are contained only 76 lbs. of dry hay, and in 100 lbs. of mangel-wurzel only 10 lbs. of that root. So in reality we find that 34 lbs. of dry mangel-wurzel equal 76 lbs. of hay. Thus the equivalents become completely reversed, and dry mangel-wurzel is seen to possess considerably more than double the equivalent of dry hay.

not upon stored roots. The table is of use in showing us what we remove from our land. Thus suppose we cart from 3 acres 100 tons of turnips, we actually remove 89 tons of water, 1 ton of mineral matter, and only 10 tons of dry turnips.

* Journal, vol. iii. p. 79.

I will here insert another table by Professor Johnston, which will, as Mr. Karkeek remarks (*Jour. Roy. Ag. Soc.* vol. v., p. 249), prove serviceable, by enabling us to trace the sources from which are derived particular organic compounds essential to nutrition. Thus the proportion of starch, gum, and sugar, contained in any separate article of food, will enable us to form a rough approximation as to the per centage of *fat* or *tallow* which it is capable of yielding; and the number representing the *gluten*, *albumen*, and *caseine*, in the same article of food, will give us a very correct indication of its muscle or flesh-forming principle. In the mill, 14 lbs. of good wheat yield, on an average, 13 lbs. of flour; the same quantity of barley, 12 lbs.; and of oats, only 8 lbs.

100 parts of—	Water.	Husk or woody fibre.	Starch, gum, & sugar.	Gluten al bumen, & casi. e.	Fatty matter.	Saline matter.
Field beans,	16·0	10·0	40·0	28·0	2 0	3 0
Peas,	13·0	8·0	50·0	24·6	2·3	2·8
Barley,	15 0	15·0	60·0	12·0	2·5	2·0
Oats,	16·0	20·0	50·0	14·5	5·6	3·5
Meadow hay,	14·0	30·0	40·0	7·1	2· to 5·	5. to 10·
Clover hay,	14 0	25·0	40·0	9·3	3·0	9·0
Potatoes,	75 0	5·0	12 0	2·25	0·3	0·8 to 1
Carrots,	85·0	3·0	10·0	2 0	0·4	1·0
Turnips,	85·0	3·0	10 0	1·2	—	0·8 to 1
Oat straw,	12·0	45·0	35 0	1·3	0·8	6 0
Wheat straw,	12· to 15	50·0	30 0	1·3	0 5	5·0

"It forms," says Mr. Karkeek (*Jour. Roy. Ag. Soc.*, vol. iv.. p. 263), "a curious and interesting subject for the feeder to ascertain the respective qualities of the fleshing and fattening properties contained in an acre, of the different crops commonly used in the rearing and fattening of stock. The following *acreable table of nutrition* has been constructed chiefly from Profes-

sor Johnston's calculations; the proportion of gluten, &c., from Boussingault's analysis, which indicate the *fleshing properties*, and the proportions of starch, gum, and sugar, the *fattening properties*.

An acre of.	Gluten, Albumen, &c.	Starch, Gum, Sugar, and Fat.	Water.
	lbs.	lbs.	lbs.
Beans, or 25 bushels	450	672	256
Peas, or 25 bushels	380	845	208
Oats, or 50 bushels	290	1,168	336
Hay, or 3 tons	480	2,790	752
Potatoes, or 12 tons	600	3,330	20,250
Carrots, or 25 tons	1,120	5,800	47,600
Turnips, or 30 tons	800	6,700	56,950
Wheat straw, or 3 000 lbs. ..	40	940	450
Oat straw, or 2,700 lbs.	36	970	324
Barley straw, or 2,100 lb. ..	28	646	252

Some experiments of Mr. Hyett (*Jour. Royal Agri. Soc.*, vol. iv., p. 143) would appear to support the conclusion, that the nutriment afforded by some vegetable substances increases with their specific gravity: he obtained the following results:—

No. of roots weighed.		Specific gravity.	Average specific gravity.	Nutriment in 1000 lbs. by analysis of Herepath.
	In Turnips,			
	Pomeranian globe averaged,..	889	908·67	White turnip 42
	Green round, ...	905		
	Border imperial, ...	932		
	In Swedes,			
	Purple topped, } from Mr. Pu-	949	957·67	Swede 64
	Green, ... } sey's farm, ..	952		
	Skirvings,.... }	972		
	In mangel-wurzel,			
	Long red, .. } from Mr. Pu-	995·5	1015·97	Orange globe 135
	Red globe, .. } sey's farm,	1005·9		
	Yellow globe, } sandy soil, ..	1014·55		
	Sugar beet,.. }	1036·6		Su. beet 145
	Yellow globe, stone brash, ...	1022·15		

Table of the quantities of soluble or nutritive matters afforded by 1000 parts of different vegetable substances examined in their green state :—

VEGETABLE SUBSTANCES.	Whole quantity of soluble or nutritive matter.	Mucilage or starch.	Saccharine matter or sugar	Gluten or Albumen.	Extract or matter rendered insoluble during evaporation.
Middlesex wheat, average crop,	955	765	..	190	..
Spring wheat.	940	700	..	240	..
Mildewed wheat of 1806,	210	178	..	32	..
Blighted wheat of 1804,	650	520	..	130	..
Thick-skinned Sicilian wheat (1810),	955	725	..	236	..
Thin-skinned Sicilian wheat (1810),	961	722	..	239	..
Wheat from Poland,	950	750	..	206	..
North American wheat,	955	730	..	225	..
Norfolk barley.	920	790	70	66	..
Oats from Scotland,	743	641	15	87	..
Rye from Yorkshire,	792	645	38	109	..
Common bean,	570	426	..	103	..
Dry peas,	574	501	22	35	41
Potatoes,	260to200	200to155	20to15	40to30	..
Linseed cake,	151	123	11	17	..
Red beet,	148	14	121	14	..
White beet,	136	13	119	4	..
Parsnips,	99	9	90	..	..
Carrots,	98	3	95	..	..
Cabbage,	73	41	24	8	..
Swedish turnip,	64	9	51	2	2
Common turnip,	42	7	34	1	.
Broad-leaved clover,	39	31	3	2	3
Long-rooted clover,	39	30	4	3	2
White clover,	32	29	1	3	5
Sainfoin,	39	28	2	3	6
Lucern,	23	18	1	..	4
Meadow fox-tail grass,	33	24	3	..	6
Perennial rye grass,	39	26	4	..	5
Fertile meadow grosss,	78	65	6	..	7
Roughish meadow grass,	39	29	5	..	6
Crested dog's tail grass,	35	28	3	..	4
Spiked fescue grass,	19	15	2	..	2
Sweet scented soft grass,	82	72	4	..	6
Vernal grass,	50	43	4	..	3
Florin,	54	46	5	1	2

The following table shows the average quantity of nutritive matter in 1000 parts of several varieties of animal and vegetable food :—

Bones	510	Tamarinds	340
Mutton	290	Plums	290
Beef	260	Grapes	270
Chicken	270	Apricots	260
Veal	250	Cherries	250
Pork	240	Peaches	200
Bacon	200	Gooseberries	190
Haddock	180	Apples	170
White of egg	140	Pears	160
Milk	72	Strawberries	100
Morels	896	Melon	30
Almonds	650		

Table of the comparative value of different kinds of fodder, by the Rev. W. L. Rham.

	lbs.		lbs.
100 lbs. of good hay is equal in nourishment to	100	Dried stalks of Indian corn	400
Lattermath hay	102	Millet straw	250
Clover hay, made when the blossom is completely developed	90	Raw potatoes	201
		Boiled ditto	175
		White Silesian beet	220
		Mangold wurzel	339
Ditto, before the blossom expands	80	Turnips	504
Lucern hay	98	Carrots	276
Sainfoin hay	89	Kohlkalis	287
Tare hay	91	Swedish turnips	308
Spergula arvensis dried	90	Ditto, with the leaves on	350
Clover hay, after the seed	146	Grain of rye	54
Green clover	410	—— wheat	45
Vetches, or tares green	457	—— barley	54
Green Indian corn	275	—— oats	59
Green spergula	425	—— vetches	50
Cow-cabbage leaves	541	—— peas	45
Beet-root leaves	600	—— beans	45
Potato haulm	300	—— buckwheat	64
Shelter wheat straw	374	—— Indian corn	57
Rye straw	442	—— French beans dried	32
Oat straw	195	—— chestnuts	47
Peas haulm	153	—— acorns	68
Vetch haulm	159	—— horse chestnuts	50
Bean haulm	140	—— sunflower seed	62
Buckwheat straw	195	Linseed cake	69
		Wheat bran	105

	lbs.		lbs.
Rye bran . .	109	Dried lime-tree leaves .	73
Wheat, peas, and oat chaff . . .	167	—— oak leaves .	83
Rye and barley chaff .	179	—— Canada poplar leaves . .	67

(*Johnson and Shaw's Farmers' Almanac*, vol. i., pp. 22—216.)

The subjoined table will show the composition of 1000 parts of different animal and vegetable food—

	Carbon.	Hydrogen	Oxygen.	Nitrogen.
Albumen,	516	76	258	150
Gelatine,	483	80	276	161
Fat,	780	122	98	
Curd of milk,	609	73	116	203
Sugar of milk,	454	61	485	
Gluten,	557	78	220	145
Starch,	438	62	500	
Gum,	419	68	513	
Sugar,	444	62	494	
Woody fibre,	500	56	444	

"It may often be a question of practical importance, whether it might be advisable in cold weather to mix with the roots, upon which oxen or sheep are fed, a certain quantity of some other food containing a less proportion of water.

"To illustrate our meaning, we will take the case of an ox fed upon mangel-wurzel, as described by Earl Spencer.* The ox consumed between the 24th of December and 23rd of January, 1848 lbs. of mangel-wurzel, or in round numbers, 60 lbs. daily.† By reference to the preceding table, it will be seen that the ox in this quantity received 53½ lbs. of water, and only 6½ lbs. of dry mangel-wurzel. Let

* Journal, vol. ii., p. 297.

† 60 lbs. ordinary mangel-wurzel contain 45 ounces of carbon.

us assume that, during the above cold months, the average temperature of the air was 32°. In this case the 53 lbs. of water taken in the food had to be raised to the temperature of the animal (98°). To effect this, 2 ounces of carbon, or $\frac{1}{22}$ of the whole quantity contained in the food, are necessary to elevate it to the proper temperature of the body. This quantity of carbon corresponds to nearly 3 lbs. of mangel-wurzel. The actual loss is, however, very much greater than this, as much of the water is converted into vapour at a great expense of heat.

"In feeding pigs we endeavour to avoid this loss as much as possible, by giving them little water and very dry food. Those who feed pigs are well aware of the fact, that they thrive more rapidly on dry than on wet food. The explanation of this fact has now been given.

"As muscle is formed only by the gluten or albumen of the food, which albumen is in reality flesh itself, we can ascertain the comparative value of food, as far as the production of muscle is concerned, by estimating the exact quantity of the nitrogenous constituent of the food. The following table has been constructed by estimating the quantity of nitrogen in the food, and multiplying this by $6\frac{1}{5}$; the product is the quantity of albumen. This method is far more exact than the mechanical process proposed by Sir Humphry Davy, which the progress of organic chemistry has shown to be insusceptible of accuracy. The analysis used in the production of the table have been made by Boussin-

gault and myself. When I found that my analyses differed considerably from that of Boussingault, I have taken the mean of both of our analyses, on the presumption that this will give a fairer indication of the average value of food, as the amount of nitrogenous matter varies, according to the state of cultivation. Nearly all the kinds of food analysed I have procured from Lord Ducie's farm at Whitfield, and they were selected as fair average specimens. In all cases the table is drawn out in correspondence with the preceding table of the quantity of water and ashes. When these are added to the quantity of albumen, which we find by analyses, and the combined number subtracted from the whole quantity of food, it is obvious the remainder must be the unazotized part of the food: this being known, we are in possession of approximative, though not perfectly accurate, information relative to the value of the food for the support of respiration and production of fat:—

100 lbs.	Albumen. lbs.	Unazotized Matter. lbs.
Flesh . . .	25	0
Blood . . .	20	0
Beans . . .	31	51½
Peas . . .	29	51½
Lentils . . .	33	48
Potatoes . . .	2	25
Oats . . .	11	68
Barleymeal . .	14	68½
Hay	8	68½
Turnips . . .	1	9
Carrot . . .	2	10
Red-beet . . .	1½	8½

"A few considerations will show that it is quite impossible to draw up any series of numbers to represent the equivalent values of the food; for we must first know the object for which the food is intended. The numbers in the first column, representing the gluten, are actually the equivalent value of the various foods, as far as flesh is concerned; but they yield no indication of the power of the food to form tallow. The second column, on the other hand, furnishes a rough approximation on the latter point, whilst it gives no indication of the former. In a cold day the animals ought to be furnished with food containing a considerable amount of unazotized ingredients, in order to protect them from the effects of the cold. The equivalent values of potatoes and beans could not be compared, because their respective value as food arises from totally different causes. Potatoes are of great use in keeping up the heat of the body and in forming tallow; but are in the highest degree unprofitable for forming flesh. It will be seen by the table, that 1550 lbs. of potatoes would be required to form the same quantity of *flesh* that 100 lbs. of beans would do; whilst little more than 200 lbs. would suffice to form the same quantity of tallow: hence the great advantage of mixing food so as to supply in smaller bulk those constituents of which one kind of food is deficient. Sheep fed on oil-cake increase in weight faster than on any other kind of food, but they feel quite soft, and when fat handle like a bag of oil. This is because they receive food which contains

very little albumen to form flesh, so that tallow is the only product.* But if with the oil-cake they receive oats or barley, they are firm to the touch, and possess plenty of good flesh, and the fat lies equally distributed amongst the muscular fibre. The reason here also is obvious; for both oats and barley contain much albumen.†

"In an experiment made by Mr. Morton at Lord Ducie's farm, twenty-eight pigs put up in pens of seven each, and fed on an average on 15½ lbs. of potatoes and 4 lbs. of barley-meal each, gained 15 or 16 lbs. weekly. In this quantity the pigs actually consumed nearly equal quantities of the two kinds of food, or exactly 30 lbs. of *dry* potatoes and 23 lbs. of dry barley-meal weekly. The increase in weight being 16 lbs. for each pig, 37 lbs. of the food were lost in supporting respiration and the necessary muscular movements, even without taking into calculation the water contained in the flesh of the animal, which amounts to 75 per cent. If these animals had been deprived of muscular movement by being placed in narrow warm cribs, it is reasonable to suppose that less food would have been lost, because less would have been consumed in the

* Oil-cake owes its fattening properties partly to its oil, but principally to its mucilage. When oil-cake is put into water, it dissolves into a thick gummy mass.

† Chemically speaking, they do not contain albumen, but gluten. All the nitrogenized ingredients of food being of the same composition, I employ for them one term. This is *chemically* wrong, but *agriculturally* correct.

production of force and in sustaining the animal heat. The barley-meal contains the constituents for furnishing firm flesh, as well as for producing tallow, or supporting respiration. The economy of using potatoes consisted in their supporting the respiration of the animals at less expense than barley. The 108 lbs. of potatoes used in the week for this purpose and for the production of tallow contain 26 lbs. of unazotized matter. In order to replace this, 33 lbs. of barley-meal would be requisite. It does not invalidate the conclusion that 33 lbs. of barley-meal would produce a greater return than 108 lbs. of potatoes, because the former contains much more albumen and less water than the latter.

"He then enters into calculations to show that this fat is more than is necessary to account for the increase of tallow in an animal. He contends further that the tallow of the food may be found completely in the milk of a cow fed upon it. 'In such a case he considers that none of it is lost. But even admitting this to be correct, M. Dumas must suppose that some digestive process converts the tallow into butter, for the composition of the fat found in vegetables is quite different from the butter of the milk. The conception of a digestive process is, therefore, quite as indispensable in his theory as in that of Liebig. I have shown, continues Dr. Playfair, in a memoir read before the Chemical Society, that the fat contained in food does not account for half the butter in

the milk of a cow, even conceding that it is all transformed into butter.

"We know that fatty substances are of use in fattening animals. Mutton-suet is often given to fattening ducks. Linseed-oil is occasionally given as a substitute for linseed-cake. There cannot, then, be the smallest doubt that fatty matters are capable of producing tallow in the body, but it is impossible to admit M. Dumas's opinion in all its generality. We know that sugar is a substance which occasions a great development of tallow; but surely it cannot be affirmed that fat exists in it ready formed? Rice given to fowls causes them quickly to be covered with fat, yet rice contains very little fat.

"We therefore do not see any reason to depart from the opinion of Liebig that fat is the product of a peculiar digestive process on the unazotized constituents of food.

"The *form* in which the food is given to cattle is far from being a matter of indifference. If the food be in a state in which it is either difficult to attain, or difficult to masticate when obtained, much of it will be lost in the production of force necessary to adapt it for the organs of digestion. The cutting of hay and straw to chaff is unwittingly done with a view to prevent any unnecessary expenditure of force. Less mastication is requisite, and consequently less of the tissues of the body are expended in grinding down the food. The use of saliva, according to Liebig, is to form a receptacle for air or oxygen, by which means it is mixed with the food and carried to the stomach. The use

of mastication, then, is not only to comminute the food, but also to mix it with air or saliva. We find that a larger size of chaff is given to those animals which chew the cud than to those that do not. One great object of rumination is to obtain a repeated supply of oxygen to the food. Hence, in our ordinary practice, we cut the hay-chaff 1 inch in length for oxen, ½ inch for sheep, and only ¼ inch for horses. The two first being ruminating animals require it longer than the horse, which is not one. When we consider that fresh grass is much more easily masticated than hay, the economy of force exhibited in cutting the latter is well judged.

"I am quite aware many farmers entertain the opinion that cutting hay is only of use in the facilities which it affords for mixing with the hay straw or other inferior fodder. Straw, except when new, is not a very nutritious food, for we find a great part of it unchanged in the fæces of the animal fed upon it. Its principal use is to give a bulk to the food taken. Even in the case of turnips, a food of considerable bulk, straw is necessary, because they contain nearly 90 per cent. of water, which becomes soon separated. Thus it is that cattle fed upon turnips voluntarily take 2 or 3 lbs. of straw daily, or as much as will serve to give the necessary bulk to the food. The digestive process of herbivorous animals is very complicated. The food is primarily taken into the first stomach or rumen, which is analogous to the crop in birds. Here it is moistened with a secretion from the stomach. The coarse unmasticated

food is from thence transmitted into the second stomach or reticulum, where it is rolled up into little balls, one of which from time to time is returned to the mouth to be further comminuted and insalivated. After this reduction, it is sent into the manyplus or third stomach, where it is further reduced to a pulpy mass, and in this state enters the fourth stomach, where true digestion commences. The object of the three first stomachs being merely to obtain a proper comminution of the food, it is necessary to have that food of sufficient bulk, otherwise the peristaltic motion of the stomach would be impeded. This would appear to be the reason for giving straw with turnips and other kinds of succulent food. The expression of the farmer is 'that straw corrects their watery nature,' which means, increases their bulk when their water has left them and reduced their volume. Rumination is requisite in order to keep an ox in health. A little straw or hay is accordingly necessary to enable it to chew the cud. We know a case in which barley-meal and boiled potatoes were given to cows without hay or straw. Constipation resulted, and the cattle nearly perished from the ignorance of the feeder.

"From these considerations we are induced to consider that a greater return will be made by food partly but not too much reduced. The turnip-slicer is known to save food, and this arises from the fact that the sheep expend less force in eating sliced than whole turnips, and to their being enabled to lie down more con-

stantly. On similar grounds are we to ascribe the advantage of steaming food, or reducing it to the state which the first three stomachs would otherwise have to do at a great expenditure of force, and consequently of food to produce it.

"The ordinary state of health of an adult animal consists in keeping the supply equal to the waste of the tissues of the body. When the supply is either greater or less than the waste, it is certain that the nutrition of the animal is effected under unnatural conditions.

"But the process of nutrition is different in a young animal. In youth the supply must be greater than the waste of the body, otherwise an increase in the mass of the body could not be produced. The life of an adult consists in the sustenance of the tissues already fully formed; while the life of a child includes the increase and development of the tissues. The principle which produces this increase has been termed the 'vegetative life' of the animal. It merely consists in an increased ascendancy of vitality and subjugation of causes of waste or the chemical forces.

"The respiratory apparatus of a young animal is more active than in an adult, and consequently a greater amount of oxygen enters its system; a fact which is attested by the temperature of its body being higher than that of its parent. As this oxygen cannot again be separated from the body without being in union either with carbon or hydrogen, it is indispensable that both of these elements should exist

largely in the food of the young animal. But it is quite as indispensable that the food should contain materials fitted for the increase of its growing frame. Both these conditions are united in the milk of the mother. I subjoin the composition of the milk of several animals:

	Woman. Playfair.	Cow. Playfair.	Ass. Peligot.
Casein,	1·54	4·0	1·95
Butter,	4·37	4·6	1·29
Sugar of milk,	5·75	3·8	6·29
Ashes,	0·53	0·6	..
Solid matter,	12·19	13·0	9·53
Water,	87·81	87·0	90·47
	100·00	100·0	100·00

"Casein is precisely the same in composition as animal flesh, and hence supplies matter adapted for the growth of the body. Butter and sugar are destined for the support of respiration, and consequent maintenance of animal heat. Butter is a substance admirably suited for this purpose; for, being of a combustible nature, it yields much heat by its union with oxygen. Sugar also is well adapted for the support of respiration, from causes which I explained in my former lectures. The milk of the ass is very similar in composition to that of woman; both are remarkable from their large proportion of sugar. The milk of the cow contains more casein and butter, and less sugar, than that of either of the previous animals. The ashes of milk consists principally of common salt and the earth of bones. It also con-

tains potash and oxide of iron. The soda of the common salt is necessary for the formation of bile, as I stated in my last lecture, whilst its muriatic acid aids in the process of digestion.

"In milk, therefore, we find united all the conditions for the life of a young animal. Its rapid respiration, and the high temperature of its body, are supported by the butter and sugar of the milk. The casein furnishes matter for its growth, and the ashes the materials for the formation of the bones, and necessary constituents of the blood.

"Casein, although of the same composition as vegetable albumen and gluten, differs from them materially in its properties. It is soluble in water, and does not coagulate by heat. Such properties obviously fit it for the nutrition of a young animal, in whom the organs of digestion are not yet matured.

"The young ruminant, subsisting on the milk of its mother, does not require that complicated system of stomachs which afterwards becomes necessary for the proper comminution of its food. Accordingly we find that the aperture of the first and second stomach is entirely closed, and the folds of the third adhere together so as to form a narrow tube. The milk passes at once into the fourth stomach, which is the seat of true digestion. This arrangement of itself indicates that the food of the young animal ought to be liquid, even when it is deprived of the milk of its parent. It is for this reason that the weaning of a calf must take place very gradually.

"There cannot be the slightest doubt that the future health and constitution of the adult in a great measure depends upon its judicious and generous treatment when young. Nature has pointed out to us, in the milk of the mother, not only the proper food of the child, but has exhibited also in it the model after which all food should be prepared. I do not mean that the adult should receive the various constituents of its food in the same proportion as the child, but that none of these constituents should be absent."

FOOD, DISTENSION WITH, see HOOVE.

FOOT, DISEASES OF. In the horse, *Inflammation of the Foot*, see FEVER.

Pumiced Feet.—This is a complaint for which there is no cure. Bar shoes may palliate the complaint.

Contracted Heels, see CONTRACTED FOOT.

Tread or Overreach.—Wash out the dirt carefully and apply a little friar's balsam, and in bad cases a poultice.

Quittor.—This is a complaint of the foot which can hardly be treated with success but by a veterinary surgeon; and even in the hands of such a person, the disease is commonly cured with difficulty, and only by the exercise of considerable skill and perseverance.

Pricked or Wounded Foot.—When the seat of the disease is ascertained, especially if in a recent case, the cure may often be accomplished by paring the sole down to the quick, and applying a little tow and friar's balsam to the place: if matter has formed, apply a poultice.

Corns, see CORN.

Canker, see CANKER.

Thrush.—This disaster shows itself by an offensive discharge from the cleft of the frog. Horses of all ages, shod or unshod, are subject to it, in the hind legs more often than in the fore. It arises from inflammation of the sensible frog, during which pus is formed and discharged.

A paste may be made, which will speedily dry up an ordinary thrush, of blue vitriol powdered 2 ounces, white vitriol powdered 1 ounce, rubbed down with lard 2 lbs., tar 1 lb.; some of this on a little tow may be applied deeply into the cleft over night, and removed in the morning before the horse leaves the stable.

Foot Rot—in sheep commonly arises from the animal standing about in wet yards and other places.

Liquid Application for Foot Rot.

Verdigris powdered, ¼ ounce,
Blue vitriol, ½ ounce,
White vitriol, ½ ounce,
Soft water ½ pint; mix these together and then add
Nitric acid 1 ounce,
Butter of antimony, 1 ounce.

After paring away the horn apply this liquid upon a feather to the part affected.

Foul Foot.—After cutting away the fungous flesh and using butyr of antimony, apply the following tincture:—

Friar's balsam, 1 ounce,
Butyr antimony, 1 ounce; mix together for use.

It is generally advisable to give the beast a dose of salts.

FRIAR'S BALSAM—Is thus made—

Gum Benzoin, 3 ounces,
Storax Balsam, 2 ounces,
Balsam of tolu, 1 ounce,
Powdered aloes, 1 ounce,
Rectified spirit of wine, 2 pints. Let it stand fourteen days, occasionally shaking, strain for use.

Frog of the Horse's Foot.—In preparing the horse for shoeing, the farmer must remember that the frog should be trimmed and pared away, and "left just above or within the level of the shoe."—*Youatt on the Horse*, p. 285.

FURNITURE OIL—Is thus made—

Linseed oil, 1 pint,
Alkenet root, 1 ounce; simmer them together in an earthen pipkin for an hour.

G.

GALLIC ACID, see ACID.

GARGET—Arises from the inflamed and hardened state of the internal substance of the udder of cows. This is a complaint which is very apt to arise in young cows. In the early stages of it the best remedy is to allow her calf to suckle, and rub about her udder. If this does not effect a cure, then it is generally necessary to take away a little blood, and afterwards to give the following drench:—

Epsom salts, 1 pound,
Aniseeds powdered, 1 ounce,
Warm water, 3 pints.

The udder to be bathed with hot water three

times a day, and after each bathing to be well rubbed with the following ointment:—

Yellow Basilicon, 4 ounces.
Camphor, 1 ounce, rubbed down with a little spirits of wine,
Strong mercurial ointment, 2 ounces,
Soft soap, 16 ounces; rub these well together.

In very obstinate cases I have found the following successful:—

Hydriodate of potash, 1 drachm, rubbed into very fine powder and mixed with 1 ounce of spermaceti ointment.

After bathing with hot water, a piece the size of a small nutmeg should be well rubbed in night and morning.

GELATINE—Is the name given to the animal substance which is well known in the form of isinglass, glue, and size. A solution of one part of gelatine in 5000 parts of water is rendered slightly turbid by the addition of a strong infusion of galls. It is composed of:—

Carbon	47·8 parts.
Hydrogen	7·9 „
Nitrogen	16·9 „
Oxygen.....	27·100 „

GELDING, see CASTRATION.

GESTATION, see MISCARRIAGE.

GLANDERS. It will be best for the farmer, who has the misfortune to have a horse attacked with this, almost always, incurable disease, to commit him to the care of a veterinary surgeon. The peculiar discharge from the (almost always the left) nostril of the horse will sufficiently distinguish this disease from an ordinary catarrh. The matter of which this discharge is composed is thinner, lighter, and

more even in its current than that of catarrh; is more glutinous. This disease is readily engendered, or may be produced by the effects of other diseases, as in farcey. It is also highly contagious.

Ball for Glanders.

Blue stone, 3 ounces dissolved in water,
Powdered Myrrh, 3 ounces,
„ nitre, 8 ounces,

Linseed meal and soft soap sufficient to make the mass into twenty-four balls.

Give one night and morning. The ulcers which form during the progress of this disease may be injected night and morning with a weak solution of chloride of lime by means of a syringe, at the same time giving the horse green food. Its prevention is best effected by cleanliness, good ventilation, and a moderate temperature. The stabled horse is alone subject to the glanders.

GRAIN SICK, see DISTENSION and HOVEN.

GREASE. "Grease," says Professor Youatt, "is the child of negligence and mismanagement. It is driven from our cavalry, and it will be the fault of the gentleman and farmer if it is not speedily banished from every stable."

Grease consists of an inflammation of the heel of the horse, and it most generally attacks the hind legs; and during the attack a complete stoppage is put to the development of the greasy matter, which exudes on the surface of the skin of the heel. It arises from the sudden transitions and temperature to which the heel of the horse's

hind legs are more peculiarly exposed from cold currents of air in warm stables, the accumulation of dirt, the too deeply bedding in straw; the stable door, when open, produces of course a cold current of air, which is nearest to the hind legs. The causes then of grease in horses are rapid transitions in temperature, high feeding, with irregular exercise, filthy stables, washing the legs when heated, and leaving them to dry, without sufficiently sponging and rubbing them, the washing when heated in ponds, or the pouring of water over them.

Well wash the heel with soft soap and water, and afterwards apply the following ointment:—

Ointment for Scurfy Heels,

Yellow wax, 2 ounces,
Sweet oil, 8 ounces, melt together and add
Sugar of lead in very fine powder, 2 drachms.

Use a little of this after each bathing. The horse to have bran mashes, and a diuretic ball every third or fourth day, at the same time having green food if possible. If not attended to, the inflammation extends and the heel cracks. Poultice the heel with carrots boiled soft; if they cannot be obtained, one made with linseed meal. Apply the following caustic wash:—

Blue stone, 2 drachms,
Alum, 2 drachms,
Water, 1 pint.

When the inflammation has subsided, we may leave off the poultice and apply the following ointment:—

Yellow resin, 4 ounces,
„ wax, 4 ounces,
Sweet oil, 2 pints, melt them together and add
Calamine in very fine powder, ½ pound; stir till cold.

GROGGINESS—In horses, is a peculiar knuckling over of the fetlock joint, and tottering of the fore legs. It commonly arises from a want of force in the ligaments of the joints, produced by over-exertion and ill-usage; for which there is no cure.

H.

HAIR, see ALBUMEN.

HAW, INFLAMMATION OF, see EYE.

HEART, INFLAMMATION OF. This is, fortunately, not a very common, since it is a very dangerous disease. The symptoms are a quick and strong pulse, with sudden rapid action of the heart, which may be heard even at a short distance. The animal is exceedingly alert, and looks all life and activity. The only remedy is copious bleeding.

HEALING OINTMENT FOR SORE EARS IN DOGS:—

Yellow resin, 2 ounces,
„ wax, 1 ounce,
Sweet oil, ½ pint.

Melt them together; and when it begins to cool, stir in four ounces of calamine, in fine powder.

HIDE-BOUND. This well known hardness, and unthrifty appearance, of the skin of the horse, is usually a symptom of other complaints. If, however, the horse presents no other indications of disease, then it will be ad-

visable to give him a mild physic ball, composed as follows :—

Barbadoes aloes, 5 to 6 drachms,
Powdered ginger, 2 drachms,
Castile soap, 2 drachms,
Treacle, sufficient to form a ball.

After the physic has operated, the following diuretic ball, to be given every day, with bran mashes, green food, regular exercise, and good grooming :—

Alterative Ball.

Powdered black antimony, 2 ounces,
,, nitre, 2 ounces,
Flour of sulphur, 2 ounces,
Powdered yellow resin, 1 ounce,
,, gentian, 2 ounces,
Treacle, sufficient to make eight balls.

HOOSE, see CATARRH.

HOOVE—Is a disease in cattle, caused by the fermentation of green food, which, evolving a great quantity of gas, distends the rumen. It is a common complaint in those cattle and sheep, who, taken from very poor food, are turned into clover, turnips, or rich pastures.

In Cattle.—The animal ceases to eat, becomes distressed, its breath is oppressed, it moans; the belly is blown up; the brain is next effected; the tongue protrudes; the animal falls and, after some struggling, dies.

There are two common modes of treating the animal suffering with the hoove, which are commonly and successfully followed.

The first is, by piercing the left flank of the animal with a knife. Through the aperture immediately rushes the gas, with considerable violence, carrying with it some of the food and

other matters. Professor Youatt observes, with regard to the safest place of performing this operation,—"Supposing a line to be drawn close along the vertebræ, from the haunch-bone to the last rib, and two other lines, of equal length, to extend down the flank, so as to form an equilateral triangle, the apex of the triangle, or the point where the lines would meet, would be the proper place for the operation," (*Cattle*, p. 440.) In this operation, it is by far the best to use a trocar, which is an instrument consist-of a stillett or knife, encased in a silver tube or canula. In using this, after the piercing is effected, the stillett is withdrawn, leaving the pipe sticking in the aperture, where it may be secured by means of a ring, which is fixed on the end protruding from the wound, and by a cord round the animal's body. By this means the discharge through the aperture is properly directed in its course, some portion of which might otherwise escape (as it usually does by the old mode) into the abdomen. In a day or two, the affection being cured, the carnula may be withdrawn.

The other mode of relieving cattle suffering with the Hoove is, to introduce an elastic pipe, or probang, down their throats into the stomach, by which means the gas is immediately liberated, and the animal relieved. There are several varieties of this implement made by various instrument-makers, which I commend to my readers. This may be introduced into the stomach of the animal as often as the belly swells.

When the animal is quite relieved, a dose of physic should be administered. This may consist of—

Epsom salts, 1 lb.
Carraway seeds, 2 oz.
Ginger, ½ oz.
Gruel, 3 pints.

And then, to impart tone to the stomach, for three or four mornings give a dose—

Epsom salts, 4 oz.
Gentian, in powder, 1 oz.
Ginger powder, ½ oz.
Carraway, in powder, 1 oz.
Gruel, 3 pints.

Calves—Have the Hoven occasionally. The remedy: introduce the probang.

Sheep—When first turned into rich green food, are, like cattle, apt to eat voraciously; the stomach becomes overloaded; fermentation takes place; the belly becomes distended; and the animal, if not relieved, speedily dies. For this disease there is, perhaps, no mode so practically available by the shepherd as the trocar, to which I have already alluded when speaking of this disease in cattle. A probang for sheep is also constructed, and is a far better mode of cure than the use of the knife, or a trocar. This is passed down the animal's throat much in the same way as in the case of cattle.

The after-treatment is, to give the animal a dose of physic, say—

2 oz. Epsom Salts,
1 drachm Powdered Ginger,
2 drachms Carraway,
In ½ pint of warm water.

Avoid turning it into pasture too luxuriant.

See, FOOD, DISTENSION WITH.

HORN, HOOF, &c.—Partake of the chemical nature of the cartilaginous part of bone, consisting chiefly of albumen, with gelatine and a trace of phosphate of lime. The horns of black cattle contain, in 100 parts—

Albumen	90
Ditto with gelatine . . .	8
Fat	1
Salts, &c.	1

HYDATIDS, see TURNSICK.

HYDROCEPHALUS, OR WATER IN THE HEAD, IN SHEEP. For this there is rarely a cure to be accomplished. The best treatment is, to give moderate doses of Epsom salts, combined with ginger and gentian. For a sheep, the dose may be—

2 oz. Epsom salts,
1 drachm of Gentian,
½ drachm of Ginger,
In a ¼ pint of warm water.

I.

INK, BLACK WRITING—May be thus prepared—

Galls, bruised, 1 pound,
Logwood, 8 ounces,
Green vitriol, 5 ounces,
Gum arabic, 6 ounces,
Boiling water, 2 galls. Let it stand a fortnight, occasionally stirring it.

Marking Ink :—

Lunar caustic, 2 drachms,
Distilled water, 6 drachms; dissolve, and then add
Gum water, 2 drachms. Mix.

Whet the linen where you intend to write with liquid pounce; dry it; then write upon it with a clean pen.

Liquid Pounce :—

Subcarbonate of soda, 1 ounce,
Bole Armenian, 1 drachm,
Water, 1 pint. Mix.

If potash is used instead of soda, the ink will run.

IMPREGNATION, see MISCARRIAGE.
INFLAMED EYES, see EYES.
INFLAMED FEET, see FEET.
INFLAMED LIVER, see LIVER.
INFLUENZA, see CATARRHAL FEVER.

J.

JAUNDICE, OR YELLOWS. This disease in cattle is distinguished by the yellow colour of the eyes, urine, and skin. It sometimes comes on suddenly, at other times the yellow colour gradually appears, and the tint as slowly deepens. It is a complaint caused, by an obstruction of the passage, for the bile leading from the gall bladder, to the duodenum—it is difficult to treat.

Should there be symptoms of fever, pulse full and quick, it will be advisable to take a

small quantity of blood, afterwards give the following drench :—

Epsom salts, 1 pound,
Powdered ginger, 4 drachms,
Warm water, 3 pints.

After the bowels are well opened the following drench may be given every day.

Madder 1 ounce,
Flour of sulphur, 2 ounces,
Powdered carraway seeds, 1 ounce,
Epsom salts, 2 to 4 ounces,
Warm water, 3 pints,

Jaundice or Yellows in Sheep.

Purging Drench for Yellows.

Epsom salts, 2 ounces,
Powdered ginger ½ drachm,
„ aniseed, 2 drachms,
Warm water, ¼ pint.

This drench to be repeated occasionally so as to keep the bowels well relaxed. Should this weaken the animal too much the following may be given.

Powdered gentian, 2 drachms,
„ bark, 1 drachm,
„ ginger, ½ drachm,
Warm water, ¼ pint.

JOINT FELLON OR RHEUMATISM.

Purging Drench.

Epsom salts, ½ pound,
Powdered carraway seeds, 1 ounce,
Flour of sulphur, 4 ounces,
Warm water, 1 quart.

The bowels to be kept open with this drench, and the following may be given once or twice a day :—

Tartar emetic, 1 drachm,
Camphor, ½ drachm,
Nitre, 2 drachms,
Aniseed powder, 1 ounce.

To be well rubbed together and given in a quart of thick gruel; if the joints continue much swollen, use this liniment:—

Rheumatic Liniment.

Spirits of hartshorn, 2 ounces,
Opodeldoc, 2 ounces,
Camphor Liniment, 4 ounces,
Laudanum, 1 ounce; mix for use.

JOINT MURRAIN, see BLACK WATER.

K.

KICKS AND OTHER BRUISES. Foment the parts copiously and frequently for some time with hot water; if the skin is broken apply the following tincture.

Friar's Balsam, 2 ounces,
Tincture of aloes and myrrh, 2 ounces; mix for use.

KIDNEYS, INFLAMMATION OF. This complaint, in horses, arises most commonly from excessive doses of resin, and other diuretics; it may be caused by inflammation of the loins, which speedily extends to the kidneys, caused by strains from overweighting or sudden jerks, exposure to cold; the continued use of food which is unwholesome or has diuretic properties will produce the same effect, such as mow burnt hay, musty oats, or oats burnt on a kiln will produce this complaint.

Its treatment is to bleed copiously, and repeat this in six hours if requisite, and give the following physic ball:—

Barbadoes aloes, 8 to 10 drachms,
Powdered ginger, 2 drachms,
Treacle sufficient to form a ball.

The operation of the physic to be assisted by means of clysters of warm water (to which is added half a pint of linseed oil), frequently thrown up; the loins well fomented with hot water, and afterwards a mustard poultice applied, with bran mashes and linseed-tea.

L.

LAMENESS OF THE SHOULDER. Foment the shoulder frequently with hot water; a little blood may be taken from the plate vein and a dose of physic given; and in obstinate cases a blister applied—some prefer a liniment.

Liniment for Lameness.

Opodeldoc, 4 ounces,
Laudanum, 1 ounce,
Sweet oil, 4 ounces,
Spirits of hartshorn, 4 ounces.

Mix them together, and after each fomenting with hot water must be well rubbed in.

LAMPAS. This is a complaint in horses arising from the swelling of some of the bars of the mouth, which sometimes rising to, or even beyond the level of the teeth, prevents the animal from grinding his food. In most cases the swelling will subside of itself, especially if a few

mashes be given, aided by a gentle alterative. In need, a few moderate cuts may be made across the bars. The brutal custom of the old race of farriers, who, by burning the swelling down with a red hot lamp iron, gave a name to it, is now very properly abandoned.

LICE IN CATTLE—Are generally the result of poor keep. They may be readily killed by the use of some ointment thus prepared—

Ointment to destroy Lice.

Strong mercurial ointment, 2 ounces,
Lard, ¾ pound.

Mix well together and rub on the parts where lice are found, so as to make a small quantity go a great way: by this careful rubbing in you run no risk of salivating the animal.

LINIMENTS—Are thus prepared—

Camphor Liniment.

Camphor, 4 ounces,
Olive oil, 16 ounces; dissolve the camphor in the oil.

Liniment for Strains.

Camphor liniment, 4 ounces,
Opodeldoc, 4 ounces,
Spirit of turpentine, 4 ounces,
Spirit of sal ammonia (liquor ammonia) 4 ounces,
Oil of thyme, 2 drachms; mix.

Stimulating Liniment for Strains.

Camphor liniment, 4 ounces,
Opodeldoc, 4 ounces,
Spirit of turpentine, 4 ounces,
Strong liquid blister, 1 ounce,
Oil of thyme, 2 drachms; mix for use.

Soap Liniment or Opodeldoc.

Camphor, 2 ounces,
Oil of thyme, ½ ounce,
„ rosemary, ½ ounce,
Rectified spirits of wine, 1 pint,
Soft soap, 4 ounces,
Soft water, 2 pints.

Mix the camphor with the spirits of wine, then the rosemary and thyme, afterwards the water and soft soap. Let it stand fourteen days, occasionally shaking it.

Mustard Liniment for Inflammation in Horses or Cattle.

Flour mustard, 4 ounces,
Spirit of sal ammonia (liquor ammonia), 2 ounces,
Water, sufficient to give it the consistence of cream.

LINSEED OIL—Is the oil expressed from linseed, is an excellent purgative for horses, in doses of from 16 to 24 ounces; for cattle, from 12 to 20 ounces; for sheep, from 2 to 3 ounces.

LIVER, INFLAMMATION OF. The symptoms in cattle are, in addition to those of ordinary fever, a constant reclining on the right side, and a fulness more especially on that side of the belly, accompanied with great tenderness and diminished evacuations; the urine yellow or brown, and sometimes bloody.

Should there be much fever, take a small quantity of blood, and give the following:—

Calomel, 1 drachm,
Powdered opium, 10 grains,
„ ginger, 2 drachms,

Rub them together and give the mixture in a quart of gruel, and repeat it twice a-day. Give the following purge in six hours after the first dose:—

Epsom salts, 8 ounces,
Water, 1 quart, dissolve and add
Linseed oil, 1 pint.

And repeat this till the bowels are opened. If purging takes place from the first, give the

calomel, opium, and ginger, and give the drench as ordered in diarrhœa, at the same time blistering the right side. Great weakness is frequently left after inflammation of the liver: the following tonic drink will, in such case, be found serviceable:—

Tonic Drench.

Powdered gentian, ½ ounce,
„ carraway seeds, 1 ounce,
„ aniseed, 1 ounce,
Epsom salts, 4 ounces.

Mix and give in a pint of warm ale.

For Sheep.—Bleed moderately, and afterwards keep the bowels well opened with the following drench:—

Epsom salts, 2 ounces,
Powdered ginger, 1 drachm,
Warm water, 4 ounces.

LOCKED JAW IN THE HORSE.

This disease is one of those which the farmer can hardly hope, unassisted by the skilful veterinary surgeon, to treat successfully. It arises from a variety of causes, such as the injury of a nerve, the laceration of some tendon, as after docking, &c.; from ill treatment, over exertion, &c. It consists of such an over excitation of the nervous system, that the whole frame becomes affected as with one agonizing spasm.

Medical treatment for a Horse.—Bleed till the circulation is evidently affected, which generally causes the muscles of the jaw to be sufficiently relaxed to administer a strong purging ball or drink, its operation to be assisted by means of clysters, composed of linseed oil one pint, to about four quarts of warm water, and

thrown up with Read's pump, at the same time apply a strong blister from the poll to the rump, and even on the sides. When the physic begins to act, the following anti-spasmodic will be found serviceable, and repeated twice or three times a day:—

Powdered opium, 1 drachm,
„ aniseed, 2 drachms,
Camphor, 1 drachm.

Rub the camphor down with a little spirit of wine and mix with the opium and aniseed, and beat into a ball with treacle, or it may be mixed with a little thick gruel.

For Locked Jaw in Cattle—Bleed till the beast blows and threatens to fall, which generally relaxes the spasm, and give the following drink:—

Epsom salts, 1½ pounds,
Flour of sulphur, ½ pound,
Warm water, 4 pints.

Mix them together and repeat in half pound doses of the above every six hours, the operation to be assisted by clysters administered every four hours, composed of epsom salts half a pound, linseed oil half a pint, warm water four quarts. When the physic has well operated, give one drachm of opium, dissolved in warm water, twice a-day, and put a seton in the dewlap. Sheep require similar treatment; bleeding and physic, either epsom salts or linseed oil.

LOSS OF CUD, see Cud.

LOUGH, see Brain, Inflammation of.

LUNGS, INFLAMMATION, see Pneumonia.

M.

MALLENDERS AND SALLENDERS. This is the name given to a well-known scurfy eruption in the legs of horses; if in the fore legs, they are called mallenders; if in the hind legs, sallenders.

Give a diuretic ball (see BALL) every third night, and dress the part twice a day with the following ointment:—

Tar, 4 ounces,
Suet, 4 ounces. Melt them together, and add sugar of lead, 1 ounce; stir till cold.

MALIC ACID, see ACID.

MALT. The following is Dr. Thomson's analysis of 100 parts barley, and the pale malt made from it:—

	Barley.	Malt.
Gluten	3 ..	1
Sugar	4 ..	16
Gum	5 ..	14
Starch	88 ..	69

MANGE. This disease of the skin—too well known to need description—is generally produced by neglect, such as bad treatment, want of food, and diet.

Its medical treatment for a horse consists in the following physic balls and ointment:—

Physic Ball for Mange.

Barbadoes aloes, 6 drachms,
Calomel, 1 drachm,
Powdered ginger, 2 drachms,
Castile soap, 2 drachms,
Oil of carraway, 20 drops,
Treacle sufficient to form a ball.

After the mange has set, give the following—

Alterative Balls.

Powdered black antimony, 2 ounces,
„ nitre, 2 ounces,
Castile soap, 2 ounces,
Flour of sulphur, 8 ounces,
Soft soap, sufficient to make the mass into eight balls.

Give one of these every night, and use the following ointment—

Mange Ointment.

Flour of sulphur, 8 ounces,
Strong mercurial ointment, 2 ounces,
Soft soap, 4 ounces,
Train oil, 1 pint. Rub the whole well together.

Let some of this be well rubbed in with the hand over the parts affected, using as small a portion of the ointment as convenient. After repeating the above some time, in need, two ounces of spirits of tar may be added.

For the mange in cattle, use the following drench—

Epsom salts, ½ pound,
Flour of sulphur, ½ pound.

Mix, and give in three pints of thin gruel every third day; and use the ointment I have recommended for horses.

Mange Ointment for Dogs.

Flour of sulphur, 1 pound,
Soft soap, 4 ounces,
Oil of tar, 1 ounce.
Train oil, ½ pint. Mix them together for use.

Rub this in carefully with the hand upon the affected places.

MANGEL WURZEL—1000 parts of this root contains of—

Mucilage or starch . . .	13	parts.
Saccharine matter . . .	119	„
Gluten	4	„

MAW BOUND, see DISTENSION.

MEASURES. The measures employed by the London College are those of wine. In these—

	Cubic inches.
1 Gallon contains	231
1 Pint, or 16 Ounces	28·875
1 Ounce, or 8 Drachms . . .	1·804

For Fluid Measures, see WEIGHTS.

MEDICINE-ROOM, see RACE HORSE.

MEGRIMS IN HORSES—Is the mildest form of determination of blood to the head. If the horse has been driven a little faster than usual, or wears a collar a little too tight, all at once he stops, and shakes his head and trembles; if allowed to stand a minute or two, he usually recovers, and goes on again. The mode of giving present relief is, to draw a penknife deeply across the bars of the mouth, and set them bleeding.

When the horse gets home, he ought to be well mashed, and have a dose of physic, with green food. When the physic has operated, the following alterative balls should be given:

Alterative Balls.

Flour of Sulphur, 5 ounces,
Powdered nitre, 5 ounces,
„ resin, 1½ ounces,
„ black antimony, 3 ounces,
Liquorice and soft soap, sufficient to make twelve balls.

One to be given every night.

MERCURIAL BALL, see BALL.

MERCURIAL OINTMENT.

Strong Mercurial Ointment.

Quicksilver, 2 pounds,
Prepared suet, 4 ounces,
Lard, 1¼ pounds.

Rub the quicksilver, suet, and a small quantity of the lard together, until the globules entirely disappear; then add the remainder of the lard, and mix. *Mercurial Ointment (Mild) for Sheep*, see SCAB.

MILK. If milk be left at rest, the fatty globules separate, rise to the surface, and form cream; if it be long agitated, they attract oxygen, coalesce, and form butter. Cow's milk is heavier than water; its specific gravity is 113; it contains in 100 parts (*Farmers' Encyclo.*)—

Caseine, with fatty matter	2·600
Sugar of milk	3·500
Extract, lactic acid, and lactates	0·600
Chloride of potassium	0·170
Alkaline phosphate	0·626
Phosphate of lime, and other salts	0·200
Water	92·875

Deprived of its cream, 100 parts contain of—

Water	928 75
Curd, with a little cream	28·
Sugar of milk	35·
Muriate of potash (chloride of potassium)	1·70
Phosphate of potash	·25
Lactic acid, acetate of potash	6.
Earthy phosphates	·30

See FOOD.

MISCARRIAGE—Is the abortion, slinking, casting, or warping, all meaning the expulsion of the fœtus from the womb (*uterus*) at so early a period of pregnancy as to render it impossible for it to live. The immediate causes appear to be the death of the fœtus, or derangement in the functions of the womb or its dependencies, arising from some external cause or causes operating on the mother. Amongst these may be reckoned too much or too little

food, sudden fright, or sympathy with certain smells or sights, such as the smell or sight of blood, of bones, of horns, and particularly of the aborted fœtus of another animal: on a similar principle, perhaps, to that which causes even some strong-nerved men to faint away on witnessing a surgical operation. Accidents, also, such as falls, bruises, over-driving, or fatigue, frequently bring on miscarriage.

The signs of approaching abortion are—great langour, uneasiness, and restlessness; sometimes a discharge of bloody matter from the vagina, and the sudden filling of the udder, similar to the signs of approaching parturition.

The following table contains the period during which domestic animals go with young:—

	Period of Gestation and Incubation.		
	Shortest Period.	Mean Period.	Longest Period.
	Days.	Days.	Days.
Mare	322	347	419
Cow	240	283	321
Ewe	146	154	161
Sow	109	115	143
Goat	150	156	163
Ass	365	380	391
Buffalo	281	308	335
Bitch	55	60	63
Cat	48	50	56
Rabbit	20	28	35
Turkey, sitting on the eggs of the ... Hen	17	24	28
Turkey, sitting on the eggs of the ... Duck	24	27	30
Turkey, sitting on the eggs of the ... Turkey	24	26	30
Hen, sitting on the eggs of the ... Duck	26	30	34
Hen, sitting on the eggs of the ... Hen	19	21	24
Duck	28	30	32
Goose	27	30	33
Pigeon	16	18	18

Professor Youatt has (*Jour. Royal Agri. Soc.*, vol. i., p. 170,) suggested a means of ascertaining the pregnancy of the cow and the mare, by the application of the ear to the flank, when the quicker beating of the heart of the fœtus may be distinguished. This, however, is doubted by Lord Spencer (*Jour. Royal Agri. Soc.*, vol. ii., p. 112,) who thinks it possible, however, to calculate, by careful observation, the number of calves likely to be produced by a herd of cows. The observations, however, of Mr. Youatt are so valuable that I shall make no apology for inserting them here. He remarks—

"Among healthy animals, the impregnation of the female rarely fails to be the result of an intercourse between the sexes. The assurance, however, of this having taken place, is, occasionally, an affair of considerable interest, and of no little difficulty; and the value and the destiny of the female may very much depend on the decision of the question. A certain time having elapsed, the thing will speak for itself; but are there any symptoms or circumstances that will warrant the veterinary surgeon, or the agriculturist, in giving a decided opinion on the case in an early period of supposed pregnancy?

"It occasionally happens that the fifth or the sixth month arrives, and, even to the practised eye, there are few or no indications of conception having taken place. There are, also, but somewhat unfrequently, diseases which very closely simulate this natural process. Can the veterinary surgeon or the breeder decide? The answer is in the affirmative, and plainly and

unequivocally. This is one of the boons which the veterinary art can now confer on the agriculturist. The altered character of the female is regarded, and very properly, as a circumstance of no little weight. She is comparatively calm and quiet; her appetite returns, and she regains her former condition and her former habits. Five or six weeks pass, and there is no outbreak of any kind. The owner concludes, and he is not often wrong, that she is impregnated. He, however, has had little to do with mares or with cows who has not witnessed the return of the most furious œstrum, after a much longer period of time has elapsed. I have known more than three months pass in this delusive quietude, and then a salaciousness worse than at first has indicated that no actual impregnation had taken place. On the other hand, the œstrum, but not with all its former fury, has returned, two, and three, and four months after the connection; and yet, as the result finally shows, impregnation had taken place at their first intercourse.

"Many circumstances may cause the owner to be anxious to know the truth of the matter. He may wish to sell her, or he may be unusually desirous to breed from her. Let the animal be examined per vaginum. Let the hand be slowly and cautiously passed up the vagina until it reaches the os uteri. Let there be no attempt to penetrate farther. No information can be gained from introducing the fingers into the uterus. It is simply wished to ascertain the character of the os uteri. In its natural and unimpregnated state

it will be closed: but it will not be tightly or spasmodically so, and the contraction of the mouth of the womb will form a kind of cup, with the base towards that viscus. If she is impregnated, the entrance to the uterus will be more firmly closed, and the protrusion will be towards the vagina. This is the only exploration per vaginum which I would allow; it is easily made, and it will be satisfactory. If an exploration of this kind is attempted when half or more than half of the period of pregnancy has passed, it is not at all unlikely that so much irritation of the parts will ensue as to cause the expulsion of the fœtus.

"I will suppose that two months have passed since the supposed impregnation. The fœtus is still remaining in the pelvic cavity. The heart has begun to beat, and the blood to circulate through its little veins. It will be situated immediately below the rectum. I introduce my hand into that intestine. I have not occasion to pass it very far up. I feel the little substance; for it then is small in proportion to its after growth. I feel it under my hand. I am certain that I am pressing upon the uterus and its contents. I cannot perhaps detect the pulsation of the embryo; but if I had delayed my examination until the fœtus was three months old, I should have assurance that it was there by its now increased bulk, while the pulsation of its heart would tell me that it was living.

"For two months from this period in the cow, and for three in the mare, I should have no other indication of the presence of the fœtus,

nor of its life and growth, except from the gradual enlargement of the abdomen of the mother: and, by that time, the little one would have increased in size and strength, and would have begun to take occasional exercise in its first domicile, and then would become the more evident, but not more satisfactory proof of the life of the fœtus; its motion strong enough to be seen through the integument.

"I might, perhaps, wish to give this assurance of the life of the fœtus to some curious spectator, or to some intended purchaser. I would not gallop the mare in order to effect this; I would not so far disturb her or the young animal that she bore within her. Much less would I give her cold water to drink, and which she usually would drink until she annoyed the fœtus, and the unborn animal told us how much we annoyed him by endeavouring to shift his quarters and get away from the action of the cold. I would not run the hazard of giving her the colic, and perhaps destroying him or her by this unscientific and somewhat cruel method of exploration; but I probably should give a tap or two on the outer wall of his dwelling, just sufficient to rouse him from his slumbers, and induce him to express his anger at the annoyance by a tolerable distinct plunge or kick.

"Most certainly, if it was a cow that I was exhibiting, I would not give, nor would I suffer any one else to give, those terrible punches in the right flank which I have no doubt are the cause of much unsuspected injury, and, occa-

sionally at least, connected with, or the origin of, a difficult or a fatal parturition.

"I may here observe that the fœtus of the mare from the beginning occupies nearly the centre of the belly. In the early stage Mr. Mogford generally found it 'lying across the pelvic cavity, the spine being immediately under; the head on the left side, and the tail on the right side.' In the latter portion of its fœtal state its motions are pretty equally distributed on either side, and the beating of the fœtal heart is most plainly heard at the very base of the abdomen. The fœtus of the cow is huddled up on the right side of the belly. There its motions are most seen, and the beatings of its heart best heard. The enormous paunch, lying principally on the left side, presses every other viscus, and the uterus among the rest, into the right flank. This also explains a circumstance familiar to every breeder. If the cow should happen to carry twins, they are crowded together in the left flank, and one seems absolutely to lie upon the other. Whenever the farmer notices the kicking of the fœtus high up in the flank, he at once calculates on twins.

"To return from this digression. If half the period, or more, of utero-gestation had passed, and I could not get the little stranger to move by my gentle tapping, and it was a cow with which we had to do, and a quiet one, I would have her carefully held by the cowherd, while I stooped and applied my ear flat upon the flank, and then slowly and with gentle pressure

upwards and downwards, and forwards and backwards, over the flank and the lower part of it, until I heard—and which I should do in a great majority of cases—the pulsations of the fœtal heart. I should recognise it by their quickness, the pulsations of the fœtus being double or more than double those of the other.

"If it was a mare, I would have a halter put on her, and an assistant should hold up one of her legs, while some person interested reached under, or perhaps knelt under the belly of the mare, and passing one ear along an imaginary line from between the teats to the chest, and deviating a little from one side to the other, he would then also recognise the quick pulsation of the fœtal heart.

"These observations are addressed to practical men, and will be speedily put to the test by them. The object of the author is to get rid of the vulgar and inefficient methods of detecting pregnancy which are now in general use, and to introduce others that are founded on a surer and more scientific basis."

Abortion in the Horse.—Abortions very frequently happen among mares. This often arises in consequence of over-exertion during the latter period of pregnancy. Mares are liable, also, very frequently to various accidents in their pastures, which may be the cause of their slipping their foal, such as kicks, tumbling into holes and ditches, over-exerting themselves to get over fences, and the like. On this account, when a mare is near her time, she should be kept by herself, in some convenient

quiet place. But there is another, and I suspect a very general, cause of these accidents in mares: I mean a stinting of them in their food, either in quantity or quality. It appears, indeed, that some imagine that the mare, when she is in foal, may be turned out almost anywhere: but this opinion is ill-founded; for although the mare does not require to be kept so high in condition as when she is at hard work, yet she is not to be turned out into a pasture where she may be in a manner starved; but how often do we see the mare-in-foal on the worst piece of ground in the whole farm, exposed, during the rigorous winter season, to endure the cold, as well as to put up with scanty food. Every well-informed farmer knows that the slinking of the foal is often the consequence of such treatment. On the other hand, when the mare is not worked at all, and indulged with too high keep, she is almost equally in danger of abortion, her high condition having a tendency to cause inflammation and other disorders: and these, deranging the reproductive organs, frequently produce miscarriage. It would seem, then, that moderate exercise and diet are best suited as means to avoid the misfortune of the premature exclusion of the foal.

Abortion in the mare usually occurs between the fourth and fifth month; a mare that has slinked her foal on a previous occasion, should be separated from other mares about this time, for she will be very liable to do so again, "For such," says Mr. Youatt, "is the power of

imagination or of sympathy in the mare, that if one of them suffers abortion, the greater number of those in the same pasture will share the same fate."—*On the Horse*, p. 222.

Abortion in the Cow.—The usual period of gestation in a cow is two hundred and seventy days, or nine calendar months; but there is much variation in the time of the cow being with calf. According to M. Tessier, in eleven hundred and thirty-one cows upon which his observations were made, the shortest period was two hundred and forty, and the longest three hundred and twenty-one—being a variation of eighty-one days, or, reckoning from nine months, fifty-one days over, and thirty-one days under. Of five hundred and seventy-five cows, he found twenty-one calved between the two hundred and fortieth and two hundred and seventieth day; five hundred and forty-four between the two hundred and seventieth and two hundred and ninety-ninth, and ten between the two hundred and ninety-ninth and three-hundred and twenty-first day. It has been remarked that the cow goes longer with a bull calf than with a cow calf. Of seven hundred and sixty-four cows, noted by Lord Spencer, (*Jour. Royal Agri. Soc.*, vol. i., p. 165,) two hundred and twenty days was the shortest period when a *live* calf was produced, and two hundred and forty-two days the shortest period when the calf was *reared*; 313 days was the *longest* period he remarked a cow to be in calf; three hundred and fourteen cows calved before the two hundred and eighty-fourth day, and

three hundred and ten after the two hundred and eighty-eighth day.

Abortion occurs oftener in the cow than in all other domestic animals put together. Perhaps it is one of the greatest annoyances the proprietor of cows has to encounter, and unfortunately, for aught we see to the contrary, it is likely so to continue; for, in spite of the improved state of veterinary medicine, and the researches of skilful veterinary surgeons both at home and abroad, abortion still continues as frequent and annoying as ever. The causes are frequently involved in obscurity; but it may be mentioned that an extremely hot and foul cow-house, a severe blow, violent exertion, starvation, plethora, an over-loaded stomach, internal inflammations, constipated bowels, bad food or water, improper exposure, and the like, will now and then produce abortion. Any thing whatever, indeed, that seriously affects the health of the animal in general, or the state of the reproductive organs in particular, may do so. But abortion occurs again and again when no such causes as those enumerated can be traced. The disease, if such it may be called, as I think it may, is even said to be infectious. No sooner does it show itself in one animal than it is seen in another, and another, till it has spread over the most part of the cow-house. Some say this is to be attributed to the odour arising from the substances evacuated. Possibly it may be so; there is nothing unreasonable in the supposition; for although we cannot perceive the smell, nor account for its peculiar

influenee, it is still quite within possibility that such an odour does exist, having the power attributed to it. There can be no great harm, however, in acting as if we were assured that the mischief has its origin in the source so commonly supposed, provided we do not shut our eyes to any other which accident or investigation may reveal. In the meantime, the number of abortions may be diminished by carefully avoiding all those causes which are known to be capable of producing it. Let the cows be regularly fed; let their food be good, and in proper quantities; let them have water as often as they will take it; avoid sudden exposure to cold or heat: and, above all, let the cow-house be well ventilated. Prohibit all manner of rough usage on the part of those who look after the cows, whether they be pregnant or not. If any of them accumulate flesh too rapidly, gradually reduce their allowance; and, on the other hand, if any become emaciated, discover the cause, and remedy it, always by slow degrees. Sudden changes in the matter or mode of feeding should also be avoided. The same sort of diet does not agree equally well with all the cows; and this, in general, is indicated by undue relaxation, or constipation of the bowels: this should be watched, and removed at once. Attention to these and many other minor circumstances, will amply repay the proprietor for the little additional trouble.

"When the farmer perceives symptoms of abortion, he should, "says Professor Youatt, in his excellent work on cattle, p. 533, "remove

the cow from the pasture, to a comfortable cow-house, or shed. If the discharge is glaring, but not offensive, he may hope that the calf is not dead—he will be assured of this by the motion of the fœtus, and then it is possible that the abortion may yet be avoided. He should hasten to bleed her, and that copiously, in proportion to her age, size, condition, and the state of excitement in which he may find her, and he should give a dose of physic immediately after the bleeding (this may be 1 lb. of Epsom salts, in a quart of warm water). The physic beginning to operate, he should administer half a drachm of opium, and half an ounce of sweet spirits of nitre; unless she is in a state of great debility, he should avoid above all things the *comfortable drink* which some persons recommend; he should allow nothing but gruel, and keep his patient as quiet as he can. By these means he may occasionally allay the general or local irritation that precedes, or causes the abortion, and the cow may yet go her full time."

Abortion in the sheep.—The ewe goes with lamb about five months, or one hundred and fifty-two days. Of nine hundred and twelve ewes noted by Mr. Tessier, one hundred and forty-six days was the shortest period, and one hundred and sixty-two days the longest, the majority, however, produced between the one hundred and fifty and one hundred and fifty-four days. The ewe is not so much liable to abortion as the cow, yet she is occasionally, in consequence of the numerous accidents they

are liable to, such as fright, overdriving, being worried or run with dogs. A pack of hounds, in pursuit of a hare, got among a flock of sheep belonging to a farmer, and so hurried and alarmed them, that thirty out of a flock of two hundred ewes prematurely dropped their lambs. It is the same in sheep as in the other cases of domestic animals,—scarcity of food, and exposure to severe cold, having a great tendency to make the ewes prematurely drop their lambs, or produce them weakly and crippled at the full time; and although there may be a little danger in giving too much food, such as allowing them to feed all the winter on turnips, the danger is trifling compared with the starving system. The symptoms of abortion in a ewe are commonly too indistinct to enable the farmer to prevent its occurrence. If the ewe is afterwards attacked with fever, she may be treated as directed in fever; if she is too much weakened, small doses of gentian and ginger and Epsom salts may be given, say two drachms of ginger, one drachm of gentian, and one ounce of Epsom salts in warm water or gruel. —*Youatt on Cattle. Farmers' Encyclopædia. Jour. Royal Ag. Soc.*

MURIATIC ACID, see ACID.

MUSTARD LINIMENT, see LINIMENT.

N.

NASAL GLEET—Is a disease in horses

which shows itself by a more copious and thicker discharge from the nose than usual. For this complaint a ball, composed as follows, may be given, night and morning:—

Blue vitriol, 1 drachm, dissolved in water,
Powdered gentian, 2 drachms,
„ ginger, 1 drachm,
Treacle and meal, sufficient to form a ball.

The nose should be injected, especially if the discharged matter is offensive, with a solution of chloride of lime.

NAVEL-ILL. The treatment in this dangerous disease is, when the navel is found to bleed, to tie a ligature a short distance from the belly, a pledget of lint, dipped in Friar's Balsam, over it, confined with a bandage, and changed night and morning; and the bowels to be kept open with linseed oil. Afterwards a cordial drink should be given, in a little gruel, once a-day, composed as follows:—

Cordial Drink.

Powdered carraway, 2 drachms,
„ gentian, 1 drachm,
„ ginger, ½ drachm. To be given in a little gruel.

NEATSFOOT OIL. The common neatsfoot oil generally sold is made with hog's lard and train oil; the following is a much better composition for the leather:—

Prepared suet, 1 pound,
Southern whale oil, 1 gallon; melt them together.

Prepared suet is made by melting the suet and straining it through a cloth.

NEWMARKET OILS—Are thus prepared:

Linseed oil,
Spirit of turpentine,
Green oil, of each 1 pint.

Mix them together in a stone jar, and *gradually* add one ounce of oil of vitriol.

O.

OAT. 1000 lbs. of the oat plant contain, after being burnt, according to Sprengal—

	Seeds. lbs.	Straw. lbs.
Potash	1·50	8·70
Soda	1·32	0·2
Lime	0·86	1·52
Magnesia	0·67	0·22
Alumina	0·14	0·6
Oxide of iron	0·40	0·2
Oxide of manganese	—	0·2
Silica	19·76	45·88
Sulphuric acid	0·35	0·79
Phosphoric acid	0·70	0·12
Chlorine	0·10	0·5
	25·80	57·40

OIL OF VITRIOL, OR SULPHURIC ACID, see ACID.

OILS. This term comprehends two classes of substances that have very distinct properties, namely, volatile and fixed oils; but, in general language, the term oil is indicative of the latter. If a drop of a volatile oil is suffered to fall on a sheet of paper, this after being exposed to a gentle heat should entirely disappear, if a greasy

appearance remains, it has been adultrated with a fixed oil. Fixed oils are unctuous fluid bodies, which, when dropped upon paper, sink into it, and make it semi-transparent, or give it what is called a *greasy* stain. The following is the result of analysis of 100 parts of.—

	Hydrogen.		Oxygen.		Carbon.
Olive oil ..	13·36	+	9·437	+	77·213 = 100
Train oil ..	16·1	+	15·03	+	68·87 = 100

OPODELDOC, see LINIMENT.

OVERREACH, see FOOT, DISEASES OF.

OXALIC ACID, see ACID.

OXYGEN GAS.—A simple or undecomposed substance, discovered in 1774, by Dr. Priestley. It constitutes 21 per cent of the atmosphere, and is that portion of it which supports animal life and combustion. It is emitted by plants growing in the light, and is absorbed by them during the night. It is found in combination with hydrogen and carbon, and less often with nitrogen, in all vegetable and animal substances. It unites with various bases, and forms alkalies, acids, and metallic oxides. It is tasteless, and soluble in water, which at a temperature of 60° absorbs about 1-27th of its bulk. 100 cubic inches of this gas weigh about 34 grains.—*Farmers' Ency.*

P.

PALM OIL is employed in veterinary prac-

tice as an excellent emollient to supple the udders of cows and sheep.

PALSY. Palsy is a stoppage of the nervous influence; it is not the muscle which is weakened in its power, it is the nervous energy which is diminished or destroyed.

If palsy arises from violence or accident, the horse must be bled, and have a dose of physic given him, the back or loins well fomented with hot water, and after each have the following liniment well rubbed in:—

Opodeldoc, 4 ounces,
Spirit of turpentine, 4 ounces,
„ hartshorn, 4 ounces: mix them together.

If necessary, after three or four days a mustard liniment may be applied, or a blister.

For Palsy in Cattle.—The bowels to be kept well open by the following drench:—

Epsom salts, 1 pound,
Powdered caraway, 1 ounce,
„ aniseed, 1 ounce,
„ ginger, 2 drachms.

Mix and give in a quart of warm beer, and well rub in the stimulating liniment as ordered for horses.

For Palsy in Sheep.—Keep the bowels well open with the following drink:—

Epsom salt, 2 ounces,
Warm water, 3 ounces, dissolve and add
Linseed oil, 1 ounce; mix them together.

PARSNIPS. These roots, as they are carried from the field, contain in 10,000 parts,

according to Professor J. F. Johnston.—*Lec. on Ag. Chem.* p. 322.

Potash	20·79
Soda	7·02
Lime	4·68
Magnesia	2·70
Alumina	0·24
Oxide of iron	0·05
Oxide of Manganese	—
Silica	1·62
Sulphuric acid	1·92
Phosphoric acid	1·0
Chlorine	1·78—41·80

PEAS, FIELD. 1000 parts contain, according to Professor Johnston, when dried in the sun :—

	Seed lbs.	Straw. lbs.
Potash	8·10	2·35
Soda	7·39	—
Lime	0·58	27·30
Magnesia	1·36	3·42
Alumina	0·20	0·60
Oxide of Iron	0·10	0·20
Oxide of Manganese	—	0·07
Silica	4·10	9·96
Sulphuric acid	3·37	0·50
Phosphoric acid	1·90	2·40
Chlorine	0·38	0·04

PHRENZY, see BRAIN, INFLAMMATION OF.

PIGS, DISEASES OF. For the common disease of pigs the following should be given :—

Flour of sulphur, 1 pound,
Madder, ½ pound,
Powdered nitre, ¼ pound,
„ black antimony, 2 ounces.

Mix them together and give one or two table spoonsful in their food for a dose.

PNEUMONIA, OR INFLAMMATION OF THE LUNGS. This diseased state of the lungs commonly arises in the horse from sudden transitions in the temperature of the air the animal is obliged to breathe. Its generally predisposing causes are too much warmth, in confined and filthy stables. It is caused also by sudden stoppages in the insensible perspiration of the animal; this generally produces a cold or a cough, inflammation of the lungs, and all its attendant dangers. As this disease varies in the rapidity of its attacks, being sometimes rapid, sometimes gradual in its approach, so do its symptoms vary considerably; the pulse is sometimes rapid, often oppressed and subdued; the nostrils are extended, the feet and ears cold, with a peculiar working of the flank, the breathing hurried and fast, the membrane of the nose very red, the countenance anxious, the fore legs wide of each other, the animal constantly standing, or if from sheer fatigue he does lie down, he rises directly. Sometimes this is the disease into which other disorders degenerate, such as distemper, catarrh, &c., but it betrays itself almost always by the symptoms I have described. Its treatment consists in copious bleeding until the animal begins to be faint; and if the bad symptoms return, the bleeding must be repeated in five or six hours until the same appearance exhibits itself; but only a moderate bleeding of say two or three

quarts may be necessary. Afterwards give the following:—

Fever Ball.

Tartar emetic, 1 drachm,
Powdered fox glove, ½ drachm,
„ nitre, 3 drachms,

Linseed meal and soft soap sufficient to form a ball, to be given twice or three times a-day.

When once the bleeding and balls have subdued the force of the fever, it may then be necessary to apply extensive blisters to the brisket, and to the sides under the elbows. To secure the requisite operation of the blister, Professor Youatt directs (*Horse*, p. 186) the hair to be close shaved, and the blister ointment to be formed of powdered Spanish flies one part, lard four parts, resin one part, melt the lard and resin together, then add the Spanish flies: rub the ointment well in with the hands for a quarter of an hour.

In Cattle.—Inflammation of the lungs, presents similar symptoms to that of the same disease in the horse; dullness, extension of the head, cough frequent, mouth hot, ears, feet, and horns cold. The patient no longer ruminates, but keeps continually standing.

The treatment is nearly the same as for a horse. Bleed copiously till an effect is produced on the circulation of the blood, and in need this must be repeated. A dose of purgative medicine should be administered, of which epsom salts is in this case the best. Afterwards give the following dose twice a-day:—

Tartar emetic, 1 drachm,
Camphor, 1 drachm,
Nitre, 4 drachms, to be given in a quart of thick gruel.

It is difficult to raise a blister on the skin of a cow, yet still it may in need be effected; for if the ordinary blister ointment fails to operate, still, as a dernier resort, boiling water and a hot iron may be used.

Epidemic Pneumonia.—Pneumonia in cattle "occasionally appear," says Mr. Youatt, (*Cattle*, p. 401) "as an epidemic. The beast hangs its head; there is dryness of the muzzle; the mouth and breath are hot; the flanks more or less agitated; there is a hard dry and frequent cough; the appetite is gone, but the thirst is excessive: the excrement is solid and black,—liquid, black, and fetid; the coat rough; the horns and ears hot, or alternately hot and cold; there is languor and apparent weakness, and sometimes direct lameness, and most frequently of one of the hind legs." These are the primary symptoms, others soon succeed, such as tenderness of the spine, the stretched out head, &c. The progress of the disease is commonly rapid, sometimes however death does not ensue for a week; at other times in twenty-four hours death terminates the animal's sufferings. The treatment must be decisive. Bleeding copiously, with a careful reference to the state of the pulse, must be adopted. Purging medicine, such as Epsom salts, $1\frac{1}{2}$ pound in two quarts of warm water, and to aid this, by means of the injection pump, a solution composed of one pound of Epsom salts, dissolved in one gallon of warm

water and one pint of linseed oil added may be injected. After it has operated give this drink twice a-day—

Tartar emetic, 1 drachm,
Camphor, 1 drachm,
Nitre, 4 drachms; in a quart of gruel.

It will be very desirable, as this is an epidemic disease, to bleed and physic the remainder of the herd of healthy cattle, as soon as one is attacked with it.

As every information relating to the fatal epidemic pluero-pneumonia is become of more than ordinary value, from the ravages it has committed within these few years in the cattle of this country, I shall here insert copious extracts from the essay which obtained the prize offered by the Mutual Cattle Assurance of London, in 1844. By Mr. John Barlow, V.S.—(*Farmers' Magazine*, vol. xxii., p. 5.)

"Epizootic diseases," says Mr. Barlow, "somewhat various in character, but extremely destructive, have appeared at intervals from the earliest ages. Although we are not wholly destitute of dates and other information connected with some of them, the accounts as furnished by their respective authors are frequently so confounded with superstition and the ignorance of the ages in which they were written, as to afford little of interest to the scientific medical inquirer. They are ascribed to various causes, and often to the rage of offended deities. That the hand of Providence is connected with them, no one confessing the omnipotence of the Deity can deny, or that various means are em-

ployed by that hand, sometimes evident to, and at other times hidden from, man. 'And the Lord did that thing on the morrow, and all the cattle of Egypt died.' We have in the Iliad of Homer an account of a devastating disease among his countrymen and their cattle engaged in the siege of Troy, attributed by him to the 'vengeful arrows' of Apollo.' Plutarch and Livy also notice the occurrence of fatal pestilences among cattle, succeeded by sad mortality among men. Virgil furnishes an interesting account of a disease, bearing considerable resemblance to the murrain one hundred years ago.

"From the commencement of the Christian era until about the period of 1744, we have accounts of fatal diseases among cattle at various intervals, somewhat alike, in general characters, to the terrible murrain of that time. Practitioners of human medicine were the only competent recorders of their nature, for veterinary schools and properly educated veterinary surgeons may be said not to have had existence until 1761, and in this country not until much later. Among the medical men of our own country who honourably exerted themselves in ascertaining the nature and treatment of the murrain, are Doctors Mortimer, Hird, Layard, and Brocklesby. They also left such accounts of it as the knowledge of the age enabled them to impart. Amongst the foreign writers on epizootic diseases, previous to the establishment of veterinary schools, may be mentioned as deserving of particular notice, Lancisi and Ramazini, Italian physicians. Of later years

eminent veterinarians have appeared, chiefly of the French schools, as Delafond, Dupuy, Hurtrel d'Arboval, and others, who have paid much attention to these strangely devastating diseases. Of our own country, Youatt is decidedly the best authority on the murrain and other diseases of cattle; he, in fact, may be said to have placed the veterinary art, as connected with these animals, on a basis which, previous to his time, it had not attained in England.

"More recently, and with respect to diseases almost similar in character to the present epizootic, we have some accounts by veterinary surgeons, chiefly foreign. Professor Abelgaard speaks of a contagious disease which effected great devastation in Denmark. There is an account in 'Le Recueil de Médécine Vétérinaire,' 1838, by M. Lecoq, of the Veterinary School at Lyons, respecting a pleuritic affection somewhat similar in nature to our epizootic, only more chronic.

"An account of an enzootic contagious gangrenous peripneumony is described by M. Mathieu, a continental veterinary surgeon, as existing in mountainous districts, among ill-fed and badly housed cattle, which appears to continue more or less through all seasons, but does not, except by means of contagion, affect cattle in the plains.

"The name pleuro-pneumonia is peculiarly appropriate as applied to the present epizootic among cattle; the words conjointly signifying inflammation of the lungs, and involving of a thin membrane, which forms their immediate

investment, and is reflected over or covers the chest internally. These terms are of Greek origin; the former from Πλευρα, the side; and pneumonia, Πνεύμων, the lungs. Epizootic is also a word of Greek origin, from επι, upon, and ζωον, an animal, and is used to signify a disease of similar character prevailing among inferior animals, as epidemic diseases do among human beings.

"Although this disease had some time previously existed and committed sad devastation in Ireland, we first noticed its appearance in this country about the latter part of 1841, following close upon the vesicular epizootic of that time. These, however, were mostly isolated cases. In the winter and spring of 1842 and '43 it appeared more frequently than during the summer of 1842. In the summer of 1843 it somewhat abated; during the later winter months of 1843, and in the spring month of 1844, it more frequently occurred; but in the late summer again considerably subsided. During these periods many farmers lost from twelve to thirty and more cows, and some the whole of their stock. On its first appearance it afforded an instance wherein all remedies seemed alike ineffectual in arresting its progress.

"Many persons, on observing the post-mortem appearances, attributed the extensive and peculiar pulmonary disorganization to rottenness or decay of the tissues within the thoracic cavity; but the veterinary surgeon, from observing the nature of these appearances, both during their earlier and later periods, knew

them to arise from other causes. He has attained considerable knowledge of their true pathology, and, although many cases bid defiance to his best-directed efforts of cure, a larger proportion is now recovered than when the disease originally manifested itself.

"Epidemic diseases among the human race, and epizootic ones among the lower animals, appear under various characters, attributable to the season of the year, or some peculiar kind of food used during such season, when the digestive organs are most likely to suffer. At other times they occur during the prevalence of some particular wind, as in spring or winter, and frequently when they are many sudden changes of atmosphere combined with moisture. On such occasions the air passages, synovial membranes, and muscular faschiæ are affected under the forms severally of catarrh, influenza, rheumatism, and some others.

"Although epidemic and epizootic diseases occur most frequently in seasons during which there exists the greatest variation of temperature, they sometimes appear for a considerable period, when their connection with any predisposing or exciting cause may not appear so evident to us. On such occasions they continue to exhibit some peculiar type, or manifest a preference to a particular system in the animal frame—one epizootic affecting the respiratory, another the digestive system, and a third the mucous or serous membranes, and all without any very obvious cause.

"Since the murrain of the last century, the

cow has not suffered from any epizootic disease which for fatality can be compared with the one we now propose to consider. This affection, although apparently consisting in sub-acute inflammation, and its consequences involving tissues and organs within the thoracic cavity, and parts without, as the larynx and the trachea, which are concerned in respiration, still the course and ultimate terminations of that inflammation differ from those pursued by ordinary inflammation of these parts, so much so as to warrant us in our opinion applying to it the term specific.

"We will suppose the patient to be a milch cow. Our first indication of the malady is a partial suppression of the lacteal secretion, with tenderness of udder, which is often accompanied by cough and quickened respiration. In the field she leaves the herd, and stands without ruminating. The back is sometimes slightly arched—the head depressed—the general appearance dull and dejected—evacuation of fæces scanty—the pulse about 70. In this state, frequently mistaken for one of cold or indigestion, she may, to all appearance, continue for a day or longer, when she begins to walk stiffly, and moans when first moved. There is total neglect of food, tenderness of the throat and sides; there is a hot, dry nose; the horns, ears, and extremities alternately are hot and cold, the pulse ranging from 70 to 80, but seldom very strong or vibrating; the eyes somewhat sunk in their sockets, and the conjunctive vessels injected. During inspiration the nostrils

dilate more than previously; moaning, or rather grunting, on expiration, becomes audible when the animal is not moved, and particularly when lying, for, unlike the horse under inflammatory pulmonary disease, she will, in the earlier stages, lie down; constipation exists; the cough becomes more painful and suppressed. Little or no milk is yielded, and there is great debility.

"Should not any remedial means be adopted —and, indeed, too frequently, if the most judicious are employed—the second or incurable stage supervenes, after a continuous aggravation of the above-named symptoms, during variable periods of three, four, five, and sometimes more days. Inflammation has run on to some of its terminations, with condensation of the lungs, or effusion of serum within the thorax, or both. Breathing becomes intensely laborious; the head is extended almost on a line with the trachea; the nostrils expand to their utmost, so as to afford every facility for the admission of air. The cough frequently almost subsides, or the animal becomes unable to utter or bear it. The pulse rises in number to 90 or 100 beats per minute, but decreases in strength. Frothy fluid accumulates in the mouth and trachea. There is diarrhœa and wasting of muscular substance, especially near the shoulders; the horns, ears, and extremities continue deadly cold; the feet are brought almost together under the centre of gravity; and the tail is often drawn close between the hind legs. In this condition our poor patient, when afraid to lie longer, endeavours to stand, as if to avoid the sense of

impending suffocation; she soon reels helplessly about; her groans become more frequent and louder; breathing is almost impossible; and a short interval of delirium usually ensues before death relieves the animal from suffering.

"Death occurs at variable periods, this being determined by the severity of each case. About eight days we have found the average duration of life. Should a beast survive fourteen days, she may stand a chance of a lingering recovery —an event, at such late period, being scarcely desirable. Amendment, to be practicable to the owner, should commence on the fourth or fifth day of illness; not that recovery may not occasionally take place where indisposition has longer existed, but amendment protracted beyond this period is generally accompanied by so much organic pulmonary disease as to render the animal comparatively worthless.

"The cattle on first manifesting symptoms of disease should be instantly removed from those still healthy, and placed, if medical treatment is contemplated, in some distant out-house, where plenty of fresh air, more especially at its upper part, can enter. Both the building they have left and that which they inhabit should be white-washed and fumigated; chloride of lime in solution is an excellent disinfectant, sprinkled within the house, or washed upon the walls. Plenty of dry litter should be allowed; and the excrements, which are mostly very offensive, should be constantly removed, and kept from any situation frequented by other cattle. The cattle diseased are best when loose, and, if con-

venient, may be tied whilst medicine is administered.

"Regimen.—Our first object is to avoid all kinds of food or drink in any way exciting the system or accelerating the pulse, and to have the animal so placed as to insure the greatest degree of quietness. A cow labouring under this disease, if she will eat, should have very little solid food, and even that of the simplest kind. All stimulating farinacious food must be avoided. Clover or hay is better withheld. Mashes may be allowed in very small quantities, containing boiled linseed or barley.

"If she will drink, nearly all solid food may be dispensed with, and well-boiled linseed or wheat-flour gruel allowed. Anything more than such diet cannot fail to be injurious during the suspension of rumination, which mostly takes places early. Many cows will eat a little during the first day or two of illness, and we have seen instances in which such were indulged in all kinds of solid meat; rumination then ceasing, its continued presence in the first stomach caused hoven, leading the farmer to suppose that disease of the digestive organs chiefly existed. If the beast will take neither food nor drink, let the owner remember that this refusal to take sustenance at these times is a wise provision of nature.

"Blood-letting, in addition to subduing inflammation by weakening the heart's action, causes derivation, and prevents blood from accumulating in the inflamed pulmonary substance, facilitating circulation therein, which

would otherwise soon become obstructed. The extent to which it can be carried in pleuro-pneumonia must be decided by the veterinary surgeon. The character of the pulse, that sure index of the intensity of inflammation, must be his choicest and his best guide. In early stages of disease it must be resorted to until arterial action is reduced—until the quick wiry pulsation usually attending pleuro-pneumonia becomes softer, more compressible, and slower.

"1. Purgatives.—Under inflammatory pulmonary disease in the horse, every veterinary surgeon is aware that an administration of purgative medicine is attended with danger, from the extreme susceptibility presented by his intestinal mucous membranes to partake in similar action under such irritants. The cow, however, bears them with comparative impunity, and thus affords us an opportunity, by drawing more blood towards the intestines, not only to divert it considerably from the seat of disease, but also to carry away large quantities of its thinner portions by means of the fæces. To fulfil these objects, then, in pleuro-pneumonia, we recommend, immediately after bleeding, the following medicine, as it produces in this form more certain action and more watery evacuations than many others:—Croton oil 10 drops, calomel ½ drachm, Barbadoes aloes 4 drachms, sulphate of magnesia 8 ounces, ginger ½ ounce. The aloes must be powdered, and dissolved in a quart of hot gruel; among which the other ingredients are afterwards to be stirred, and when cooled down with a pint of whey or water, ad-

ministered. All medicines given to cattle must be fluid or suspended in a fluid, for any solid body forced down the œsophagus enters the first stomach or paunch, where, under suspension of rumination, it may remain long inert. A fluid cautiously given will more probably pass on to the third and fourth stomachs, where it will produce its specific effects.

"2. Counter-irritants are peculiarly serviceable in pleuro-pneumonia. It was maintained by John Hunter that two inflammations cannot exist at the same time in one body; although this perhaps is not literally correct, still a blister applied to an external surface, and acting well, is known by experience to afford us good grounds for forming a favourable prognosis of inflammatory pulmonary disease; inasmuch as, being a powerful irritant, more blood than usual is determined to a part whereon it is applied, and inflammation excited in a substance or situation less important to life than the lungs. If this action is greater than the internal one, much benefit may be expected, as blood which would otherwise be determined to the lungs is directed in large quantities to the seat of artificially excited inflammation. In applying a blister, then, in this disease, we should endeavour to raise external irritation as intense as possible, without leaving permanent blemish. If the blister only acts slightly, excitability of system is increased thereby, and the original disturbance still continues most severe.

"The common method of applying blisters to cattle under pleuro-pneumonia is far from effica-

cious; we have seen those of the farrier and cow-leech, six or eight inches in diameter, of common ointment rubbed in merely as upon a horse, followed, of course, by scarcely any effect. What possible prospect of causing the derivation of internal inflammation infinitely more extensive than this can be seen here?

"The hair should be removed from a space twelve to sixteen inches broad, and in length extending from the vertebral column above to the sternum below, immediately behind the scapula on each side. This, with shears, is somewhat tedious to effect, but is well and quickly accomplished by very slightly moistening the part with oil of turpentine, securing the cow by her horns and nose, in a situation where no mischief can arise from the flame, and setting fire to it. It is highly requisite to moisten the part very slightly with this liquid, otherwise the burning will be so severe as to cause sloughing of the true skin after recovery. About an ounce is sufficient for the purpose. A large woollen horse-rug should be had in readiness to lay flat upon the parts when the flame has just covered them, or it may burn too long. Any who dare not venture in this way, must, after well shaving, or otherwise removing hair from the sides, wash them thoroughly with very hot (not scalding) water, dry and rub them with a hard brush till they become tender, then apply, as an ointment, one-half on each side:—Croton oil, ½ an ounce; euphorbium and cantharides, each 2 ounces; common turpentine, 6 ounces; lard, or palm-oil, 6 ounces. The lard and turpentine

must be melted over hot water in a pitcher, and the other articles stirred among them as they cool. This must be used upon the sides with considerable friction, fifteen minutes at least being devoted to each. We have seen irritation of the bladder arise from an absorption of cantharides, but never any permanent ill result. Other cheaper stimulating articles may be used, if on that account preferred; their action, however, is not so certain. Such a compound as the following will occasionally act well:—Mustard, ½ pound: spirit of ammonia, 2 ounces; spirit of turpentine sufficient to form a thin paste.

"A seton may be inserted in the dewlap, and each side of the chest, if deemed advisable. The actual cautery may be used by those preferring that mode of irritation; in fact, as the object to be attained is extensive and severe—counter inflammation—it is of little importance what means are resorted to, if but calculated for the purpose. Not any of them should be used until blood-letting has been employed, unless the animal has reached a condition wherein blood-letting would be injurious."

POISONS. The ordinary vegetable poisons with which the farmer's domestic animals are affected are the leaves of the yew tree, the common hemlock, the dropwort, and the water hemlock, sometimes the black henbane, and the wild parsnip. For cattle thus effected, give one pound of Epsom salts in two quarts of water.

In such cases the power of medicine can effect little. The active use of the stomach-pump, injecting and copiously withdrawing

water, is the best mode of proceeding. The symptoms are commonly sudden swelling, thirst, refusal of solid food, grinding of the teeth, pawing, rolling as if in pain from the colic.

POLL EVIL—May arise from either a blow, or undue pressure, such as from too tight reining up, or from the horse hanging back in the stall. This is a disease difficult to cure. The first thing to be done is, to cool the system by bleeding, administering a dose of physic, and the application of cold lotions. If these fail, and the tumour increases, matter is forming, and our plan of operations must be changed. The formation of the matter must be promoted by poultices and warm fomentations, and then a seton must be skilfully introduced by a veterinary surgeon.

PORTER, see ALE.

POTATOES. These roots, according to the analysis of Professor J. F. Johnston, contain in 10,000 parts, as they are carried from the field (*Lec. on Agri. Chem.*, p. 322) :—

	Roots.	Tops.
Potash . . .	40·28	81·9
Soda . . .	23·34	09.
Lime . . .	3.31	129·7
Magnesia . . .	3.24	17·0
Alumina . . .	0.50	0·4
Oxide of iron .	0.32	0·2
Oxide of manganese .	—	—
Silica . . .	0·84	49·4
Sulphuric acid . .	4·40	4·2
Phosphoric acid .	4·01	19·7
Chlorine . . .	1·60	5·0
	82·83	308·4

PRICKED FOOT, see FOOT, DISEASES OF.

PRUSSIC ACID, see ACID.

Q.

QUARTER EVIL, see BLACK QUARTER.

R.

RACE HORSE, THE. *Physic commonly used by Trainers.*—Mr. Darvill, in his work on the "Treatment of the English Race Horse," has given a variety of the prescriptions commonly employed by the trainers. From these I select the following:—

COLD LOTION.

For Kicks, Bruises, &c.

Sal ammoniac, 4 ounces,
Sugar of lead, 1 ounce,
Vinegar, 3 pints,
Water, 1 pint.

PURGES IN THE DISTEMPER.

For a flighty delicate Horse.

1 pint of Castor oil.

For a hearty Horse.

Barbadoes aloes, 2 drachms, dissolved in 4 ounces of warm Water; then add Castor oil, 6 ounces.

For a craving Horse.

As in the last case; using, however, 3 drachms of Barbadoes aloes, and 8 ounces of Castor oil.

RED WATER, see BLACK WATER.

RING BONE—In horses, is an enlargement of the postern joint, caused by undue pressure. The only mode of treatment is, by applying a blister over the ring bone, composed of—

Powdered cantharides, 1 ounce,
Resin ointment, 4 ounces. Mix for use.

RHEUMATISM. *Embrocation for Rheumatism in Dogs:*—

Camphorated oil, 2 ounces,
Spirits of hartshorn, 1ounce,
Laudanum, ½ ounce. Mix for use.

In Cattle, see JOINT FELLON.

ROARING—Is an unnaturally contracted state of the wind-pipe and larynx, arising from a malformation, either from inflammation, undue pressure on the parts, as by too tight reining; the strangles. It is a complaint for which—in the early stages—a blister, bleeding, cooling medicine, may succeed in recovering. It is, however, in confirmed cases, beyond the reach of the veterinary surgeon to effect a cure. It is a complaint always disagreeable to the animals' owners, and yet it is one with which many a valuable horse has been visited.—Eclipse, the most celebrated of race horses, was a confirmed roarer.

ROT. This, as I have in the *Farmers' Encyclopædia* remarked, and from which almost the whole of this article is taken, is a disease in sheep and other animals in which both the liver and lungs are affected, and there is commonly a dropsical tendency. Its ravages

are chiefly, however, confined to sheep, and it is most commonly closely connected with excess of moist food, or placing these animals in low moist situations, every way foreign to their natural habits. For sheep, in a state of freedom, seek the most elevated, dry, and healthy situations—an instinct which long imprisonment and domestication has not yet eradicated. Every farmer is aware with what tenacity his sheep adhere to the very highest portions of a field. It is only when we force them to inhabit low grounds, and situations foreign to their habits, that they thus become diseased. In a state of nature, too, they browse upon the heath plants, and seek with avidity, at certain periods, salt springs and salt exudations; facts which have not entirely escaped the notice of modern flockmasters. Thus the argali, or wild sheep of Siberia, which is the presumed origin of all our domestic sheep, are found about the size of the fallow deer on the immense chain of mountains reaching through the middle of Asia to the Eastern Ocean. They are found in small flocks, ranging over the highest elevations. As the winter approaches, they move downwards into the plains, and exchange their food from the mountain plants to grass and other vegetables. They are so partial to salt that they scoop away the earth in considerable quantities in the neighbourhood of saline places, in order to procure it. All animals, in fact, seek salt with the greatest avidity. The shawl goat of Thibet (*Dr. Macculloch*), the rein-deer of Norway (*Von Buch*), the gyall, or bos fron-

talis of Aracan (*A. B. Lambert*), the horses and mules of Mexico (*Dr. Paris*), the cattle of Buenos Ayres, the merino flocks of Spain, (*Lord Somerville on Sheep*, p. 97,) the sheep of Flanders, whose owners *deem its use an effectual prevention of the rot (Minutes of the Salt Committee*, p. 119),—all are fond of salt; and there is very considerable reason to believe that by the use of this valuable condiment, the ravages of this dreadful disease might either be very materially or perhaps entirely prevented.

Many years since, Ellis, in his *Practical Husbandry*, advised the use of salt, mixed with wort, in which had been boiled sage, penny-royal, wormwood, shepherds' purse, comfrey, &c., as a prevention of the rot; seven or eight spoonsful was the dose once a week after April, whenever the weather was wet.

The symptoms of the rot, and of some of its most decided remedies, have been thus described by Dr. Brown, of Boston, (*Mag. of Nat. Hist.*, vol. v., p. 98) :—"It cannot, I conceive, be demonstrated that, in this disease, the bile is thrown back upon the system, and mingles with the circulating fluid; for in the early stages there is no obstruction to the bile; and in the latter, what little is secreted is intercepted by the flukes on the hepatic side of the gall-bladder. The eye, which some persons take to be an index to the bilious condition the system, has really not that 'tinge of yellow, and jaundiced-like appearance,' at the commencement of the disease. On the contrary, the peculiar whiteness of the eyes is the

first symptom which guides the shepherd to the unwelcome truth. If the bile ducts be carefully examined in the earliest stages of the complaint, there will be found a few flukes in the duct which conveys the bile from the gall-bladder to the intestine, but none in the gall-bladder, and none beyond it, a sound liver, no 'tubercles,' no 'abscesses,' and, withal, a fine fat healthy-looking carcass. If it be in the latest stage when the examination is made, the gall-bladder will be found filled with flukes instead of bile: and the animals will be seen making their way up those channels which convey the bile from the liver to the gall-bladder, arresting it in its course, and pressing forward and enlarging the biliary tubes. Thus, when but few of these animals have possession of this viscus, its function is not materially impaired; the parenchyma, or substance of the liver, is unaltered in appearance; the mucous channels, which convey the bile to the gall-bladder, and from the gall-bladder to the intestines, have not yet felt their presence, and the bile itself is secreted apparently unaltered in quality or quantity; but here, as they live in a medium of perpetual nourishment, they multiply to an extent incredible, and impede the natural action of the liver and subordinate organs of the body. They at length completely block up the conduits of bile, devouring the bile as fast as it is secreted; spreading irritation and disease from the vessels in which they live to the whole mass of the liver itself; and in some instances they carve their way through

the membrane which encircles them, and escape by myriads into the cavity of the abdomen; thus completing the destruction of an important organ, and with it the life of the animal. These extreme states are generally associated with dropsy, and a total degeneracy of the muscular tissue; the blood is deficient in quantity, very serous, and almost destitute of fibrin. A correspondent inquires the class and family of the fluke, in hopes of *finding a remedy* for a disease so fatal. He will find it in the class Vérmes, and order Intestína, and it is the *Cascìola hepática*. Contemplating it, as it is, as a variety of exotic worm, it occurred to me that vermifuges, destructive to other species, might be employed with advantage against this. But in instituting experiments on the living animals, I discarded those popular remedies which have only a mechanical action, and which could never reach the liver, for those which operate by a wider range of influence. What I have observed is, that there are in this class of remedies those which have little or no effect when brought in contact with the living fluke; and there are others which destroy the animal immediately. To the first of those which are inert, belong solutions of vegetable bitters, spirits of tar, and several others which need not be enumerated. To the second, or to those which destroy the animal, belong solutions of mercury, and the spirits of turpentine. For example: a little calomel suspended in water, and dropped upon the animal, quickly deprives it of life; and a drop of the spirits of turpen-

tine kills it in a few seconds. The oil of turpentine is a deadly poison to the fluke. The next consideration is, how far it may be safe to administer this medicine to the living sheep, and what probability there is of its disturbing an animal inhabiting the liver. With regard to the first exception, there can arise no difficulty. The spirit of turpentine is borne readily by children, and has been given to adults in doses of a quarter of a pint; it is likewise applied externally to blistered surfaces, and as a styptic to the bleeding mouths of ruptured blood-vessels. There can be as little doubt with regard to the second exception, when we consider the penetrating nature of this drug; when we know that the mere immersion of the hand in it is sufficient to impregnate the urinary secretion; nor can we doubt that its influence will be acknowledged by an organ approximating and communicating with the stomach, and by the worm inhabiting that organ."

The outward symptoms of this disease were, many years since, well described by Dr. Harrison, of Boston, in Lincolnshire, when he said—"If in warm sultry, and rainy weather, sheep that are grazing on low and moist lands, feed rapidly, and some of them die suddenly, there is reason to fear that they have contracted the rot; this suspicion will be further increased if, in a few weeks afterwards, the sheep begin to shrink, and become placid in their loins. By pressure about the hips at this time a crackling is sometimes perceptible. Now, or soon afterwards, the countenance looks pale, and upon

parting the fleece, the skin is found to have parted its vermilion tint for a pale red, and the wool is easily separated from the felt; as the disorder advances, the skin becomes dappled with yellow or black spots. About this time the eye loses its lustre, and becomes white and pearly, from the red vessels of the *tunica adnata*, and eye lids being contracted or entirely obliterated. To this succeeds debility and emaciation, which increase continually till the sheep die, or else ascites, or perhaps general dropsy supervene before the fatal termination."

Such are the symptoms, and the most powerful known remedies for this disease, an equally important research is its origin, its predisposing circumstances, or immediate cause. In this, however, in common with most other diseases of animal and vegetable life, difficulties occur at every turn of a nature almost entirely inexplicable. We must be content to do little more than merely trace its symptoms, and the course in which it commonly runs. No flock masters are, perhaps, more anxiously alive to the disease, or more often its victims than the owners of the noble water meadows of the south of England, such as those of the vallies of the Kennett, the Itchen, and the Wiltshire Avon. These excellent farmers have noticed that the first crop of spring-water meadow grass never imparts the rot to sheep, but that the *second* crop, which they, therefore, make into hay, is almost certain to do so. They notice also that the worst rotting time is from Midsummer to Michaelmas; that almost all meadow

land, if *chance* flooded in summer, that is if covered by the overflowing of rivers, so as to be covered with their muddy waters is almost certain to rot the sheep. That *gravelly-bottomed water* meadows, like those between Marlborough and Hungerford, *never rot the sheep* fed on them, *in any season or period of the year*. This would appear to confirm the very common suspicion that it is not *the grass* which rots the sheep, but the gaseous or aqueous vapours which emanate from such places, more copiously as the weather becomes warmer in the summer; but then *against* such a conclusion we have the fact, well known to the owners of the water meads, that when sheep are soiled even upon fine dry elevated soils, (such as never render sheep rotten) with the *second* crop of grass from water meads that then the sheep become as equally rotten, as if they had been pastured on the very meads from whence the grass was carried. It would seem, therefore, that there are more watery matters, or other sources of disease, in the second crop than in the first. That the grass of the second crop varies very materially in its chemical composition from that of the first, has been clearly shown by the analysis of the late Mr. George Sinclair. He found that rye-grass (*Lol Perenne*), at the time of flowering, taken from a water meadow that had been fed off with sheep till the end of April, afforded of nutritive matter 72 grains. The same grass from the meadow that had not been depastured in the spring afforded 100 grains. The same weight of this grass, taken from a

rich old pasture that had been shut up for hay about the same time, afforded of nutritive matter 95 grains. That from the rich pasture that had not been depastured, afforded 120 grains.—*Hort. Gram., Wob.*, 384.

And in the great majority of instances the aftermatter of the upland grasses is considerably less rich in nutritive matters than that of their first or spring crop.

Such, then, are the supposed causes, symptoms, and treatment recommended for the cure of this disease. For the cure both turpentine and common salt seem to have sometimes been successfully used; but the effect of salt seems to be much more decided when employed as a *prevention* rather than a cure. It is a curious fact, illustrative of the importance of salt for preserving the strength and health of all animals, that the Russian soldier, who receives no salt but only money to buy it, and neglects to do so, suffers from a disease closely resembling sea scurvy. When sent into the hospital, he is cured by salt. As a prevention, too, the use of aromatic vegetable substances seems to be excellent; it is the kind of prevention also which might be supposed to be efficacious from following the order of nature, and observing the habits of the sheep in their wild state, browsing as they invariably do, upon the aromatic plants, and the shoots of mountain shrubs, and never descending to live upon the rank and watery grasses of the vallies, until compelled by the severity of the weather. Every farmer is aware with what avidity they consume such domestic

herbs, the parsley for instance, as abound in essential oils. An attempt has indeed been recently made to cultivate this herb in the fields as feed for sheep, and I have little doubt that, if some attention was paid to the cultivation of such plants as these (and if the parsley will not bear the browsing of the sheep, they might be occasionally soiled with it) by way of condiment or change, if the flock were allowed at all times and seasons access to common salt, (and this might be mixed if necessary with aromatic substances grateful to the sheep), and, lastly, if some care was taken in supplying them, when feeding on watery plants, with some hay or corn, or oil cake, that then the destruction caused by this melancholy scourge of the flockmaster would be either entirely prevented or very materially reduced.—*Johnson's Farmers' Ency.*

ROUND BONE, SPRAIN OF. Foment the part well frequently with hot water, and afterwards apply a blister. See BLISTER.

ROWELS—Are made by raising the skin between the finger and thumb, making a slit with a lancet or sharp knife, then separating the skin by means of a roweling scissors introduced through the orifice, from the muscular substance underneath for the width of two or three inches, and then inserting into the place thus made some tow smeared with blister ointment, leaving a few shreds of the tow projecting from the place; by this means the matter caused by the irritation of the blister and tow, readily discharges itself; the tow should be changed every day, and in need fresh ointment added.

RUMEN, DISTENSION OF, see FOOD, DISTENSION OF. This is sometimes called *grain sick* or *mawbound.* Rumen is the name given to the paunch or first stomach of ruminating animals.

S.

SADDLE-GALLS, SIT-FASTS, AND WARBLES. Saddle-galls arise commonly on a horse's back from the irregular pressure of the saddle. If it is convenient, the horse should be rested, or the saddle stuffing so managed that all pressure should be removed from the part affected; if neglected, these are apt to degenerate into sitfasts. The wound should then be bathed with vinegar, goulard-water, or brine, which in recent cases will commonly dispel the enlargement; if not, a blister may be applied, and when that has caused it to separate, then dress the place with a little cooling cerate, composed of—

Basilicon ointment, 4 ounces,
Calamine, in fine powder, 1 ounce, to be used twice a-day,

Or some friar's balsam.

For saddle-galls there is perhaps no dressing superior to common salt dissolved in water, and the brine mixed with one-fourth of its bulk of friar's balsam.

SALLENDERS, see MALLENDERS.

SALVE FOR SMEARING SHEEP.—Mr. John Graham, of Newbigging, recommends the following:—

Butter and hog's lard, of each 18 pounds,
Yellow resin, 12 pounds,
Gallipoli oil, 1 gallon; melt them together.

This is sufficient for fifty-five sheep.—*Tran. High. Soc.*, vol. ix., pp. 4 and 244.

SCAB IN SHEEP. This very common disease of sheep has been remarkable for the damage it does to the wool, skin, and flesh of the animal from a very early age. It is perhaps nearest in resemblance to the mange in other animals, and is usually the most prevalent in the summer or spring months. It is a most contagious disease. It has been ascertained that the pustules make their appearance about twelve days after the infection has been communicated. The owner of scab infected sheep can hardly sell them to any one than a butcher, for he must not warrant such to be sound, (see *Man* v. *Parker—Youatt on the Sheep*, p. 537.) It has been clearly shown that the scab is owing to the presence of certain minute insects or *Acari;* to destroy these, and consequently remove the disease, either a mild mercurial ointment or a lotion or wash may be used, in all cases taking care that the application is well and carefully rubbed in.

Mercurial Ointment for Scab.
Quicksilver, 1 pound,
Venice turpentine, ½ pound,
Spirit of turpentine, 2 ounces.

Rub them together in a mortar until the

globules entirely disappear, then melt half a pound of resin and six pounds of (rancid) lard; when nearly cold, add the other ingredients, and stir till cold. Separate the wool from the poll to the tail, and rub the ointment well in, proceeding in the same manner on each side about six inches apart; the quantity to be used is from half an ounce to two ounces: a lamb requires about a third of this quantity; it may be repeated in four or five days. Or the following lotion may be used:—

Lotion for Scab.

Corrosive sublimate, 1 ounce,
Sal ammoniac, 4 ounces,
Spirit of turpentine, 1 pint,
Boiling water, 2 gallons.

Dissolve the sublimate and sal ammoniac in the water, and then add the turpentine; separate the wool, remove the scab, and apply a small quantity of the lotion.

SCOUR IN CALVES, see DIARRHÆA and CALVES.

SCOUR IN LAMBS.—

Astringent Cordial Drink.

Prepared chalk, 2 ounces,
Powdered cannella bark, 2 drachms,
Tincture of catechu, ½ ounce,
Laudanum, ½ ounce,
Water, 1 pint.

Mix them together and give one or two tablespoonfuls for a dose once or twice a day.

SETONS—Are pieces of tape or cord, which by means of a needle are introduced into and allowed to remain in ulcers, or other wounds, from whence it is necessary to keep up a regu-

lar discharge. It is usual to move the string in the wound once or twice a day, and sometimes to wet the string with spirits of turpentine. They are advantageously employed in fistulous withers, or poll evil, but they are too often introduced in cases when the more energetic action of a rowel or a blister would be more advantageous.

SHOULDER LAMENESS, see LAMENESS OF THE SHOULDER.

SLINKING, see MISCARRIAGE.

SOAP OF LINIMENT, see LINIMENT.

SPIRITS OF SALTS, OR MURIATIC ACID, see ACID.

SORE TEATS IN COWS. Before milking bathe the teats well with warm water; after she has been milked, use the following cooling ointment:—

Cooling Ointment for Sore Teats.

Wax, 2 ounces,
Lard, 6 ounces, melt them together and add
Sugar of lead, in very fine powder, 2 drachms; stir till cold.

SPIKE, OIL OF—Is thus prepared—

Spirits of turpentine, 2 pints,
Alkanet root, 1 ounce.

Mix them together in a bottle, and let it stand near the fire to extract the colour, strain it off, and add Barbadoes tar two ounces: mix for use.

SPAVIN BLOOD, see BLOOD SPAVIN.

SPAVIN BONE, see BONE SPAVIN.

SPAVIN BOG, see BOG SPAVIN.

SPLINT. A splint is the consequence of

inflammation of the shank bone, caused by external injuries. Its growth is attended by heat, tenderness, and pain, and generally some degree of lameness; when the inflammation has passed off, the splint becomes like other bone. If it produces lameness, cut the hair off quite close and rub in for three or four nights a little strong mercurial ointment, then blister the part with the blister ointment, and repeat it again if necessary; and when the inflammation from the blister has subsided, turn him out.

SPRAIN OF THE BACK SINEWS.—see BACK SINEWS.

STAGNANT WATER, see WATER.

STAGGERS, see BRAIN, INFLAMMATION OF.

STALING, DIFFICULT. In the horse, give bran mashes, green food, and plenty of gruel. If this treatment fails, take a little blood, and give a mild dose of physic.

STALING, PROFUSE; OR, DIABETES. This disease of the horse is by no means common. It may be treated as follows. Bleed, and give a dose of physic; afterwards give the following astringent:—

Ball for Profuse Staling.

Powdered bark, ½ ounce,
„ opium, ½ drachm,
„ coriander, 2 drachms.
Treacle, sufficient to form a ball.

To be given once or twice a day Green food, if possible, to be given, or a few carrots.

STIFLE LAMENESS. Fomentations of hot water, frequently applied, with a mild dose of physic. The horse must be rested.

STRAINS, see LINIMENT.

STRANGLES. The strangles is a complaint which commonly attacks young horses of about four or five years of age, and most generally in the spring of the year. It commences with a cough, which is not readily distinguishable from a common cough. The principal distinction is, that there is rather more discharge from the nostrils in strangles than in common cough, and a fluid of a soapy nature is discharged from the mouth. A swelling under the throat soon appears, the horse ceases to eat almost entirely, and there is considerable fever.

Give mashes and green food, and apply the following blister to the throat over the tumour:

Blister Ointment.

Powdered cantharides, 1 ounce,
Yellow basilicon, 4 ounces,
Oil of thyme, 2 drachms. Mix for use.

When the tumour has formed, it should be opened with a lancet, and the wound dressed with the following tincture:—

Tincture for Wounds.

Friar's balsam, 2 ounces,
Tincture of myrrh and aloes, 2 ounces. Mix.

When the tumour begins to heal, give a mild dose of physic.

It is not often necessary to give any medicine should much fever exist. At the commencement of the disease give the following balls:—

Fever Balls.

Tartar emetic, 4 drachms,
Powdered nitre, 16 drachms,
Linseed meal, and
Soft soap, sufficient to make four balls.

SULPHATE OF COPPER, see BLUE STONE.

SULPHURIC ACID, see ACID.

SURFEIT—Is a complaint of the skin, which occurs usually in the spring, in horses. Numerous pimples appear on the skin, attended with considerable itching. These come away in a few days, and sometimes, though not often, a sore place follows.

Take away a small quantity of blood, give mashes and green food, and one of the following balls every night:—

Alterative Balls.

Powdered black antimony, 2 ounces,
„ nitre, 2 ounces,
„ resin, 1 ounce,
„ Gentian root, 2 ounces,
Flour of sulphur, 4 ounces,
Soft soap sufficient to make eight balls.

SWELLED LEGS—Commonly occur in the hunter, or the horse kept for pleasure, whose work is irregular. This would, in some degree, point out the natural remedy: regular exercise is the best; this may be assisted by hand-rubbing, and by bandages wrapped rather tightly round the legs. Avoid to the utmost the use of diuretic balls: employ these only when the mechanical means to which I have referred have failed, or that there is a tendency to grease into which the swelled legs are apt to degenerate. See GREASE.

T.

TARES. 1000 parts of the common tare, when dried in the sun, contain, according to Professor Johnston:—

	Seed.	Straw.
Potash	8·97	18·10
Soda	6·22	0·52
Lime	1·60	19·55
Magnesia	1·42	3·24
Alumina	0·22	0·15
Oxide of iron	0·09	0·09
Oxide of manganese	0·05	0·08
Silica	2·0	4·42
Sulphuric acid	0·50	1·22
Phosphoric acid	1·40	2·80
Chloride	0·43	0·84
	22·90	51·01

TARTARIC ACID, see ACID.

TEMPERATURE, see ATMOSPHERE.

THICK WIND—Is very often a defect in fat, coarse-bred, round-chested horses. Large dray horses, and those worked when their bellies are full, are apt to be thick-winded. It often occurs that thick wind ends in broken wind. The best treatment of thick-winded horses is, to feed them with moderation; to give them green food occasionally; and to let them have as much gentle continued exercise as possible.

THOROUGH PIN—In horses, is a well-known swelling above the hock, which arises from the enlargement of certain little bags, which contain the fluid for lubricating the

joints. These sometimes attain a considerable size, and then lameness follows. The best treatment is to apply a blister.

TICKS OR LICE IN SHEEP. The variety of louse, the *hipobasca ovina*, is a small parasite peculiar to the sheep. It is most common in sheep out of condition, and of these in lambs and hog sheep.

The *Sheep Tick* is another parasite which annoys the sheep; but much larger and less numerous than the sheep louse.

Both the lice and ticks may be readily removed by the careful application of the following wash :—

Sheep Wash.

Powdered arsenic, ½ pound,
Soft soap, 7 pounds,
Soft water, 4 gallons.

Boil for fifteen minutes, or till the arsenic is dissolved, and add as much soft water as will be sufficient to dip fifty to seventy sheep. The quantity of arsenic, as generally recommended, is too large, there not being sufficient alkali to hold the arsenic in solution, whereby many sheep are frequently lost in dipping.

TINCTURES :—

Tincture of Myrrh—Is thus prepared :

Gum myrrh, bruised, 3 ounces,
Rectified spirit of wine, 20 ounces,
Soft water, 10 ounces.

Let it stand fourteen days in a bottle, occasionally shaking the mixture, then filter it for use.

Compound Tincture of Rhubarb—

Rhubarb root, sliced, 2 ounces,
Liquorice root, sliced, ½ ounce,
Ginger root, sliced, 2 drachms,
Saffron, 2 drachms,
Rectified spirits of wine, 8 ounces,
Soft water, 20 ounces.

Let it stand fourteen days, occasionally shaking it; then filter for use.

Tincture of Opium, or Laudanum—

Opium, 2½ ounces,
Rectified spirits of wine, 1 pint,
Soft water, 1 pint.

Let it stand fourteen days, occasionally shaking; then filter it for use.

Tincture of Myrrh and Aloes (compound,) see ALOES.

TONIC BALL, see BALL.

TREAD, see FOOT, DISEASES OF.

TURNER'S CERATE—Is thus made—

Yellow wax, ½ pound,
Olive oil, 1 pint.

Melt them together. When it begins to set, add half a pound of calamine, in fine powder.

TURNIPS. There is no doubt but that turnips, like most other vegetable substances, vary in their chemical composition, with the soil on which they are produced and the manure with which they are dressed. Thus, the farmers of Lincolnshire have found turnips produced from lands dressed with crushed bones to be peculiarly nutritive. Some roots produced in the ordinary way, as carried from the field, according to Professor J. F. Johnston (*Lec. Agri. Chem.*, p. 322), contain in 10,000 lbs.—

	Roots. lbs.	Leaves lbs.
Potash	23·86	32·3
Soda	10·48	22·2
Lime	7·52	62·0
Magnesia	2·54	5·9
Alumina	0·36	0·3
Oxide of iron	0·32	1·7
Oxide of manganese	—	—
Silica	3·88	12·8
Sulphuric acid	8.1	25·2
Phosphoric acid	3·67	9·8
Chlorine	2 39	8·7
	63·3	180·9

It is well known that the turnip, like other plants, contains considerable portions of saline and earthy matters. Professor J. F. Johnston has shown (*Quar. Jour. Ag.*, March, 1844,) that 1000 parts of the turnip contain from 8 to 10 parts; carrots, 10; clover hay, 90; meadow hay, 60 to 100; and rye-grass hay, 95 parts of these substances. He has further compared the chemical composition of these solid matters of the Swede turnip with the soil on which they were produced. (*Far. Mag.*, vol. xx., p. 610.) The following table gives the composition of each:—

	Turnips.	Soil.
Chloride of potassium	5·42	0·02
Sulphate of potash	31·37	0·87
Phosphate of potash	5·72	—
Carbonate of potash	24·39	0·11
Phosphate of magnesia	1·05	—
Phosphate of alumina	6·06	6·45
Phosphate of lime	2·64	—
Carbonate of lime (chalk)	10·97	0·29
Oxide of manganese	8·70	0·22
Silica	1·32	78·99
Organic matter	—	6·24
Water	—	6·61

TURNSICK, or GOGGLES, or GIDDY, or DUNT. "This," says Mr. Cleeve, (*Jour. Royal Ag. Soc.*, vol. i., p. 296) "is a complaint of the head, affecting sheep more than lambs. It usually appears when the sheep is about attaining its first year, though it is by no means confined to that age. It proceeds from the presence of hydatids in the brain. They are lodged in a sac or bladder, filled with a watery fluid, and the pressure of this bladder on the brain occasions the peculiar symptoms by which the complaint is recognised. The affected sheep has a wandering, staggering, and insecure appearance; he carries his head on one side, and hence has difficulty in feeding; he appears absent in mind, and has a circuitous walk, resembling a horse while being lunged. There is an important distinction to be noticed between the symptoms of this complaint and the general indications of cerebral disease. Occasionally the sheep may be properly called delirious. An unnatural wildness, at times almost amounting to ferocity, appears to govern the animal's movements; but here a heavy dull languor is the first apparent symptom. The disorder is slow in its progress, the patient languishes on for many days, and even weeks, and at length dies as if pining away from a low and diseased condition of the system. The eyes are usually prominent. When the animal is driven he takes the circular route I have described. The complaint is not, even in its advanced stages attended by violence or extreme agitation, but rather by an increasing and settled depression

of spirits. It is more frequent in wet lands than in high pastures, and especially in undrained soils.

"It is sufficiently obvious from the description of the symptoms that the disease is beyond the reach of medicine. The brain in all the animal creation is very destitute of absorbent vessels, and were it otherwise, it would be difficult to promote the absorbent action by medicine in this case, because the fluid is contained in a closed crust, and is part of the living animal. Hence, the farmer has been led, but with little success, to the adoption of such unusual means for the purpose of opening the vesicle containing the hydatid, and thereby removing the pressure of the fluid in the brain. I have no hesitation in saying that in the few instances in which the rude operations employed for this purpose have been successful it is to be attributed more to accident than to skill. If it were possible to ascertain with certainty the exact position of the vesicle the operation of trepanning might be safely resorted to. Mr. Smith of Southam is said to have repeatedly performed this operation successfully. It is to be done by making two incisions, so as to form, when united, the letter T over the somewhat softened part of the skull, supposed to cover the hydatid. Turning the angles of the skin back by dissecting them from the bone, the latter is now to be pierced by a trephine, and the crust of bone removed. This done, the brain will be exposed and the hydatid, if at the part, will rise up covered with the dura mater; this

must also be cut through and turned back, and the parasite punctured with a fine curved needle conveying a thread. As soon as it has shrunk up it may be gently drawn away by means of the thread, and the dura mater and skin replaced over the part, the edges of the latter being held together by a stitch or two, and covered with a cap. The portion of the bone must not be returned. A very rude, and although I have practised it myself, I must say cruel operation, allied to the trepanning principle, has sometimes, though rarely, proved useful. It is called wiring, and consists in passing a wire or knitting needle up the nostril and through the perforated plate of the ethmoid bone into the brain. This is no certain or easy task, for although the passage is straight it is narrow, and if the needle deviates from its path in a very slight degree it will be stopped by a projection of the frontal bone from above, or the solid portion of the ethmoid bone below. But assuming that the perforation is effected, its success must depend on the position of the vesicle, for if it should happen to be situated too superficially or too deeply, or in fact any where out of the direct line of the needle, it will not be punctured, and of course the fluid not being removed the pressure on the brain will continue, while the puncturing is of itself likely to occasion fatal inflammation.

"Other attempts of a mechanical nature have also been made, but with yet more doubtful results, and scarcely more humane in their character. Some farmers have cut off the ears

after severely wringing them, others have dogged the animal, and worried it to exhaustion. The principle of those and similar barbarous and general experiments is to create that violent and convulsive struggling in the animal that may perchance rupture the vesicle wherever situated, a disgraceful and generally useless mode of treatment.

"It is probable that in a very large majority of cases where recourse has been had to those violent remedies immediate death has followed, even when the vesicle has been broken. I can only recommend prevention instead of surgical operation, by selecting, as far as possible, dry and well-drained pasturage, and paying careful attention to the choice of breeding stock. It is considered by well-informed men that the disease is far less prevalent than formerly, and its decline has been attributed to the great improvement in our agricultural system, that has, under the patronage of influential men, been made of late years. *Sturdy* is a name often given to this disease, as well as to water in the head. There is no question, however, that the two complaints are distinct, and proceeding from different causes, though affecting, as they do, the same organ, many of the symptoms well correspond. Some degree of difference, however, is to be found in the degree of rapidity with which the disorder advances. Water in the head will sometimes continue for many months before it terminates fatally; but the turnsick, or goggles, properly so called, will occasionally carry off the sheep in a very few weeks."

TURPENTINE, HORSE TURPENTINE—Is thus prepared—

Yellow resin, 18 ounces,
Spirit of turpentine, 8 ounces.

Dissolve by a gentle heat in an earthen pipkin.

TURPENTINE, VENICE.

Black resin, 16 ounces,
Spirit of turpentine, 9 ounces.

Melt by a gentle heat in an earthen pipkin.

U.

ULCERS. Bathe twice or three times a day with a solution of chloride of lime, and use the following ointment :—

Yellow basilicon, 4 ounces,
Powdered verdigris, ½ ounce; rub them together for use.

URINE. The urine of the domestic animals of the farm yard is that of the horse, the cow, the sheep, and the pig. These differ materially in composition, as may be seen from the results of the following analysis. The urine of the horse is composed of—

Water and mucus . .	94·0 parts.
Urea . . .	0·7
Carbonate of lime (chalk) .	1·1
Carbonate of soda . .	0·9
Benzoate of soda . .	2·4
Muriate of potash . .	09· = 100

The following are the constituents of that of the cow—

Water . . .	65·0 parts.
Urea	4 0
Phosphate of lime . .	3·0
Muriates of potash and ammonia	15·6
Sulphate of potash . .	6·0
Carbonates of potash and ammonia . . .	4·0
Loss	3·0 = 100

100 parts of the urine of sheep kept at grass contained—

Water . . .	96.0 parts.
Urea, albumen, &c. . .	2·8
Salts of potash, soda, lime, and magnesia, &c. . .	1·2 = 100

The urine of the pig has been examined by Dr. Sprengel (*Journ. Roy. Agr. Soc.* vol. i., p. 492): he found, in 100 parts that of the animal fed on corn, and offal—

Water . . .	92·6 parts.
Urea, mucus, albumen, &c. .	5·64
Common salt, muriate of potash, gypsum, chalk, and glauber salt	1·76 = 100.

V.

VENTILATION, see ATMOSPHERE.

VICES. The vices of horses are treated of by Professor Youatt, in his valuable treatise on the *Horse*, p. 330.—he says of them very truly, "Some of them may be attributed to natural temper, for the human being scarcely discovers

more peculiarities of habit and disposition than does the horse. The majority of them, however, as perhaps in the human being, are consequences of a faulty education. Their early instructor has been both ignorant and brutal, and they have become obstinate and vicious." The chief vices of horses are restlessness, gibbing, or backing, biting, kicking, getting the check of the bit into the mouth, unsteadiness in mounting, rearing, running away, dislike of being cleaned or shod, bolting food, crib-biting, wind-sucking, cutting, not lying down, over-reaching, pawing, quidding, rolling, shying, slipping the halter, tripping, weaving.

VINEGAR, OR ACETIC ACID, see ACID. Vinegar may be easily and cheaply made by attention to the following directions:—Add one pound of course brown sugar to each gallon of water; boil them together, taking off the scum; when that ceases to rise, pour off the liquor; and when it has cooled down to the same temperature as beer in the process of brewing, throw in a piece of hot toasted bread spread with yeast. In twenty-four hours, put the whole into an iron-hooped barrel, placed near the fire: or in summer, where it may have the sun the greater part of the day. The barrel must not be bunged up; only place a tile, or anything else that will keep out dust and insects, over the bung-hole. In three months, or sometimes less, the vinegar will be clear and fit for use; it should then be bottled off, and the longer it is kept in bottle the better it will be.

W.

WARBLES—Are the little tumours which arise on horses from the undue pressure of the saddle. They may usually be removed by fomenting them frequently with hot water, and applying a lotion as soon as the tenderness has abated, composed of—

Strong vinegar, 1 pint,
Rectified spirit of wine, 2 ounces,
Extract of goulard, 1 ounce,
Spirit of turpentine, 1 ounce; mix them together for use.

WARTS—Are little tumours which arise from the cutis or outer skin in the first instance, but by age and enlargement they become attached to the inner or true skin. Cut them off close with a pair of scissors, and touch the roots with lunar caustic. I have sometimes destroyed them by bathing the wart night and morning with a feather dipped in strong acetic acid, but this is a more tedious operation.

WARRANTY. A warranty may be either written or verbal. (*Cave* v. *Coleman*, 3 *M.* & *R.*, 2. *Button* v. *Larder*, 7 *Taunton*, 405.) A written warranty is usually given in the following form:—"Received of A. B. fifty pounds, for a Bay Gelding, warranted only four years old, sound, free from vice, and quiet to ride and drive.—C. D." The seller of a horse may warrant him sound for a limited period only, and perhaps it may be be prudent to do so in all cases; thus he may add—"This warranty will remain in force only until twelve of the clock at noon of the next day after the day of sale,

when the sale will become complete, and the responsibility of the seller will terminate, unless in the meantime a notice to the contrary is sent by the purchaser to the seller." (*Bywater* v. *Richardson*, 3 *N. & M.*, 748.) And it may be well to add—"Accompanied with the certificate of a veterinary surgeon. Such certificate to set forth the cause, nature, or description of any alleged unsoundness." (*Smart* v. *Hyde*, 8 *M. & W.*, 723.) In the case of *Bywater* v. *Richardson*, Lord Denman remarked—"The situation of the purchaser is the same as if the seller had said to him, by word of mouth, I will not warrant this horse to you for a longer period than twenty-four hours. This the seller was perfectly warranted in doing. It may be prudent to make such a condition of sale. The case of *Bagehole* v. *Walters* (3 *Campbell*, 154) is applicable. There a ship was sold with all her faults, and it was held that it was quite immaterial how many faults belonged to it *within the knowledge of the seller*, unless he used some artifice to prevent their discovery. Here the horse is sold with all faults, except such as shall be discovered within a limited period." The term "sound" in a warranty of a horse or other animal implies the absence of any disease, or seeds of disease, in the animal at the time, which actually diminishes, or the progress of which would diminish, the animal's natural usefulness in the work to which it would properly and ordinarily be applied. (*Kiddell* v. *Burnard*, 9 *M. & W.*, 668.) In this case Baron Parke observed—"The rule I laid down in *Coates* v.

Stevens (2 *M.* & *Rob.* 137) is correctly reported, and I am there stated to have said, 'I have always considered that a man who buys a horse warranted sound, must be taken as buying him for immediate use, and has a right to expect one capable of that use, and of being immediately put to any fair work the owner chooses. The rule as to unsoundness is, that if at the time of the sale the horse has any disease, which either actually does diminish the natural usefulness of the animal, so as to make him less capable of work of any description, or which in its ordinary progress will diminish the natural usefulness of the animal; or if the horse has, either from disease or accident, undergone any alteration of structure, that either actually does at the time, or in its ordinary effects will diminish the natural usefulness of the horse, such horse is unsound. If the cough actually existed at the time of the sale, as a disease, so as to diminish the natural usefulness of the horse at that time, and to make him less capable of immediate work, he was then unsound. Or if you think the cough, which did afterwards diminish the usefulness of the horse, existed at all at the time of the sale, you will find for the plaintiff. I am not now delivering an opinion formed on the moment on a new subject; it is the result of a full previous consideration.' That is the rule I have always adopted and acted on in cases of unsoundness, although, in so doing, I differ from the contrary doctrine laid down by my Brother Coleridge, in *Bolden* v. *Brogden* (2 *M.* & *Rob.*, 113). (Justice

Coleridge there ruled that a disease which was not calculated permanently to render the horse unfit for use, or permanently to diminish his usefulness, but which, with ordinary care, would soon be cured, did not amount to an unsoundness, so as to constitute a breach of the warranty.) I think the word sound means what it expresses, namely, that the animal is sound and free from disease at the time he is warranted to be sound. If, indeed, the disease were not of a nature to impede the natural usefulness of the animal for the purpose for which he is used; as, for instance, if a horse had a slight pimple on his skin, it would not amount to an unsoundness; but even if such a thing as a pimple were on some part of the body, where it might have that effect, as, for instance, on a part which would prevent the putting a saddle or bridle on the animal, it would be different. An argument has, however, been adduced from the slightness of the disease and the facility of cure, but if we once let in considerations of that kind, where are we to draw the line? A horse may have a cold, which may be cured in a day, or a fever, which may be cured in a week or a month, and it would be difficult to say where to stop. The opinion which we now express is the result of deliberate consideration." If a person warrants a horse to be sound (and the cases in general apply to all other animals, whether sold in a fair or market, or by private contract), he does it at his own peril, whether he knew the horse to be sound or not. (*Anon Lofft*, 146.) And he is bound by what his servant or agent

says at the time of the sale (*Helyear* v. *Hawke*, 5 *Espinasse*, 52), who has an implied authority to warrant (*Alexander* v. *Gibson*, 2 *Campbell*, 555), and even if a horsedealer's servant was told expressly by his master not to do so; but a person, not a horsedealer, is not bound by the forbidden act of his servant (*Scotland* v. *Watson*, 1 *Dowling*, 45), and the warranty must be given at the time of the sale, and is not binding if merely given by the servant employed to deliver the horse. (*Woodin* v. *Burford*, 2 *C. & M.*, 391.) In this case Judge Bayley remarked—"What is said by a servant is not evidence against the master, unless he has some authority given him to make the representation, and the question in this case is whether there is reasonable ground for inferring such authority. There had been already a bargain made between the parties to this action. It seems to me that, although a warranty given by a person entrusted to sell *prima facie* binds the principal, yet the warranty of a person entrusted merely to deliver is not *prima facie* binding on the principal, but an express authority must be shown." An infant, of course, cannot warrant. (*Howlett* v. *Halsewell*, 4 *Campbell*, 118. *Green* v. *Greenbank*, 2 *Marshall*, 485.) A verbal representation of the seller to the buyer of a horse, in the course of dealing, that he "may depend upon it, that the horse is perfectly quiet, and free from vice," is a warranty (*Cave* v. *Coleman*, 3 *M. & R.*, 2.) In this case, in the course of conversation, at the dealing for the horse, the seller made use of those words, and the bargain

was afterwards struck, without any warranty being given, either by parol or in writing. Lord Tenterden observed, "The parties are dealing, and the seller says, 'You may depend upon it, that the horse is perfectly quiet, and free from vice.' That is a sufficient warranty, though the word *warrant* was not used." Or that "he could warrant." (*Button* v. *Carder*, 7 *Taunton*, 405.) If the seller says at the time of the sale, "I never warrant, but the horse is sound as far as I know," this is a qualified warranty, and the purchaser may maintain an action, if he can show that the horse was unsound to the knowledge of the seller. In this case Lord Tenterden remarked, "If a man says, when he sells a mare, 'she is sound, to the best of my knowledge, but I will not warrant her,' and it turns out that the mare was unsound, and that he knew it, I have no doubt but that he is answerable." (*Wood* v. *Smith*, 4 *C.* & *P.*, 45.) But a warranty does not extend to manifest and visible defects. (*Margetson* v. *Wright*, 5 *M.* & *P.*, 606.) In this case, which related to the race horse Sampson, Chief Justice Tindal remarked—"Two subjects which might or might not have been the ground work, or have become a source of unsoundness, namely crib-biting, and a splint on the off fore leg, were discussed by the parties at the time of the bargain, and after that discussion the warranty in question was given. It is laid down in the older books, that where defects are apparent at the time of a bargain, they are not included in a warranty, however

general the terms may be, because they can form no subject of deceit or fraud. If a person purchase a horse, knowing it to be blind, he could not sue the seller on a general warranty of soundness, although he had warranted the animal to be sound in every respect." In this case, however, it was decided that a splint is an unsoundness (8 *Bingham*, 457), and that the defendant having warranted a horse sound at the time of the contract, and the horse having afterwards become lame from the effects of a splint although visible when the defendant sold him, that he was liable on his warranty.

Bone spavin in the hock is unsoundness in a horse, and therefore is a breach of a warranty of soundness, whether it produces lameness apparent at the time of the warranty or not, and though it may not produce lameness for years after. (*Watson* v. *Denton*, 7 *C. & P.*, 85.)

Professor Youatt (*on the Horse*, p. 359) gives the following opinion on the various common sources of unsoundness in horses. He is of opinion that *broken knees* "do not constitute unsoundness after the wounds are healed." *Capped hocks*, "if in consequence of a sprain of the hock, and accompanied by enlargement of it, unsoundness." *Contracted feet*, "a horse must not be pronounced unsound because his feet are contracted, for many horses, with strangely contracted feet are never lame." *Corns* "manifestly constitute unsoundness." *Cough*, "this is a disease, and consequently unsoundness." *Roaring*, *wheezing*, *whistling*, *high blowing*, *grunting*, and *broken wind*, "decidedly

unsoundness." *Crib-biting*, "unsoundness, although there is some difference of opinion on this point." *Curb*, "unsoundness while it lasts." *Cutting*, "unsoundness, some doubt, however, exists on this subject." *Enlarged hock*, "unsound." *Lameness*, "from whatever cause arising is unsoundness." *Pumiced foot*, "unsoundness." *Quidding*, "unsoundness." *Quittor*, "unsoundness." *Ringbone*, "unsoundness." *Sand crack*, "is manifestly unsoundness," *Spavin*, "is unsoundness." *Blood spavin*, "unsoundness." *Stringhalt*, "cannot be termed unsoundness." *Thorough pin*, only when "accompanied with lameness, unsoundness." *Thrush*, "inclined to think thrush unsoundness, but the decisions have been much at variance, or perfectly contradictory." *Wind galls* "constitute unsoundness only when they produce lameness."

Proof that a horse is a good drawer, will not satisfy a warranty that he is "a good drawer, and pulls quietly in harness." (*Coltherd* v. *Puncheon*, 2 *D.* & *R.*, 10.) In an action on a warranty of a horse, the plaintiff must positively prove that the horse was unsound. (*Eaves* v. *Dixon*, 2 *Taunton*, 343.) The Court remarked, "It is not sufficient to give such evidence as to induce a suspicion that the horse was unsound, the purchaser must positively prove that the horse was unsound at the time of the sale." And this is a question entirely for the jury to determine (*Lewis* v. *Peake*, 7 *Taunton*, 153), even a temporary lameness, if it renders a horse less fit for service, is a breach of a warranty of soundness

(*Elton* v. *Brogden*, 4 *Campbell*, 281), but roaring is not unsoundness, unless it proceed from disease, or some organic defect (*Bassett* v. *Collis*, 2 *Campbell*, 523. *Onslow* v *Eames*, 2 *Starkie*, 81), a nerved horse is unsound (*Best* v. *Osborne*, *R. & M.* 290), but crib-biting is not (*Broennenburg* v. *Haycock*, *Holt*, 630), defective formation, or badness of shape, which has not produced lameness at the time of the sale of a horse, although it may render him more liable to become lame at some future period; e. q. "Curby Hocks" is not an unsoundness (*Brown* v. *Elkington*, 8 *M. & W.*, 132), neither is malformation, as from turning out one of his fore legs as to be incapable of work to any extent, without cutting so as to produce lameness, unsoundness. (*Dickinson* v. *Follett*, 1 *Moody & Rob.*, 299.) In this case Baron Alderson remarked, "A horse cannot be considered unsound in law merely from badness of shape. As long as he was uninjured he must be considered unsound. When the injury is produced by the badness of his action, that injury constitutes the unsoundness." The goggles in sheep are an unsoundness (*Joliff* v. *Bendell*, *R. & M.*, 136), and any fraud in the sale of a warranted horse will avoid it, although it does not amount to a breach of the warranty. In this case Judge Boroughs told the jury, "If there is fraudulent representation at the time of the sale, it invalidated the contract, no matter whether it was a breach of the contract or not." (*Steward* v. *Cosvelt*, 1 *C. & P.* 23.) Upon the discovery that a horse warranted sound is unsound, the horse should be ten-

dered back, on behalf of the purchaser, to the seller, of course, by a disinterested witness. If the horse is returned the measure of damages is the price paid for him. If the horse is not returned the measure of damages is the difference between his real value and the price given for him. If the horse is not tendered to the seller, the purchaser cannot recover any damages for the expenses of his keep. (*Caswell* v. *Coare*, 1 *Taunton*, 566.) In this case Chief Justice Mansfield remarked, "The contract being broken the seller must give back the money, and the purchaser must return the horse; but, unless the purchaser has previously tendered him, he cannot recover for the keep, because it was not the seller's fault that the purchaser kept him. When the warranty was broken the plaintiff might instantly have sold the horse for what he could get, and might have recovered the residue of the price in damages." But although it is desirable, in most cases, to return the unsound animal bought with a warranty to the seller, it is not essential to the recovery of the damages that he should do so, nor even, it seems, that he should give the seller notice of the unsoundness. In the case of *Pateshill* v. *Tranter* (3 *A. & E.*, 103) the horse was purchased in November, and notice of the horse being unsound was first sent to the seller by the purchaser in the following July, and yet the Court held that the purchaser was entitled to recover damages of the seller, and it was no answer to the purchaser's claim that the horse was not returned to the seller. Lord

Loughborough remarked very truly, in a case in which this point was decided, "No length of time elapsed after the sale will alter the nature of a contract originally false." (*Fielder* v. *Starkin*, 1 *H. Bl.*, 17.) If a person has bought a horse with a warranty, which has been broken, and he tenders the horse back to the seller, who refuses to receive it, the buyer is entitled to keep the horse a reasonable time, till he can fairly sell it, and may recover against the seller for keeping the horse during that time. (*Ellis* v. *Chinnock*, 7 *C. & P.* 169.) In this case Justice Coleridge remarked to the jury, "With respect to the keep of the horse, I am of opinion that, if a person has bought a horse with a warranty, which has been broken, and he tenders the horse to the seller, and the seller refuses to receive it back, the buyer is entitled to keep it a reasonable time till he can sell it, and for that time he may, against the seller, recover the expense of keeping it; but he must not keep it as long as he chooses. All that he is allowed to do, is to keep it for a reasonable time till he can fairly sell it."—*Johnson & Shaw's Farmers' Almanac*, vol. i., p. 380.

WATER—Is composed by weight of oxygen 8 parts, and hydrogen 1 part. The quality of the water and the quantity with which live stock are supplied with it, are questions much too commonly disregarded. For horses the softest water is the best, and he should be allowed to drink at least three times a day. In a state of nature he always chooses the softest waters; and when water is constantly by him,

he drinks, it has been clearly ascertained, less than when he is allowed it only at considerable intervals. When travelling, he should be often allowed water, a quart or two at a time, according to the weather and the pace he is driven at. For cattle, and indeed for all domestic animals, the water can hardly be procured too soft and clean.

And yet, in practice, how commonly is the watering of live stock disregarded. Notice the ponds, or rather cesspools, saturated and putrefying with all kinds of organic matters, to which many a poor animal has only access in a field, or in a farm yard!—places into which all the drainage of the enclosure has access, and which is so approaching in quality to liquid manure that its owner perhaps is seriously considering the expediency of carting it on to his land, or pumping it on to his compost heaps. Consider, I say, these things, and then ask yourself whether a better supply of more wholesome water cannot be readily obtained for your live stock than such water as this? When speaking of the farmers' management in these matters, Professor Youatt observes, in his valuable work on the *Horse*, p. 359—"He lets his horses loose morning and night, and they go to the nearest pond or brook and drink their fill, and no harm results; for they obtain that kind of water which nature designed them to have, in a manner prepared for them by some unknown influence of the atmosphere, as well as by the deposition of many saline admixtures. The difference between *hard* and *soft* water is known

to every one. In hard water soap will curdle, vegetables will not boil soft, and the saccharine matter of the malt cannot be fully obtained in the process of brewing. There is nothing in which the different effect of hard and soft water is so evident as in the stomach and digestive organs of the horse. Hard water, drawn fresh from the well, will assuredly make the coat of a horse unaccustomed to it stare, and it will not unfrequently gripe and otherwise injure him. Instinct or experience has made even the horse himself conscious of this, for he will never drink hard water if he has access to soft; he will leave the most transparent and pure water of the well for a river, although the water may be turbid, and even for the muddiest pool.* He is injured, however, not so much by the hardness of the well-water as by its coldness—particularly by its coldness in summer, and when it is many degrees below the temperature of the atmosphere. The water in the brook and the pond being warmed by long exposure to the air, as well as having become soft, the horse drinks freely of it without danger.

"If the horse were watered three times a-day, and especially in summer, he would often be saved from the sad torture of thirst, and from many a disease. Whoever has observed the eagerness with which the over-worked

* Some trainers have so much fear of hard or strange water, that they carry with them to the different courses the water that the animal has been accustomed to drink, and that they know agrees with it.

horse, hot and tired, plunges his muzzle into the pail, and the difficulty of stopping him until he has drained the last drop, may form some idea of what he had previously suffered, and will not wonder at the violent spasms, and inflammation, and sudden death, that often result.

"There is a prejudice in the minds of many people against the horse being fairly supplied with water. They think that it injures his wind, and disables him for quick and hard work. If he is galloped, as he too often is, immediately after drinking, his wind may be irreparably injured; but if he were oftener suffered to satiate his thirst at the intervals of rest, he would be happier and better. It is a fact unsuspected by those who have not carefully observed the horse, that if he has frequent access to water he will not drink so much in the course of the day, as another who, to cool his parched mouth, swallows as fast as he can, and knows not when to stop.

"On a journey a horse should be liberally supplied with water. When he is a little cooled, two or three quarts of water may be given to him, and after that his feed. Before he has finished his corn two or three quarts more may be offered. He will take no harm if this be repeated three or four times during a long and hot day.

"It is a judicious rule with travellers, that when a horse begins to refuse his food, he should be pushed no farther that day. It may, however, be worth while to try whether this

may not proceed from thirst, as much as from exhaustion, for in many instances his appetite and his spirits will return soon after he has partaken of the refreshing draught."

The trainers of horses are well aware of the great importance of the most careful attention to the watering of these noble animals. Mr. Darvill, in his excellent work "on the Training, &c., of the English Race Horse," remarks, vol. i., p. 101—

"Soft, fresh, wholesome, pure, rain, river, or pond water, is, of course, the most proper for horses; but the last mentioned being a stagnant water, should not be used, unless it be on a clear, clay, or chalk bottom. On such surfaces it is not likely to ferment from the heat of the weather. Pond-water, when thus tainted, should not be given to any animal.

"All that may be necessary for me to mention, for the information of grooms, in regard to the properties of water beyond that of quenching the thirst of horses is, that it cools the habit, dilutes the blood and fluids of the body, promotes the natural secretions, and assists digestion.

"Water is never to be given to craving horses in training, immediately before their food, nor immediately after. Horses of a delicate constitution, which feed very sparingly, may be allowed to drink almost at any time they like. Craving horses eat a great quantity of food; water given to them immediately after, occasions the grain to swell, and this produces a distension of the stomach, weakens its

contracting powers, and thereby retards the process of digestion. Nor should water be given them immediately before or after their work; it is never done by good training grooms.

"If the day is wet, and the groom is obliged to water his horses in the stables, whether in the morning or the evening, the water should be given them just before they are stripped to be dressed, which is an hour before they feed; nor are they, when at exercise, to be watered on the heath until the strongest of their work is got into them; they are to be walked for an hour or more, or until they are perfectly cool, before they go to the troughs to drink.

"The water on the premises of a racing, or any other establishment, is mostly well or spring water; and, whether hard or soft, it is generally made use of for the horses, unless it is observed to be in any way detrimental to their health, which declares itself by their becoming chilly, trembling, or perhaps a little griped after taking it. To prevent hard water from producing these bad effects, it should first be put into the troughs in the yard, with some clay and chalk to soften it, and during the day, the lids of the troughs should be left up, so as to expose the water to the heat of the sun.

"When the horses are kept in the stables from other causes than from the wetness of the day, whether in summer or in winter, such water as I have made mention of, should never be given them cold from the pump or well. It should be taken from the troughs, and mixed with hot water, and given to them chilled.

"A common wooden bowl, capable of containing about two quarts, with a handle to it, is as convenient a vessel as any for the purpose of taking the water out of the boilers, troughs, or cisterns, at the time of mixing it in the buckets.

"In the heat of summer, if it has been exposed to the sun, or kept in the buckets in the stable for some hours, it will not, of course, require to be so much chilled as in winter.

"When horses are out at walking exercise in winter, it is certainly preferable (unless the season be very mild) to let them have their water, as I have just observed, with the chill off. It can be got ready by the boys who remain in, and the horses may be walked up to the stable door to be watered.

"Craving horses, and light delicate ones, should be watered often in the course of the day; the former should be thus watered, with a view to bring them to drink more moderately, and the latter, with a view, if possible, to induce them to drink more liberally. Those last mentioned, as they are at all times clear in their wind, may have some oatmeal or bran mixed in their water, as an inducement for them to drink. A craving horse eats a great quantity of food; he therefore requires a larger quantity of water to assist in the digestion of it; and if such a horse were watered only twice in the course of a day, he would (if allowed to do so) drink an immense quantity at each time. Another reason for this horse's drinking more water than any other is, that when he is

in training, he is mostly in strong work, and often sweating; and from these causes he becomes more thirsty. The best way to water such a horse, (in the *early* part of his condition, but not otherwise) is, to give it to him often and in small quantities, which is the most likely to bring him to be a more moderate drinker. If he stands in a box, it would be a good plan to leave a bucket of water with him, (unless immediately before or after either sweating or running); it may easily be judged what quantity he has taken, and if it is observed that he has emptied the bucket but a short time before he goes out to exercise, it is only to let him be at walking exercise for a longer period before he takes his gallop, and not to let his gallop be quite so severe; but this experiment is only to be tried in the *early* stage of his condition.

"The light delicate horse is, in almost all respects, the very reverse of the craving one; he eats and drinks but sparingly, can take but little work in training, and is so very delicate that he seldom or ever has to sweat; and from fifteen to five-and-twenty, or thirty go-downs is as much as many horses of this description will drink during the whole day.

"On all occasions, the greatest care should be taken not to let a horse of this class become alarmed. If at any time he gets frightened in his exercise, or is bullied, by the boy not being sufficiently patient with him, he will most likely not drink when he comes to the trough, but will stand with his head up, staring and

looking wildly about him. A horse of this sort should be tried with some water as soon as he goes into the stable, and as I have before observed, as an inducement to him to drink, a little oatmeal or bran may be mixed in it. If he will not drink it on its being offered, the bucket of water may be put down at the end of the stall, and when the horse is round, having his head and neck dressed, he will sometimes take it quietly of himself; the boy should allow him to do this without noticing him, for if the boy stops dressing his neck or fore legs, the horse will most likely stop drinking, which would be a pity, for if these delicate horses can be brought to drink but moderately, they will many of them feed much better after it, which is a matter of consideration.

"Race-horses, like many others, are at times affected with diabetes, or what by grooms is more commonly called, the jawpiss. This disease is generally brought on either by the change of food or water. Horses in common use, as those of the army, when fed on ship oats, which may have been heated by lying too long in the vessel, become immediately affected with this disease in a violent degree. There are particular herbs in the hay which will sometimes produce it, as will also hard brackish water. The first step towards a cure is, to remove the cause which may have produced the disease, by changing either the food or the water; and the remedy generally had recourse to, is that of mixing lime in the water, by putting it either into the troughs or buckets.

The quantity of lime used, should be such as to produce rather a nauseous taste. The water being thus impregnated and given them to drink, generally puts a stop to the disease. Horses, so affected, are rather shy in drinking at first; but the complaint being attended with some degree of fever, they are mostly dry, and although the water is unpleasant to their taste, yet to gratify their thirst, they soon come to drink it.

"If the above remedy does not shortly remove the disease, it would be advisable in the groom to call in the aid of a good *practical* veterinary surgeon, who will instantly have recourse to such other treatment, as from the symptoms he will see requisite for the relief of the horse.

"The remarks I have here offered, relative to water and the watering of horses, are the result of the observations I have made during my practice in the stables; and I have at all times adhered to the system which I have laid down, whenever I have had horses under my own care, and with the happiest results. I am aware that these precautions are scarcely necessary to good, careful, and experienced training grooms; but as I am writing for the information of grooms in general, they are such as, I deem, may at all times be found available by many."

Even the *quality* of the well or brook water the cattle consume might often be considered by the farmer with more attention than he some times deems needful. I am alluding here

to the *mineral* and saline matters which these very often contain—matters which, in the case of human beings, has been found to produce the most serious effects. In a recent Report of the Commissioners appointed by her Majesty to inquire into the Sanitary Condition of the Poor, they remark, when speaking of the influence of a good supply of water upon the health and comforts of the poor (*General Report*, 1842, p. 77)—

"The queries transmitted to the medical officers were directed to ascertain the sufficiency of the supplies for the purpose of cleansing, but the returns frequently advert to the bad effect of inferior supplies upon the health of the population; and it is scarcely conceivable to what filthy water custom reconciles the people. Yet water containing animal matter, which is the most feared, appears to be less frequently injurious than that which is the clearest, namely, spring-water, from the latter being oftener impregnated with mineral substances; but there are instances of ill health produced by both descriptions of water. The beneficial effects derived from care as to the qualities of the water is now proved in the navy, where fatal dysentery formerly prevailed to an immense extent, in consequence of the impure and putrid state of the supplies; and care is now generally exercised on the subject by the medical officers of the army. In the Dublin Hospital Reports, for example, we have the following statement, which is still more important, as showing the

extent to which the nature of the water influences health :—

"'Dr. M. Barry affirms that the troops were frequently liable to dysentery, while they occupied the old barracks at Cork ; but he has heard that it has been of rare occurrence in the new barracks. Several years ago, when the disease raged violently in the old barracks, (now the depôt for convicts,) the care of the sick was, in the absence of the regimental surgeon, entrusted to the late Mr. Bell, surgeon, in Cork. At the period in question the troops were supplied with water from the river Lee, which, in passing through the city, is rendered unfit for drinking, by the influx of the contents of the sewers from the houses, and likewise is brackish from the tide, which ascends into their channels. Mr. Bell, suspecting that the water might have caused the dysentery, upon assuming the care of the sick, had a number of water carts engaged to bring water for the troops from a spring called the Lady's Well, at the same time that they were no longer permitted to drink the water from the river. From this simple, but judicious arrangement, the dysentery very shortly disappeared among the troops.'—*Dublin Hospital Reports*, vol. iii. 11. Paper by Dr. Cheyne "On Dysentery."

"*Parent du Chatelet*, the most industrious and able of modern investigators into questions of public health, gives the following instance, which in like manner demonstrates the amount of disease generated solely by the use of bad

water, as well as the difficulty of detecting the specific effects produced by it:—

"'When I visited last year the prisons of Paris with my friend Villermé, who was interested in prisons generally, I was extremely surprised at the proportion of sick in the hospital of St. Lazarus, relatively to the whole population of the prisons. The prison, uniting all the conditions necessary to health as regards its position, construction, the dress and food of the prisoners, who were constantly kept at work, how explain the much greater proportion of sick to what we remark in other prisons of a bad condition, and in which are found united all the apparent causes of unhealthiness?—This I must confess, has baffled all calculation, and has driven every one to say that there must be a cause for the peculiarity, but that it could not be discovered. I do not despair to have hit upon that cause, and I believe it is to be recognised in the nature of the water drunk by the prisoners. Having tasted it in the wooden reservoir behind the house, which was in bad order, and full of plants of the genus confervæ, I found it had a detestable and truly repulsive taste, a circumstance which does not appear to have been hitherto remarked. Might not the cause, then, be detected in the chemical nature of the water of Belleville and of the neighbourhood of St. Gervais, of which the prisoners drink exclusively? What proves it is, the striking resemblance which exists in this respect between the water of Belleville and that in the wells of the entrance-court of the hospital of

the Salpêtriere, which both contain a very great proportion of sulphate of lime, and other purgative salts. Now the venerable Professor Pinel and his pupil Schwilgué have remarked for more than 20 years the influence that the water of the wells of which I speak has upon the portion of the population of the hospital who make use of it, and they believe that certain affections connected evidently with locality cannot be attributed to any other cause, and particularly the disposition to chronic diarrhœa, which is so often observed in this hospital. It turns out upon examination *that the greater part of the sick who fill the infirmary of the prison of St. Lazarus are brought there for illnesses of the same identical nature.* In the prison they are obliged to have recourse to the water of the Seine to cook vegetables and other food, an evident proof of the truth, or at least the probability, of all I have just advanced.'"

The farmer cannot be too careful in the removal of stagnant ponds and wet ditches from the neighbourhood, not only of the yards in which his cattle are confined, but from the vicinity of his own dwelling. It is an observation made by the most eminent medical men in all parts of our land that typhus fever and neglected drainage are ever found together. The evidence of many of these was obtained during the examinations of the Poor Law Commissioners, on which they founded their recently published valuable Report on the Sanitary Condition of the Poor. Thus, Dr. Barham, when speaking of the diseases produced by the neglect of the

drainage of the town of Truro, remarks, (*see Report*, p. 7) "I have repeatedly noticed in the country that the appearance of fever has been connected with *near proximity to* even a small amount of decomposing organic matter." Mr. T. H. Smith, the medical officer of the Bromley Union, says (*Report*, p. 14), "A total absence of all provision for effectual drainage around cottages is the most prominent source of malaria." Of the good effects of improved drainage *banishing* intermittent fevers there is abundant evidence spread through the same report; for instance, Mr. Crowfoot, an eminent surgeon, of Beccles, in Suffolk, shows (*Report*, p. 29) that the annual deaths in that town *before* it was drained was 1 in 67, but that *since* it has been drained the annual mortality is only 1 in 71. And again, in the case of Portsmouth, the Report (p. 37) says—"The town of Portsmouth is built upon a low portion of the Island of Portsea; it was formerly subject to intermittent fever, but since the town was paved, in 1769, it was noticed by Sir Gilbert Blane that this disorder no longer prevailed, whilst Kilsea, and the other part of the island, retained the aguish disposition until 1793, when a drainage was made, which subdued its force."

When speaking of the sanitary effect of land drainage, the Report continues (p. 80)—"In considering the circumstances external to the residence which effect the sanitary condition of the population, the importance of a general land drainage is developed by the inquiries as to the causes of the prevalent diseases to be of

a magnitude, of which no conception had been formed at the commencement of the investigation; its importance is manifested by the severe consequences of its neglect in every part of the country, as well as by its advantages in the increasing salubrity and productiveness whenever the drainage has been skilful and effectual." In support of these assertions, a mass of evidence is appended to the Report, all showing the good effects of improved drainage upon the general health of the inhabitants in all parts of the kingdom. The ministers of the parishes in some of the northern portions of the island are continually noticing in their letters to the Commissioners (although they do so incidentally) the intimate connexion which exists between the increased health of the inhabitants of a district and the improvement of its drainage. Let our readers, in support of this assertion, refer to page 83 of the Report, where the minister of the parish of Rogart, says of it "healthy and a good deal of draining;" of Alness, "climate improved by draining;" of Deckford, "healthy, and people long-lived, much draining;" Fordown, "so much draining that now no swamps; formerly agues common, now quite unknown;" of Abernyte, "since the land was drained, scrofula rare, and ague unknown." And the improved health derived from the removal of stagnant waters, evidently extends even to animals—the live stock of drained lands it has been proved are subject to fewer epidemics.

Many diseases of cattle and sheep arise from

exposure in damp wet places. "Who," says Professor Youatt, "could doubt that the same causes which produce rheumatism in the human being will produce it also in the quadruped; thus we find rheumatism in cattle chiefly prevalent in a cold marshy country; on some portions of a farm nothing seems to ail the cattle, on others, lower, moister, or more exposed, the cattle crawl about, stiffly, and in pain."—*On Cattle*, p. 562.

"At Sydney," says Mr. Spooner (*On Sheep*, p. 421) "many sheep die from the astringency of the water produced by decayed leaves; the water holes are usually surrounded by trees, which, during a continued drought, shed their leaves into the water. While any large body of water remains in the holes, the effects arising from the infusion will not be perceptible on the animal, but when, during the excessive heats of summer, the quantity becomes reduced, its powerful astringent effects will be discovered in the disease, and consequent death of many of the flock. The only chance which suggests itself to save a flock thus attacked, is instant removal to a situation, where water may be obtained without containing that strong principle of tannier, which all our trees possess in a greater or less degree."

In most situations, rain-water, if judiciously collected and preserved, affords a copious supply of water. It is a source, however, much too seldom regarded, and still more rarely rendered available by a sufficient supply of collecting gutters and capacious reservoirs.

"The annual average depth of rain in England is about two feet. In 1840, for instance, the depth at Aberdeen was 24,627 inches; at Empingham, 18,58; Epping, 20,767; Falmouth, 31,511; Gosport, 25,525; Greenwich, 18,24; York, 24,72 inches. That is, perhaps, not much below the average of the continent of Europe. Some portions of western Europe, however, are exceedingly wet, 123 inches have been noted to fall at Coimbra in Portugal in a year. The fall of rain is still greater in the West Indies. At St. Domingo 120 inches; at Cayenne, 116 inches; at Maranham, 277 inches. So that even under the Equator, a sufficient supply of rain-water can be obtained for the service of the inhabitants. In August the least rain falls. The following table shows the mean of each month's depth of rain, at King's Langley, in the eight years from 1836 to 1843, inclusive. (One-tenth of an inch of rain in depth amounts to 10,128 tons per acre.)

	Rain. Inches.	Filt. Inches.	Evap. Inches.
January,	1·847	1·307	0·540
February,	1·971	1·547	0·424
March,	1·617	1·077	0·540
April,	1·456	0·306	1·150
May,	1·856	0·108	1·748
June,	2 213	0·039	2·174
July,	2·287	0·042	2·245
August,	2·427	0·036	2·391
September,	2·639	0·369	2·270
October,	2·823	1·400	1·423
November,	3·837	3·258	0 579
December,	1·641	1·805	0·164
Mean,	26·614	11·294	15·320

The following table gives the amount of rain-water which fell upon each acre of ground in Hertfordshire during eight years, with the portions of that average depth which evaporated and filtered from the soil.—*Jour. R. A. S.*, v. 5, p. 151 :—

Years.	Rain. Inches.	Tons per acre.	Filtration per cent.	Evaporat. per cent.
1836, ...	31·0	3,139	56·9	43·1
1837, ...	21·10	2,137	3·29	67·1
1838, ...	23·13	2,342	37·0	63·0
1839, ...	31·28	3,168	47·6	52·4
1840, ...	21·44	2,171	38·2	61·8
1841, ...	32·10	3,251	44·2	55·8
1842, ...	26·43	2,676	44·4	55·6
1843, ...	26·47	2,680	36·0	64·0
Mean, ...	26·61	2,695	42·4	57·6

To preserve rain water, it is chiefly necessary to have capacious tanks, and these may be readily kept supplied at all periods of the year. A tank, twelve feet by seven feet, has been found sufficient to supply, with water, a large family and six horses; this was surrounded by only four and a half inch brick work, resting solid against the sides, in consequence of being, like a decanter, smaller at the bottom than higher up, and the dome is constructed on the Egyptian plan, by projecting horizontally each row of materials one third of their length beyond those below, by filling up the back with earth as it proceeded, to balance the weight of this projecting masonry.

At the East Bourn workhouse for fourteen parishes, a tank has been made twenty-three feet deep, by eleven wide, of the roughest ma-

terials, being only flint stones, and though they require more mortar than if they had been regularly shaped, only ninety bushels of lime were allowed, including two coats of plaster, and the workmanship is executed like field walls, at 10s. per 100 square feet; the only essential being that *no* clay be used (which worms in time bore through,) and that the lime or Parker's cement be good.

The following table will be serviceable to the farmer as showing the number of gallons contained in circular tanks of various sizes:—*Ag. Gaz.*, vol. i., p. 124.

Diameter.	When the depth is							
	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
4 feet,.....	234	312	390					
5 „	363	484	605					
6 „	525	700	875	1050				
7 „	720	960	1200	1440	1680			
8 „	933	1244	1555	1866	2177	2488		
9 „	1185	1480	1975	2370	2765	2960	3555	
10 „	1464	1952	2440	2928	3416	3904	4392	4880
11 „	1776	2368	2960	3552	4144	4736	5326	5920
12 „	2112	2816	3520	4224	4928	5632	6336	7040

A current of air is said to promote the purity of water in tanks, which is easily effected by the earthern ware or other pipe which conveys the water from the roof, being of six or eight inches in diameter, and an opening left for the surplus water to run away; and where the prevailing winds do not blow soot and leaves *on* the house, the water remains good, even for drinking, without clearing out the rubbish more than once a year; but in some cases filtering by ascension may be found useful, and effected

by the water being delivered by the pipe at the bottom of a cask or other vessel, from which it cannot escape till it has risen through the holes in a board covered with pebbles, sand, or powdered charcoal.

In the application of water to grass, as in water meadows, it is pretty well understood by the farmer, that the nutritive properties of the herbage is reduced. The difference, however, is not so great as is commonly supposed. The late Mr. George Sinclair determined this experimentally, and he is no mean authority, with regard to all that relates to the grasses. He obtained from the rye-grass (*Lolium perenne,*) at the time of flowering, taken from a water-meadow that had been fed off with sheep till the end of April, of nutritive matter, 72 grains; and from the same weight of this grass, taken from a rich old pasture, which had been shut up for hay about the same time, 92 grains. From the same grass from the meadow, that had not been depastured in the spring, 100 grains; and from the same grass, from the pasture which had not been fed off, 120 grains. All the grasses, in fact, when their growth is forced by the application of either liquid or solid manures, are found to contain nutritive matter in diminished quantities. This, too, was determined by Mr. Sinclair. From four ounces of a very rankly luxuriant patch of rye-grass, on which a large portion of cow-dung had been deposited, he obtained of nutritive matter, 72 grains: from the same quantity of the same grass, growing on the soil which sur-

rounded this luxuriant patch, he obtained 122 grains. And in a second trial, the same species of grass, on a soil entirely destitute of manure, afforded of nutritive matter, 95 grains. On the same soil, excessively manured, the grass afforded only 50 grains. In these experiments, the plants were of the same age, and were examined at the same stage of their growth.—*Hortus Gram.* 384.

WAX—Is composed of per cent.

Oxygen . .	5·54 parts.
Hydrogen . .	12·67
Carbon . .	81·78

WEATHER. As I have remarked in the *Farmers' Encyclopædia*,—"To the farmer, a careful study of the weather, and of the inferences to be drawn from precedent, and from natural and artificial data, come fraught with numerous and important considerations. Like the angler, the husbandman must observe the wind, sun, and clouds by day, the moon, stars, and wanes of the air by night. Few are so entirely dependent on the caprice of the weather, for the commonest routine operations of the farm, as the agriculturist. And how soon may his fairest crops be blighted by adverse and unfavourable seasons, or by the baneful effects of scorching and arid winds, of severe frosts, of heavy rains. Some winds come fraught with disease and death; murrain, malaria, and epidemics, in hot dry seasons, commit fearful ravages among his live stock; and these are frequently to be attributed to some mysterious atmospheric agency: other winds bring swarms

of noxious insects and predatory birds to our shores; this accords with the opinions of the ancients, who were careful observers of the weather and its results upon vegetation. Pliny considered that the mildew always occurred at the new or full moon, and during the absence of the sun. The farmers of the present day fancy that the mists which frequently prevail during mid-day, in the hottest periods of summer, are the cause of mildew. Duhamel believed that mildew was brought on by mild hazy or gloomy weather, being succeeded by a hot sun, when the wheat crops will become mildewed in a few days. He always observed wet springs very inducive of this disease; but it rarely occurs in clear, dry, hot years. Heavy showers after a hot sun, and chilly wet seasons, or a succession of cold rains while the grain is forming, is very conducive to mildew; and, although the researches of science have proved that the disease is the result of a parasitical fungus, yet there can be no doubt that the moist and unwholesome state of the atmosphere has considerable effect in extending its ravages. Blight often occurs in spring, when the bleak keen frosty winds nip and destroy the tender shoots of the plant, by stopping the current of juices. Blight from sultry and pestilential vapour occurs in summer, when the grain has nearly attained its full growth. Such was the blight that used to ravage the vineyards of ancient Italy, and which frequently damages extensively the hop-plantations and wheat crops of Britain. The Romans observed that it generally happened after short

but heavy showers occurring about noon, and followed by clear sunshine, at the season when the grapes were ripening, and that the middle of the vineyard suffered the most. This agrees pretty nearly with the manner in which the blight traverses the hop districts in the present day."

Too little attention is commonly paid to the sheltering of animals from the effects of the weather, either when in confined yards, or in the field, especially in cold bleak exposed situations, and yet, as Mr. Bain remarks (*Journal of Agriculture*, 1843, p. 173), there is hardly a spot in Scotland, nor of course in England, or in Ireland, that might not be rendered of a kindly temperament by shelter. It is not absolute height that renders our plains and mountains cold, it is merely relative height, that being the highest and unsheltered by any thing higher, the air passes over them unchecked and unmitigated, and acquiring strength as it goes, becomes at last scourging and destructive. Upon a surface so swept the sun can take no effect, nor can the earth impart any warmth, the influence of both is overborne by cold, and scourging winds. But where the gale is checked, and the air over any particular spot is rendered tranquil, it soon becomes warm, either from the direct heat of the sun, or the latent warmth of the earth. The enclosed space, though on the highest hill, becomes in effect a valley, for it is surrounded by higher objects.

To protect sheep from the effects of wet, in addition to sheltering, various other modes have

been adopted; the process of *bratting*, or cloaking, the sheep appears to be the most successful for this purpose. It is thus described by Mr. M'Turk (*Trans. High. Soc.*, July, 1843)—"Cloth very well suited for the purpose may be made from the refuse wool of carpet manufactories, equally thick and warm as a blanket, and this can be got for 6d. per yard. If cloth, such as sacks are made of, be employed it may be had for 4d. per yard. When intended for bratting hogs, it should be three quarters wide, and two feet of such cloth will be sufficient for covering one hog. When intended for old sheep of the best description, the brats may be made larger by applying the cloth the long way, and we have then twenty-seven inches of width, to cover the back and side, instead of twenty-four, and it can be cut off as long as the largest sheep will require. The brat should always come as far down the sides as to cover the widest part of the ribs, and all the back, from the tail to the back of the neck. The best plan is to select a sheep from the flock, of an average size, and measure the quantity of cloth required for it.

"When the cloth has been applied to the animal, and its proper dimensions ascertained, the parts should then be marked to which the different straps and strings are to be sewed to hold it in its proper place. A strap must then be fixed to one of the front corners, in a diagonal direction, so as to pass beneath the throat, and sewed to the other corner after it is put on, in the same way as the other

straps which are intended to pass through beneath the legs; these must be sewed only at the one end, till the covering be put upon the sheep, and then the other end can be sewed so as to make the brat fit. These straps should be of some soft material, that they may not chase or injure the skin when the sheep is in motion. If, when made, the brats are dipped in coal tar, it will enable them the better to resist the wet, and prevent them rotting. If taken care of, they will answer the end for five seasons. They ought to be made early in summer, in order that the tar may be dried before the time of using them arrives in November. They ought not to remain on the sheep any longer than the beginning or middle of April, according to the state of the weather and the condition of the flock at the time. We recommend that considerable care should be bestowed in attaching the strings to the proper places in the one first made, so that it may fit well, as it is to serve as a pattern to make the others by. A person who is accustomed to the use of the needle can make one in five minutes, and it may be put on in less than other five.

"A brat of woollen cloth with the string will not cost more than 5d.; and one of the flaxen ones about 3½d.; but the former will last longer and answer the end better. In order to prevent them being stolen, and to enable the shepherd to distinguish the flock under his charge, they should be all marked with the buisting iron dipped in white paint. Some days before the brats are put on for the winter, the sheep must

be poured with some one or other of the bathing mixtures to destroy vermin. Some days after this process, when the wool has regained its usual appearance, the brat should be put on."

The process of salving, is extensively followed in many districts. Mr. Robert Boyd remarks of this process, (*Trans. High. Soc.*, July, 1843, p. 50.):—

"The application of cocoa and gallipoli oils, in particular, is objectionable, as, in consequence of their easy liquefaction by the heat of the animal's body, they soon find their way from the roots to the top of the wool, where they form, along with the turpentine with which they may have been mixed, a hard-crusted substance, highly injurious to the fleece. As a remedy to these and many other evils incident to the prevailing modes of salving sheep, Mr. Ballantyne of Holylee, a zealous labourer for the improvement of the fleece, has, for the last two years, salved his flocks, which amount to upwards of 163 scores, with the following composition:—

30 lbs of butter,	5d...	£0	12	6
14 .. rough turpentine,	1½d...	0	1	9
3 .. black soap,	4d...	0	1	0
2 .. soda ash,	1d...	0	0	2
5 bottles refined spirit of tar,	7d...	0	2	11
		£0	18	4

To this 21 pints of water are added, to assist in the equal spreading of the mixture. The above composition is found sufficient to salve 100 sheep, which is at the rate of 2¼d. a-head. It

requires to be applied to the fleece at a temperature a little above blood-heat."

Of the advantages of sheltering sheep from the ill effects of bad weather, many practical farmers have borne ample testimony. "I have found," says Mr. J. Purves, of Thurdisloft, in Caithness, "after several years' experience, that the best mode of wintering half-bred or Leicester hogs and lambing ewes on smooth ground, where the climate is indifferent, is to have sheds with large yards attached to them. In Highland districts, where food and shelter in winter are difficult to be obtained, the only remedy is plantations, stalls, and the sowing of whin and broom hedges. The best form of stall I know is a circular wall of stone and turf, fifty feet in diameter, having a projecting wall forty feet in length, to the north, east, and west, of six feet in height, made three feet of stones, and three feet of turf. A plan of sowing a whin hedge, which answers very well, is to raise a mound of earth, with a ditch on each side, upon the top of which whin or broom seed is sown, and a dead hedge formed of brush wood. The dead hedge forms an immediate fence of itself, and it will fence the young whin plants till they become sufficiently strong to resist the teeth of the sheep."—*Trans. High. Soc.*, January, 1845, p. 401.

The weather has upon no animal a more remarkable effect than upon pigs. They suffer severely from cold, and as chilliness is rapidly produced by exposure to the wind, so pigs are rendered peculiarly uncomfortable by strong

currents of air. They delight, on the contrary, in warm sheltered situations, and always thrive best in styes and other situations having a southern aspect.

When speaking of cattle Professor Youatt remarks, p. 377—"Many a sad cough is caught in the straw yard, and particularly by young cattle; the food is scanty there, it is not sufficient to afford proper nourishment, or to keep up the proper warmth; and the more forward drive the others about, and permit them to obtain only a small portion of their proper share of the provender, and then the depressing effects of cold, and wet, and hunger, so debilitate these poor beasts, that they are seldom without catarrh, and that catarrh too frequently runs on to a more serious disease."

The horse suffers too considerably by exposure to bad weather; a native of the warmer regions of the earth, he is too often exposed in our varying climate to almost every description of weather. Is suffered to stand, in exposed yards and shelterless fields, amid all the storms and snows of winter, and yet how easily, in most situations, are these sources of disease avoided? The ill effect of cold upon all animals I have endeavoured to illustrate in the article FOOD.

And it is not only the live stock of the farmer which are materially influenced in their aptness to fatten, and in their health, by the weather, but it is by the temperature and moisture of the atmosphere that the success of his crops mainly depends—their progress towards ma-

turity, their freedom from disease. The state of the atmosphere is, we all know, materially influenced, among other things, by the soil, its inclination, its elevation above the level of the sea, and by the latitude in which it is placed. This has been so graphically given by two excellent French authors, that I shall readily give their description a place in these pages, more especially as the effect of various degrees of temperature upon vegetable life will still further demonstrate to the farmer how powerful an influence the weather exerts upon the health and the prosperity of the organized beings with which he is surrounded—

"'Multitudes of different species of plants,' says M. Mirbel, 'are spread over the surface of the globe, each having its peculiar wants, and, if we may be allowed the term, its separate habits and instinct.' Some species belong to the mountains, others to the vallies, and others to the plains; some affect a clayey soil, some a chalky one, others one of a quartzose nature, while many will thrive in no place but where the soil is impregnated with common salt. There are some that confine themselves entirely to water, dividing themselves again into those of the marsh, the lake, the river, and the ocean. Some require the hottest climates, others delight in mild and temperate ones, others thrive nowhere but in the midst of ice and frost. A large portion must have a constantly humid atmosphere; several do very well in a dry air; but the major part are equally averse to the extremes of both dryness

and moisture. There are those which flourish when exposed to the action of a strong light, while others prefer the weaker action of that element. The result of this variety of wants is, that nearly the whole surface of the earth is occupied by vegetation. Excess of heat, cold, or drought, or a total privation of air or light, are the only bars to vegetation; and yet we find some agamous species growing in caverns where the light has never gained admission.'

"In proportion as the natural temperature of a country decreases, as we advance towards the Pole for instance, we are sensible of the change in the appearance of the vegetation. The species which require a mild and temperate climate are supplanted by others which delight in cold. The forests fill with pines, firs, and birches, the natural decorations of a northern land. The birch, of all trees, is the one that bears the severity of the climate the longest; but the nearer it approaches the Pole the smaller it grows, its trunk dwindles and becomes stunted, and the branches knotty, till at last it ceases to grow at all towards the seventieth degree of latitude, the point where man gives up the cultivation of corn. Further on, shrubs, bushes, and herbaceous plants only are to be met with. Wild thyme, Daphnes, creeping willows, and brambles cover the face of the rocks. It is in these cold regions that the berries of the *Rubus arcticus* acquire their delicious flavour and perfume. Shrubs disappear in their turn. They are succeeded by low herbs, furnished with leaves at the root, from the midst of which rises a short

stalk surmounted by small flowers: such are the saxifrages, the primroses, the *Androsaces*, *Aretias*, &c. If we go further, a naked land, sterile soil, rocks, and eternal snows are all we find. The last vestiges of vegetation are some pulverulent *Byssi*, and some crustaceous lichens, which cover the rocks in motley patches.

"The principal causes which induce this progression of changes are three;—1. The excess of duration in the winter, a consequence of the obliquity and disappearance of the solar rays. 2. The dryness of the air, a consequence of the decrease of heat. 3. The prolonged action of the light, which illumines the horizon through the whole period of vegetation.

"Vegetation, in ascending above the level of the sea, undergoes modifications analogous to those which attend its progress from the line to either Pole. With this distinction, that in the last case the phenomena succeed by almost imperceptible gradations, while they crowd upon and follow each other in rapid succession on the ascent of mountains. The height of 4000 or 5000 yards in the hottest parts of the globe produces changes as distinct as the 2000 leagues or more which lie between the equator and the polar regions. The three causes of the influence of which I have just spoken all re-appear within this space; viz. a diminution of heat, dryness of the air, and protracted duration of light. The higher we ascend, the shallower the upper stratum of air becomes: thence the excessive cold at great heights. The weight of the atmosphere, which, at the level of the

sea, supports a column of mercury equal to twenty-eight inches, diminishes as we ascend; so that at considerable elevations it will only support a column of a considerably less weight, a power which gradually diminishes as we ascend. A consequence of this fact is, that the vaporisation of fluids (the evaporation of all fluids is increased by diminishing the pressure of the atmosphere in which they are placed,) takes place on high mountains at a very low degree of heat.

"This progressive varying course of vegetation on mountains had not escaped the attention of Tournefort. At the foot of Mount Ararat he had observed the plants which grow in Armenia; a little higher, those of Italy and France; above, those of Sweden; and upon the summits, those of Lapland. Observations of the same kind have been subsequently made on Mount Caucasus, the Alps, Pyrenees, and other mountains of the old continent; and in Britain, whose hills, however, can rarely be dignified with the name of mountains. Linnæus, in his own way, had summed up these observations in an axiom. 'The different kinds of plants,' says he, 'show by their stations the perpendicular height of the earth.'

"The common heath (*Erica vulgaris,*) says M. De Candolle, which covers the sandy plains that lie along the coast of Western France, grows to the very summit of Mount Calm, at nearly 3000 yards of elevation. The cross-leaved heath (*Erica tetralix*) is another instance; it grows from the level of the sea to 2400 yards of

elevation. The sea-gilliflower (*Statice Armeria*) is found in Holland, in spots which lie below the level of the sea, and on the Alps at an elevation of 2500 yards. *Statice Plantaginea* grows on the beach of Olonne, and at 2000 yards of elevation on Mount Viso. The coltsfoot and the birdsfoot trefoil both grow at the level of the sea all over France, and are met with again above Mount Jovet, at the height of about 2400 yards.

"Mat grass (*Nardus stricta*) grows at the level of the sea, and it also forms the highest situated swards that are found in the Cevennes, the Alps, and the Pyrenees. The sweet-scented vernal grass (*Anthoxanthum adoratum*,) and the Timothy grass (*O. pratense*,) which grow every where in England and France at the level of the sea, ascend to the elevation of 2000 yards. The common Juniper (*J. communis*) attains an elevation of 3000 yards; the marsh lousewort does the same; the scorpion grass, 3500 yards; and the daisy (*Bellis perennis*,) the ox-eye daisy (*Chrysanthemum Leucanthemum*,) and the bladder campion (*Silene inflata*,) ascend to 2000 yards; and the kidney vetch (*Anthyllis vulgaris*) to 3000 yards.

"Plants which are the objects of husbandry are controlled by laws corresponding completely with the preceding. Such as grow in all latitudes grow likewise at all elevations. Those that are found only in determinate latitudes are found only in corresponding elevations. Thus we learn from Humboldt that the potatoe, which succeeds so well in the north of our old

continent, is cultivated in Chili as high as 3600 yards. We know that the cabbage thrives both down at the edge of the sea as well as on the Alps, at every elevation at which man can take up his abode. Corn is also cultivated at very extraordinary elevations. Rye is grown in France, in the departments of the higher and lower Alps, at 2200 yards, particularly above Allos in Provence. Wheat does not grow so far to the north as rye, neither will it do so well as that grain at great elevations. Yet it is grown at 1800 yards. At such elevations sowing is generally done before harvest time, that the plants may get strength before the snow falls; which has been known to lie upon the rye the year through. When this has happened, the rye remained *in statu quo* while the snow lay, and resumed its growth at the end of eighteen months when that had melted away. Barley will grow well only in temperate climates. It is true it may be raised under the tropics, but not at a lower elevation than from 3000 to 4000 feet, and then it is a profitless crop.

"Cultivated plants which do not bear cold are under a like influence as to elevation; they can only be grown at such heights as correspond in temperature with that of the distance from the equator to which they belong. In general it is considered that in our temperate climate a degree of latitude affects the mean temperature nearly in the proportion of 180 or 200 yards of elevation.

"The common oak (*Quercus Robur*) grows on the plains on a level with the sea, reaches

the slopes of the mountains, and ascends to the height of 1600 yards. It degenerates in proportion as it approaches the point where it ceases to vegetate. The beech (*Fagus sylvatica*) makes its first appearance at the height of 600 yards above the sea, and its last at 200 yards above the oak. The silver fir (*Pinus picea*) and the yew (*Taxus communis*) show themselves at 1400 yards, and extend to about 2000. The Scotch fir (*Pinus sylvestris*) and the (*Pinus pumilio*) take their stations between 2000 and 2400 yards.

"There the trees stop, and shrubs, with a juiceless foliage and low or creeping stems, present themselves; these lie hid beneath the snow in winter. Amongst them are some of the *Rhododendrons*, *Daphnes*, *Salix herbacea*, and *reticulata*, &c. Soon after, we meet only small herbs with perennial roots, a foliage disposed in a rosette, and a naked stalk. These, with the lichens and byssi, arrive at the height of 3000, and even 3400 yards. The first that occur are the *Gentiana campestris*, *saxifraga*, &c.; then *Ranunculus alpestris*, *Aretia alpina*, &c.; and finally *Ranunculus glacialis*. *Saxifraga cespitosa*, *oppositifolia*, *androsacea*, and *Greenlandica*. The last brings us to the borders of eternal snow.

"As regards the effect of vegetation upon the temperature of the district, that of forests is felt far around: their usual effect is to cool the atmosphere to a greater extent even than the degree of latitude. When France and Germany were covered with wood, Europe was

much colder than at present, the winters were longer, the vine could not be cultivated on this side of Grenoble, the Seine froze every year.

"The causes why forests thus lower the temperature are plain. They detain and condense the clouds as they pass; they pour into the atmosphere volumes of water dissolved in vapour; winds do not penetrate into their recesses; the sun never warms the earth they shade; and the soil, being porous, as formed in part of the decayed leaves, branches, and stems of trees, and coated over besides by a thick bed of brushwood and moss, is constantly in a state of moisture; the hollows in them serve as reservoirs for cold and stagnant waters; their declivities give rise to numberless brooks and rivulets. The best-wooded countries are ever those which are watered by the largest rivers."

WEIGHTS AND MEASURES. Apothecaries' or troy weight is most usually employed in medicine. In this a pound contains twelve ounces.

1 lb. is	. .	5760 troy grains.
9 ounces or	¾ lb. .	4320
6	½ lb. .	2880
3	¼ lb. .	1440
1	8 drachms	480
7 drachms	. .	420
6	. .	360
5	. .	300
4	or ½ an ounce	240
3	. .	180
2	. .	120
1	. .	60
1 scruple	. .	20

Mr. Darvill has given a list of the medi-

cines and other articles usually kept in the training grooms' private saddle-room, for the use of his stud. This list I will subjoin, since it is not only applicable to the use of the training stables, but to other establishments where horses are kept (*Darvill*, vol. i., p. 150) :—

MEDICINES.

Aloes, Barbadoes	Resin
Alum	Sal Ammoniac
Arrow Root	Spanish Flies
Basilicon, yellow	Sweet Spirit of Nitre
Camphor	Spirit of Turpentine
Castile Soap	Spirit of Wine
Ginger Powder	Salt, common
Goulard's Extract	Soft Soap
Honey	Tar, Barbadoes
Hog's Lard	Tartar Emetic
Linseed Meal	Tincture of Myrrh
Nitre	Treacle
Oil of Carraway	Venus Turpentine
Oil, Castor	Vinegar
Oil of Cloves	Vitriol, Blue
Oil of Olives	Vitriol, White
Oil of Origanum	Verdigris
Oil of Rosemary	Wax
Prepared Ammonia	White Lead.

Apothecaries' Weight.

Twenty Grains—One Scruple	Three Scruples—One Drachm
Eight Drachms—One Ounce	Twelve Ounces—One Pound

Measure of Fluids.

Sixty Drops	One Fluid Dram
Eight Fluid Drams . .	One Fluid Ounce
Four Fluid Ounces . .	A Measure or Noggin
Sixteen Fluid Ounces .	One Fluid Pint
Eight Fluid Pints . .	One Gallon.

Apparatus for Compounding Medicines.

A box of small weights and scales, for the weighing of medicine in small portions, as from a grain to two drachms. The weights marked with English characters.

One pair of two-ounce scales; one pair of pound scales; one pound of brass box weights.

A graduated glass for the measure of fluids, marked with English characters.

One large and one small pestle and mortar.

One marble slab, a foot and a half square, for mixing ointments.

One large and one small ladle.

One large and one small pallet knife.

Articles necessary to be kept for Administering and Applying Medicines.

Improved ball iron.

Drenching horn.

Flannel, for the applying of fomentations and poultices.

Woollen and linen bandages.

Tow, and broad coarse tape.

A cradle is sometimes wanted to be put on a horse's neck, when his head is first let down after being blistered, more particularly if the horse is turned into a loose box.

Instruments.

Stomach pump	Abscess lancet
Elastic tube	Improved docking machine
Fleam and blood stick	Firing, scaring, and budding irons
Tooth rasp, with a guard	Improved casting hobbles.
Seaton, and curved needles	

WHEAT. According to Sprengel, 1000 parts of wheat produce, when burnt—

	Seed. lbs.	Straw. lbs.
Potash . . .	2·25	0·20
Soda . . .	2·40	0·29
Lime . . .	0.96	2·40
Magnesia . .	0·90	0·32
Alumina . .	0·26	0·90
Silica . . .	4·	28·70
Sulphuric acid .	0·50	0·37
Phosphoric acid .	0·40	1·70
Chlorine . .	0·10	0·30
	11·77	35·18

WHITE OF EGG, see ALBUMEN.

WHITE OILS are composed of—

Rape or olive oil, 4 ounces,
Spirits of hartshorn, 2 ounces, mix for use.

WINE, see ALCOHOL.

WITHERS, see FISTULA.

WOMB INFLAMMATION. This affection of the womb occurs after calving or bulling. The symptoms are, great irritation and pain. Bleed and give the following drench:—

Epsom salts, 1 pound,
Powdered carraway seeds, 2 ounces,
Warm gruel, 3 pints.

Bathe the womb with Goulard water, or vinegar and water in equal parts.

WOMB INFLAMMATION IN SHEEP. —Bleed, and open the bowels with Epsom salts in two ounce doses.

WORMS exist in the horse, occasionally in considerable quantities, but without they abound it will be well to suffer them to remain. The long white worm tenants the smaller intestines. The needle worm, a small dark coloured worm, haunts the larger intestines. If these descend into the rectum, the injection of a quart of linseed oil or salt and water will be generally effectual in bringing them away; or even an ounce of aloes in warm water. If a strong dose of physic is intended to be given to the patient, when it has set, give a ball every morning fasting for a week.

Tartar emetic, 8 drachms,
Flour of sulphur, 6 ounces.
Powdered ginger, 8 drachms,
Treacle sufficient to make eight balls.

Drench for worms in Dogs.

Spirit of turpentine, 1 to 4 drachms,
Castor oil, 2 to 8 drachms.

Mix for a dose according to size.

WOUNDS. Foment frequently with hot water, so as to remove all grit and dirt and abate inflammation, and apply the following tincture :—

Tincture for wounds.

Friar's balsam, 2 ounces,
Compound tincture of myrrh and aloes, 2 ounces.

If unhealthy granulations arise, wash the part with the following mild caustic wash previous to using the tincture :—

Caustic Wash

Blue stone, 1 ounce,
Soft water, 1 pint.

Wounds generally heal best without sewing if it can be avoided.

Tincture for Wounds in Dogs.

Tincture of myrrh and aloes, 2 ounces,
Friar's balsam, 1 ounce; mix them together for use.

Y.

YELLOWS, see JAUNDICE.
YEW, see POISONS.

ANALYSIS OF AGRICULTURAL PRODUCE.

According to M. Sprengel, 100,000 *lbs. of each of the following vegetables contain of fixed ingredients in lbs.*—(*Jour. Roy. Ag. Soc.*, vol. iii., p. 158.)

	Potash.	Soda.	Lime.	Magnesia.	Alumina.	Oxide of Iron.	Oxide of Manganese.	Silica.	Sulphuric Acid.	Phosphoric Acid.	Chlorine.	Total of fixed ingredients.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Wheat	225	240	96	69	26	..	..	400	50	400	10	2137
Ditto straw	20	29	240	32	90	90	..	2870	37	170	30	3518
Barley	278	290	106	180	25	..	..	1182	59	210	19	2349
Ditto straw	180	48	554	76	146	14	20	3856	118	160	72	5244
Oats	150	132	86	67	14	40	.	1976	35	70	10	2580
Ditto straw	870	2	152	22	6	2	2	4588	79	12	5	5740
Rye.....	532	532	122	44	24	42	34	164	23	46	9	1040
Ditto straw	32	11	178	11	25	25	..	2297	170	51	17	2793
Potatoes ..	390	234	33	32	5	$2\frac{3}{4}$	..	$8\frac{1}{4}$	54	40	$15\frac{1}{4}$	814
Beans.....	415	816	165	158	34	..	..	126	89	292	41	2136
Ditto straw	1656	50	624	209	10	7	5	220	34	226	80	3121
Vetches....	897	622	160	142	22	9	5	200	50	140	43	2290
Ditto straw	1810	52	1955	324	15	9	8	442	122	280	84	5101
Peas	810	739	58	136	20	10	..	410	53	190	38	2464
Ditto straw	235	..	2730	342	60	20	7	996	337	240	4	4971
Lucerne....	362	166	1304	94	8	8	..	90	109	353	86	2580
Sainfoin ..	494	105	527	69	16	..	..	120	82	220	38	1671
Red clover	419	111	584	70	3	..	..	76	94	138	76	1571
Cabbage ..	1847	578	1822	202	11	151	40	529	774	436	518	6908
Beet	1481	3178	285	133	20	58	50	105	123	167	380	6986
Turnips....	72	109	127	22	8	2	1	40	41	73	23	555
Swedes	2651	1164	835	282	40	35	..	475	890	408	266	7046
Carrots .. .	2718	709	505	295	30	25	46	105	208	395	54	5090

CALVING TABLE.

Day bull'd	Will calve	Day bull'd	Will calve	Day bull'd	Will calve	Day bull'd	Will calve
Jan. 1	Oct. 8	April 1	Jan. 6	July 1	April 7	Oct. 1	July 9
.. 7	.. 14	.. 7	.. 12	.. 7	.. 13	.. 7	.. 15
.. 14	.. 21	.. 14	.. 19	.. 14	.. 20	.. 14	.. 22
.. 21	.. 28	.. 21	.. 26	.. 21	.. 28	.. 21	.. 22
.. 28	Nov. 4	.. 28	Feb. 2	.. 28	May 4	.. 28	Aug. 5
.. 31	.. 7	.. 30	.. 4	.. 31	.. 8	.. 31	.. 8
Feb. 1	.. 8	May 1	.. 5	Aug. 1	.. 9	Nov. 1	.. 9
.. 7	.. 14	.. 7	.. 11	.. 7	.. 15	.. 7	.. 15
.. 14	.. 21	.. 14	.. 18	.. 14	.. 22	.. 14	.. 21
.. 21	.. 28	.. 21	.. 25	.. 21	.. 29	.. 21	.. 29
.. 28	Dec. 5	.. 28	Mar. 4	.. 28	June 5	.. 28	Sept. 5
March 1	.. 6	.. 31	. 7	.. 31	.. 8	.. 30	.. 7
.. 7	.. 12	June 1	.. 8	Sept. 1	.. 9	Dec. 1	.. 8
.. 14	.. 19	.. 7	.. 14	.. 7	.. 15	.. 7	.. 21
.. 21	.. 26	.. 14	.. 21	.. 14	.. 22	.. 14	.. 21
.. 28	Jan. 2	.. 21	.. 28	.. 21	.. 29	.. 21	.. 28
.. 31	.. 5	.. 28	April 4	.. 28	July 6	.. 28	Oct. 5
		.. 30	.. 6	.. 30	.. 8	.. 31	.. 8

LAMBING TABLE.

When to ram.	Will lamb.	When to ram.	Will lamb.	When to ram.	Will lamb.	When to ram.	Will lamb.
Jan. 1	May 27	April 1	Aug. 26	July 1	Nov. 25	Oct. 1	Feb. 25
.. 14	June 10	.. 14	Sept. 8	.. 14	Dec. 9	.. 14	Mar. 10
Feb. 1	.. 28	May 1	.. 22	Aug. 1	.. 26	Nov. 1	.. 26
.. 14	July 12	.. 14	Oct. 8	.. 14	Jan. 8	.. 14	April 9
March 1	. 26	June 1	.. 25	Sept. 1	.. 26	Dec. 1	.. 25
.. 14	Aug. 8	.. 14	Nov. 8	.. 14	Feb. 9	.. 14	May 9

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