

UMASS/AMHERST



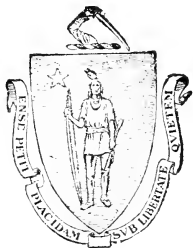
312066005824049

Farm Live Stock

636-114
Alumni Funds
No 5013

LIBRARY

OF THE



MASSACHUSETTS
AGRICULTURAL
COLLEGE

No.	5	SF	71	6-1886
SOURCE			W35	funds
			1889	

1885 CHURCH
AGRICULTURAL
COLLEGE
LATH

This book may be kept out

TWO WEEKS

only, and is subject to a fine of TWO CENTS a day thereafter. It will be due on the day indicated below.

FEB 27 1900

C.S. ~~Yps~~

8/1/8

FARM LIVE STOCK

OF

GREAT BRITAIN.

FARM LIVE STOCK

OF

GREAT BRITAIN.

BY

ROBERT WALLACE, F.C.S., F.H.A.S.,

Etc., Etc.,

PROFESSOR OF AGRICULTURE AND RURAL ECONOMY IN THE UNIVERSITY OF
EDINBURGH;

LATE PROFESSOR OF AGRICULTURE AT THE ROYAL AGRICULTURAL
COLLEGE, CIRENCESTER.

EDINBURGH:

OLIVER AND BOYD, TWEEDDALE COURT.

LONDON: SIMPKIN, MARSHALL, AND CO.

1885.

636

W15

TO

PROFESSOR JOHN WILSON, F.R.S.E., ETC.,

WHO FOR THIRTY-ONE YEARS

MOST ABLY FILLED THE CHAIR OF AGRICULTURE IN THE
UNIVERSITY OF EDINBURGH,

THIS WORK IS INSCRIBED,

AS A TOKEN OF THE AUTHOR'S GRATITUDE TO HIM AS A TEACHER
AND RESPECT AND ESTEEM FOR HIM AS A FRIEND.

PREFACE.

THE object of this volume is to lay before the student, in the shortest possible form, the many interesting facts about Farm Stock which ought to be known to every one who takes an interest in Agriculture.

The defect of most text-books on this subject is, that they are too voluminous, so filled up with much unnecessary book-makers' padding that it is simply a waste of time to read them; or else they are incomplete or incorrect, too often the productions of men who have tried farming and failed to make it pay, and who suddenly became inspired to profess to teach that which they had not succeeded in carrying out in practice. The most skilful farmers are not usually of a literary turn of mind, and consequently much valuable information, the result of years of successful experience, is constantly being lost.

Coleman's "Cattle of Great Britain," and "Sheep and Pigs of Great Britain," also Sheldon's "Dairy Farming," are suitable books for those who want to go in for extensive reading in this subject.

I was struck with the very concise, clear, and thoroughly

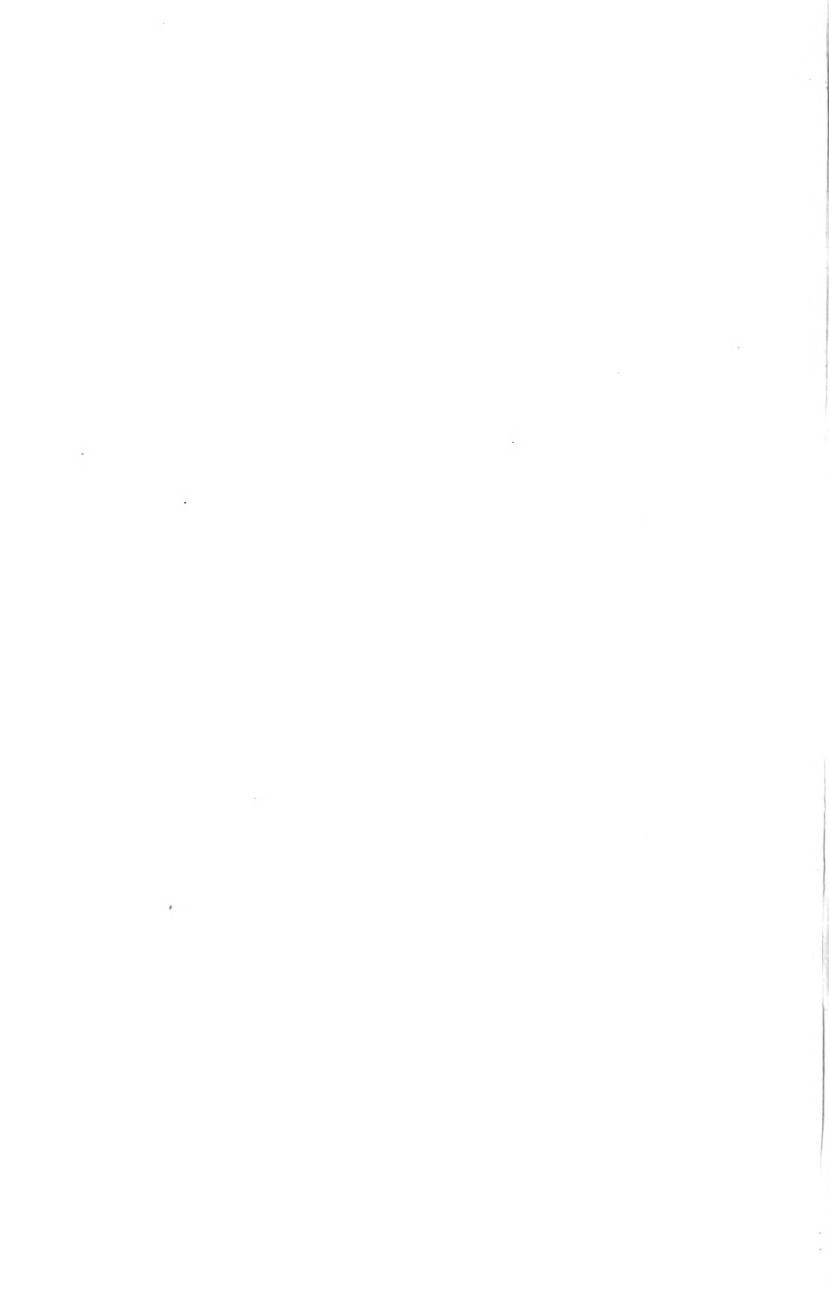
business-like style of "The Chemistry of the Farm," by Mr R. Warington, F.C.S., published in 1881 in Morton's "Handbook of the Farm" series, and I have endeavoured, as near as possible, to make my production fill the same position on the subject of Farm Stock as has been secured in that of Agricultural Chemistry by Mr Warington's volume. The subject matter has been selected and arranged with the main object of making it a students' text-book, containing all that is necessary in this special branch for the important examinations of The Royal Agricultural College, Cirencester, The Royal Agricultural Society of England, The Highland and Agricultural Society of Scotland, The Royal Agricultural Society of Ireland, and The Surveyors' Institute. This accounts for the unusual number of intricate though very necessary calculations which occur here and there, and which will require much close attention and study. It is hoped, however, that all those of the farming community who may think the book worthy of their patronage may find the time taken up in reading it profitably spent, as, besides a record of the many common facts known almost instinctively to many practical men, it contains descriptions of the causes, preventions, and remedies of the common diseases of stock, given in the ordinary language with which a farmer is familiar.

R. W.

CONTENTS.



	PAGE
INTRODUCTION,	11
PRINCIPLES OF BREEDING,	15
CATTLE,	24
PIGS,	83
THE HORSE,	96
SHEEP,	111
TYPICAL EXAMPLES OF THE STOCKING OF FARMS IN SOUTHERN AND MIDLAND ENGLAND,	164



FARM LIVE STOCK OF GREAT BRITAIN.

INTRODUCTION.

A proper knowledge of the habits and treatment of the animals of the farm is, without doubt, the most important branch of a farmer's education. It is the one, too, which is found to offer the greatest difficulties to men who take to the profession of farming late in life. In fact, few men who, as boys, have not been intimately associated with animals, can ever hope to attain to the first rank as judges or managers of stock. For the same reason we never find a really first-rate shepherd in a hill district—the place where high-class knowledge is most wanted—who has not as a boy seen and assisted in all the many little details of the management of a flock. He drinks in the information, as it were, with his mother's milk, and does not know in after life that he was not born with much of the knowledge he possesses.

It is not only a knowledge of animals that a boy gains by associating with them, but an interest in them. They are the playthings of his youth, and the objects of his affec-

tion as he grows in years. A first-rate judge and prize winner—it does not matter in what class of stock—is invariably found to spend many hours of his time gloating over the points of his favourite beasts. It is only in this way, and not from books, that a man can ever master the details of structure and the peculiarities of breed and constitution, the knowledge which alone can lead to victory in the show-ring.

A **servant** intrusted with the management of stock must make his charge his hobby if he is to be a success. A man is quite as happy in this life in the enjoyment of one hobby as of another, provided it be his own choice ; and it is much better for himself on account of his own happiness, as well as of the permanency of his employment and amount of remuneration for the same, if the hobby is that by which he wins his daily bread. One of the weak points in the new educational system, so far as agricultural labourers are concerned, is, that no adequate provision is made for admitting of their learning, while young (the time when all the deepest and most lasting impressions are formed), the business by which they are to live. Agriculture all round—but more particularly in the stock branch—whether it be the knowledge required by the farmer, or that by the labourer, is not like an ordinary trade or profession, which admits of hard and fast rules being laid down, and of being learnt in so many years, even after a man reaches maturity. It has to be taken in little by little, and through a long period of time, which must embrace a considerable propor-

tion of the boyish days. The knowledge must come, as it were, instinctively. It cannot be learnt by rote. We would not argue against the great necessity of giving every working man in the kingdom a good plain education. Putting aside all considerations of sentiment towards our fellow-man, and the necessity of having everyone educated who is to have a voice in the country's government, there is an undoubted advantage in having work performed by the aid of that intelligence which accompanies education. But what we protest against is the virtual prohibition of boys learning, at the only time when they can do that perfectly, the one branch of their education by which they themselves shall live and in time rear families. The present system runs all one-sided. It is the extreme into which we have fallen after a long period of deficiency in the branch which now receives all attention. Youth is spent in the acquiring solely of book-learning. Interests and inclinations which must develop are led into channels far away from the business of the future life. Work, when it has to be done, is performed as a drudgery and with a heavy heart. The frame is not trained, as it is being built up by nature, to dexterity and efficiency, nor yet is it strengthened and enlarged by that practice which always precedes efficiency. Why should not our educational system provide for the training of our labouring classes in both its branches, manual and mental, when it would conduce so much to their future happiness and the public good?

In treating the subject, "The Principles of Breeding" will be discussed first, followed by the different branches of stock in order, viz. :—Cattle, pigs, horses, and sheep; and two farm stocking calculations.

Darwin's work on "Animals and Plants under Domestication" treats fully of all the trustworthy principles of breeding that have yet been propounded, so that originality in this branch must not be expected to any large extent. The writer, however, avoids reiterating anything which he has not been able to verify in an experience which has extended over a quarter of a century.

PRINCIPLES OF BREEDING.

The strong family resemblance which is seen both in the human species and amongst animals related to each other, is a direct consequence of the existence of the first law of breeding, which is not constant in everything, but always holds good in some particulars, viz., that "like begets like." Other laws have to be obeyed at the same time; consequently, when we come within the immediate sphere of their action, this and various other laws have to be modified so as to harmonize with surrounding conditions. The influence of a parent, as such, in his or her first function, is not always exerted under exactly the same conditions, and consequently we have differences between individuals, alike in many respects, which distinguish them from one another.

To the uneducated eye, every member of a herd of Galloway cattle, or of a flock of Southdown ewes, looks exactly like its neighbour, and a townsman stares when he is told that some shepherds know individually every member of a flock of sheep amounting to perhaps 200 or 300.

The force of inheritance is strongest in old and well established pure breeds, but even among the best a very inferior animal (as the American skellywag among cattle)

may appear at times. This should never be allowed to breed. It is by getting rid of all such inferior or even moderately good animals that our breeds are improved. This weeding by the hand of the breeder, or selection, acts much in the same way among domesticated animals as the law of "the survival of the fittest" does among wild ones. A well bred, though plain looking bull, if he has no deformity or no very objectionable points, usually gets much better stock than a more handsome one without a good pedigree. For example—The Duke of Buccleuch's Ayrshire bull, "White Prince" (63), was "nothing" to look at, but lived till over twelve years old, and bred more good stock than any. In selecting sires, it is much more important to have them good than the females, because, besides the greater potency of the male, one bad one may affect a large number of offspring, whereas an inferior female only has to do with her own young. This becomes a most important matter when taken in connexion with the fact, that "the influence of the first male by which a female produces young is seen in her future offspring by different sires." Everyone knows, that should his English terrier bitch get lined for the first time by a Dandie Dinmont, she will years after throw puppies with some of the Dandie characters. The same applies, though perhaps not to such a marked degree, with the larger animals. For this, and the other reasons which induce people to go in for good stock as compared with bad, a mongrel bull should never be put to good cows. The best bred animals

are often far from perfect in some points. It is most important if ever a bull (or sire of any breed) with a special defect has been used, say a hollow or weakness behind the shoulder, that all succeeding sires should be specially strong in the particular point, whatever it was, else there might in time be a general defect established in the whole descendants. Males are more variable than females. For instance, say in a mountain breed of sheep, it is much more easy to select a large number of ewe lambs than of ram lambs fit to go to a show.

Animals with constitutional weaknesses amounting to unsoundness should not be bred from. Defects from injury, the result of accident, are sometimes transmitted to the young, and may, or may not, be hurtful. The tendency to bony exostoses on the leg bones of a horse, from the parents contracting these through hard work on the road, would be a case of the first kind; the following illustration of the second: A black spaniel bitch, belonging to Commander Harrison, R.N., had the tip of her tail caught in a door. White hairs grew from the injured part, and she bore various puppies with white tipped tails after, never having done so before.

Imagination sometimes comes into play in breeding, especially with regard to colour. The colour of an object at which an animal looks while conceiving sometimes governs the colour of the young. A perfectly pure bred Ayrshire cow at Auchenbrack, Dumfriesshire, gave birth to a dark dun calf, the same colour as her mate, which was

a cross from a Channel Islands' cow. The peculiar dun was not an Ayrshire colour. It is recorded of M'Combie, of Tillyfour, that he succeeded in preventing his black polled Anguses from breeding red calves by putting up a large black fence round the field, thus preventing them seeing the red cattle of his neighbours. A well-lighted byre, with whitewashed walls, is supposed to make calves lighter. How far the colour of the sire is transmitted to his offspring by inheritance, and how far by the imagination of the female, we do not pretend to say, but are inclined to believe that inheritance has most sway, especially in some crosses between two distinct breeds.

Certain colours can be, as a rule, depended upon to produce other and altogether different colours in the young; for instance, a black Galloway cow and a pure white shorthorn bull almost constantly throw a very dark-roan or blue-gray. A light-roan might give the same result; but a dark-roan or red bull will get either black or red colours, which are not so fashionable. In the same way, when Ayrshire cows are crossed with a shorthorn, a light coloured bull throws more of the shorthorn character into the colours of the calves, which bring better prices, as they are usually wanted for fattening purposes.

CROSSING AND IN-AND-IN-BREEDING.

Crossing families not related to each other usually gives increase of vigour and larger size, though sometimes the

distance between the characters is so great that the result is much like a cross between two distinct breeds. For this reason some object strongly to mixing up the blood of Booth and Bates shorthorns.

Too close "in-and-in-breeding," or pairing of animals related to each other, causes great loss of constitutional vigour, loss of size and fertility, and sometimes malformation (as a pig at Twiglees, Lockerbie, with a part of the backbone wanting). Pigs show the bad effects sooner than any other farm animals. Darwin points out that this is perhaps on account of their comparatively solitary habits. Gregarious animals do not suffer so much; they have been more accustomed to it, and nature has accommodated herself to the circumstances.

Shorthorns are not so much the worse for in-breeding as most other stock. Their distinct type has been stamped upon them by judicious in-breeding. This stamping of family characters or types by in-and-in-breeding is its only advantage, and cannot be avoided in the formation of new breeds or the improvement of old ones.

Crosses between two distinct breeds mated the proper way make the best fattening animals. The sire, in virtue of his greater potency, should be of the more improved breed; for example, the shorthorn bull breeds well with cows of milking breeds or slow maturing sorts, as Kerry, Highland, Ayrshire, or Galloway. Crossing the reverse way is a perfect failure. Of late years, since the Angus breed has been so much improved,

farmers cross shorthorn cows successfully with Angus bulls.

In farm stock it is usually considered that the male gives the external form, the female more of the vital and internal organs. This does not bar the fact that a calf has often a very strong likeness to its mother.

With a thoroughbred horse on mares of another breed, the result has usually a symmetrical form. The other way the produce is often stronger and useful, but plain, usually about the hind quarters and head.

Sheep come under the same rule. Any of the improved varieties of Leicesters or Downs may be used with advantage, under certain conditions, to put to the various mountain breeds.

The first cross between two breeds is usually intermediate between them; but after the first cross, it cannot be calculated how the tendency may run.

The first cross is the strongest. After-crosses get smaller and weaker, and all the more so the longer crossing is continued. This necessitates going back now and then to one of the pure breeds for a sire to infuse new vigour. This explains the success of crossing mongrel cows with a pure shorthorn bull.

Atavism, or "throwing back," or "reversion," is the re-acquiring by an animal of some character which the immediate parents had not, but which existed in its ancestors.

Two classes—(1.) In Purebred Stock.

(2.) In Cross Stock.

1st, Reversion in Pure Breeds.—The aboriginal species of domestic cattle and sheep no doubt had horns for defence and attack; now many are without them. Sometimes a ram of a polled breed, as the Cheviot, has small horns. In cattle this is also so, as imperfectly formed horns at times appear in both Suffolks and Galloways.

Sheep, for their better protection when wild, were originally brown or dingy black. Now and then in the best flocks reversion is shown by the appearance of a black sheep; and so frequently is this correlated with poor quality, that it has become proverbial to describe the unfortunate member of a family as the “black sheep.”

2nd, Reversion in Cross Animals.—This is much more common. When two distinct breeds are crossed, the produce has a strong tendency to revert to one of the pure forms, or rather to an inferior ancestor of one of them; and this lasts for generations. The young often take the colour of one parent, and in time change it for the other. The calf from a black cow by a red bull is often born red, becoming black; and the foal of a chestnut mare, mouse coloured, becoming chestnut.

“**The act of crossing** in itself gives an impulse towards reversion,” as seen by characters appearing in the young that had not been seen in either pure breed for generations. Calves are sometimes produced white with dark ears, like the ancient wild cattle, by a red shorthorn bull on West Highland cows.

Cross-breds are often wilder than pure-breds. This is noticed particularly in cattle and sheep. Cross sheep are not so easily fenced, and a dairy of cross cows is more difficult to train to stand for milking in the field than pure shorthorns.

Domestication increases the fertility of animals, if properly bred and not overfed. Being in an improving condition at the time of conception increases the number of twins. In a flock of ewes the largest number of twins is got the first few days the ram is out. The first young of most animals run slightly more to the female than to the male side.

Barrenness or uncertainty may be caused by, 1st, Over-feeding in the case of either sex, thus loading the reproductive organs with fat. The remedy is judicious starving, or working, in the case of cattle or horses. Some foods cause this more readily than others. Sugar, molasses, and linseed are as bad as any, but are nevertheless often used to get beasts up for show or sale, because they give a fine smooth and glossy skin, as well as lay on fat. These foods would not do damage if given in moderation with hay or straw, but it is when given in addition to a full feed of other concentrated food that they do harm. Foods for breeders should be particularly rich in phosphates, and should have more albuminoids to fat-formers than in the case of feeding animals; such foods are—beans, peas, lentils, etc. Fat animals do not come in season often, and consequently settle better and feed faster.

2nd, Too low condition, especially if combined with exposure to cold and wet, as with cattle wintered outside on poor food, or heavy milking cows sucked down by a large calf, or perhaps two. This occurs most frequently when calves run constantly with their mothers.

3rd, Constitutional weakness from in-breeding.

4th, Being a free-martin or dumb-martin, that is, a heifer born one of a pair of twins, the other being a bull. Its external as well as its internal organs of generation are imperfectly formed and contracted. It usually has a more or less masculine appearance, especially about the head.

Sheep or horses do not answer to this rule. Twins from a mare are very rarely seen. They are usually born too soon, or die if they do come to full time.

CATTLE.

BEFORE describing the distinguishing characteristics of the different British cattle, we shall give shortly the general points applicable to all those kept for beef production, when in good condition.

GENERAL POINTS.

Head broad between the eyes, flat across the top (with few exceptions in polled breeds) and down the nose, which should be neither dished nor Roman, and of medium length; muzzle broad, full, distinct, and dewy; eyes large, full, and clear; horns none, or varying in length, colour, and strength, according to breed, set on crest of head, the roots on a level with shoulder, back, and tail-head; ears full and sensitive, well covered with hair, and varying slightly in position in the different breeds.

Neck lengthy, broad, and muscular in the male, but fine, and tapering to the head.

Body long and deep, equally balanced before and behind; back broad; the frame well and equally covered with flesh, not patchy on the hooks, tailhead, rump, shoulders or other parts (when prime, a little pit may be felt on the point of each hook). The trunk should resemble as nearly as possible from all points a parallelogram; the

under and upper lines straight ; brisket well forward ; and a thin tail, set on well back, falling perpendicularly.

Skin moderately thick (not papery), loose, and mellow to touch ; hair covering all parts well, with a mossy feel.

Shoulders broad above, laid well back over the ribs, sloping downwards and forwards.

Chest full, wide, and deep.

The Forearm and Leg straight and short ; muscle large and broad ; bone strong, though fine and flat (small bone shows tendency to diminished size) ; legs well under ; hoofs clear and oily.

Hind Quarters full and well packed, lengthy from hook bones (which should not rise above back level) to tail-head ; deep from the hooks to above the hock ; thighs broad and thick.

Ribs well sprung and deep, filling up deficiency behind the shoulder and in front of the hooks.

Fore Flanks and Hind Flanks full.

The Lines of the body flowing, not sharp or abrupt, and a general balance of parts to please the eye.

CHARACTERISTIC DIFFERENCES OF BREEDS, TAKING FIRST BEEF PRODUCERS.

The Shorthorn is represented in greatest numbers, and more widely distributed than any other. It crosses well with the females of all breeds, even inferior ones. Booth cattle are better fleshed than Bates which are said to be

the best milkers. Bates are thin fleshed and more in-bred than Booths. Booth bulls cross well with Bates cows, but the other way about does not always "nick."

Shorthorns may be red, white, or roan, but never black or brindled. The skin, eyelids, and inside the ears, of a yellow creamy colour; nose, lips, palate, and eyelids free of black markings. The nose of a red flesh colour, not too deep either way. The shoulders of the female are narrower at the chine (back bone). Any character of the opposite sex in either male or female is bad. Horns curved and flattish, wide apart, and not up at the points, and all of a waxy yellow, without black tips.

The Longhorn Breed.—The name was taken from the very long, strong horns, which curve down in all directions. They came originally from Craven, in Yorkshire, and spread over the Midlands of England.

Shorthorns have greatly supplanted them since the beginning of the century. In form, large size, and quiet disposition, they much resemble shorthorns, but are coarser, and do not feed so easily. Some are deep milkers, while many are more suited for fattening than milking.

The milking qualities were neglected by Bakewell for fine form. A herd-book has been started, and more attention paid recently. Colours are those of shorthorn, plus brindles. A white ridge often runs up the back.

The Hereford Breed produces the best quality of beef,

and feeds rapidly. It is becoming widely known, and bred both at home and abroad.

The bullocks are used as working cattle. The cows, which have usually suckled their calves, are now being improved in milking powers by selection. The nostrils are flesh coloured. The face, forward part of back, throat, belly, inside and lower parts of legs and top of tail, white; the remainder rich red. The horns are medium, turning slightly up in the female, and black-tipped. The shoulder is particularly neat and well covered with flesh. The twist is also good. The great defect in the fat Hereford is want of "making up" inside. The setting on of the tail is often not so good as in shorthorns. Salop Herefords have had a dash of shorthorn blood, showing spots of brown on the faces, and less white altogether.

The Devon Breed is well proportioned, and particularly well made up behind the shoulder. Colour blood-red, no white. Feeding qualities excellent. Beef well mixed. Not so large as the Hereford. Good at farm work. The milk is rich, but there is little of it.

The West Highland Breed or Kyles.—Very hardy, with thick shaggy coats of long soft hair in winter, of various shades of dun, red, and brown; also black and brindle. Black animals are usually thought to be hardiest, while others feed faster. The legs are short and strong. Altogether like the Galloway, but with horns which are

fine, long, and spreading, black-tipped and sharp. The milk is rich, but there is little of it, and it is only given for a short season. As the calves suck their mothers, when they become cows they are often wild. When three years old the bullocks make handsome park cattle. They feed slowly until over this age, when they make the finest beef.

Scotch Polled Breeds.—(1) *The Galloway*, and (2) *the Aberdeen-Angus*. **Galloways** are usually black, with a brown tinge on the tip of the hairs, and sometimes white spots on the bellies, especially where distinct families are crossed. Now and then a brown-red appears. They have long rough hair, and are hardier than any, except West Highlanders, on poor and exposed land. As compared with Angus cattle they do not mature so quickly, and are thought to be a shade smaller. They have stronger bones, coarser necks, rougher hair, longer quarters, and the head is not so pointed at the poll. The cross with the Hereford bull is very fine quality, with a white hornless head and a red or dark-gray body. The shorthorn throws slightly larger offspring, also prime sorts. The milk is of excellent quality, but deficient in quantity.

The Angus and Aberdeen Breeds are now amalgamated. They are longer-legged and often flatter and lighter-ribbed than Galloways. The best of them are exceedingly compact, beautiful animals, showing many points

of good breeding. M'Combie's cattle won the prize at Paris in 1878 for the best lot of foreign animals. A few milk well, but they are not, as a whole, first-rate in this.

Welsh Cattle.—There are several sorts, but only two distinct strains are worth describing. The others are crosses or breeds becoming rapidly extinct, as the Glamorgan.

1st, *The South Wales, or Pembroke, or Castle-Martin* breed, is the best. The cattle resemble West Highlanders, but their strong horns are not so long. They are very hardy, and being good milkers, are used for dairying. The colour is black, with a russet tinge more particularly on the least hairy parts.

2nd, *North Wales or Anglesea* breed is wanted as black as possible. This is more a beef-producing than a milking breed. The bullocks go down into midland England as "Welsh runts," and make the finest quality of beef (weight 50 to 60 stones each) at four years old.

Other points in the general appearance of the two breeds are much alike. There is now a herd-book for each, which encourages improvement.

MILKING BREEDS.

The Ayrshire is the most perfect type for milking. It is essentially a cheese-dairy breed. The produce is greater than from any other kept on poor land or inferior food.

It is very hardy, and not so liable as the shorthorn to tubercular disease. By rich feeding and selection, many show animals have been much increased in size. The flow of milk has not in all cases grown in proportion. The Ayrshire bullock feeds well when three years old, but is not often met with, as the bull-calves are mostly sold as slinks for about 7s. or 8s. each, and killed when a day or two old. Many are never allowed to taste milk. Fed till six or eight weeks old, they may be sold for fat veal at 50s. to 60s. and upwards. Heifer calves sell for 15s. up to 20s., and are reared for dairy purposes. In the ordinary summer-milking dairy, March and April are the usual calving months, and on into May for heifers. Where milk is sold, they are calved all the year round.

The following are the points of the cow and their values in judging in the show-ring, taken from a report by a committee of the Herd Book Society (1883):—

- | | |
|---|-------------------|
| “1. <i>Head</i> short; forehead wide; nose fine between
the muzzle and eyes; muzzle large; eyes full
and lively; horns wide set on, inclining up-
wards, | 10 |
| 2. <i>Neck</i> moderately long, and straight from the
head to the top of the shoulder, free from
loose skin on the under side, fine at its
junction with the head, and enlarging sym-
metrically towards the shoulders, | 5 |
| | — |
| | Carry forward, 15 |

- Brought forward, 15
3. *Forequarters* — shoulders sloping; withers fine; chest sufficiently broad and deep to insure constitution; brisket and whole forequarters light; the cow gradually increasing in depth and width backwards, 5
4. *Back* short and straight; spine well defined, especially at the shoulders; ribs short and arched; body deep at the flanks, 10
5. *Hindquarters* long, broad and straight; hook-bones wide apart, and not overlaid with fat; thighs deep and broad; tail long, slender, and set on level with the back, 8
6. *Udder* capacious, and not fleshy, hinderpart broad,” and rounded like the side of a cheese. “The whole firmly attached to the body; the sole nearly level, and extending well forward; milk veins well developed; teats from 2 to $2\frac{1}{2}$ in. long, equal in thickness, and hanging perpendicularly; distance apart, *at the sides*, equal to $\frac{1}{3}$ of the length of the vessel, and *across* to about $\frac{1}{2}$ of the breadth, 33
- (Small teats are now considered most objectionable, both in the market and the showing.)

—
Carry forward, 71

	Brought forward,	71
7. <i>Legs</i> short in proportion to size; bones fine, and joints firm,		3
8. <i>Skin</i> soft and elastic, and covered with soft, close, woolly hair,		5
9. <i>Colour</i> red, of any shade, brown, or white, or a mixture of these—each colour being distinctly defined. Brindle, or black and white, is not in favour,		3
10. <i>Average live weight</i> in full milk about 10½ cwt.,		8
11. <i>General stylish appearance</i> and movement,		10
	<hr/>	
	<i>Perfection,</i>	100”

The Three Channel Islands' Breeds are essentially butter-makers, giving a moderate quantity of milk, rich in cream, composed of large globules. All usually called Alderneys, in England, although in the spring of 1883 there were only two pure bred Alderney cows alive.

The Alderney colour was darker than the others; the nose, tongue, and teats, black.

The two remaining breeds differ from one another in that the *Jersey* is smaller than the *Guernsey* (an average cow 700 lbs. to 800 lbs. live-weight), and is purely a milking breed. The *Guernsey* will lay on fat when not in milk. The cows of both are most docile, the result of tethering and much handling for generations. The bulls often

become wild. The points much resemble the Ayrshire.

Exceptions are as follows:—

1. Chest deep and broad.
2. Ears a deep yellow colour inside.
3. Hide of a yellow colour.
4. Hair fawn, mixed with dun, black, cream or white.
5. Muzzle dark, and encircled by a light colour, "mealy mowed."

The Jersey particularly is very handsome and deer-like ; often seen in private parks. A few of either breed are sometimes kept in ordinary dairies to raise the quality of milk and butter, and to make the cream churn more easily. The Island breeds have been kept pure, as no cattle are allowed to be imported. Much of the best blood has been bought at large prices, and taken to America, where, we are told by Mr Hewet of New York, the young of the first and second generation increase in milk and butter - producing qualities usually $\frac{1}{3}$ and frequently $\frac{1}{2}$.

The Kerry Breed, the only pure native Irish cattle. Being small and handsome, they are kept as fancy cows. The colour is black, sometimes red ; the horns fine, waxy-yellow rather than white, black-tipped, curving slightly up ; the yield of milk large.

The Kerry is the Irish cottiers' cow, especially in cold and poor districts.

The Dexter variety has more substance and more hair, and is not so leggy as the common Kerry, but is not so deer-like about the head. The brown and the spotted varieties strongly resemble West-Highlanders.

Norfolk and Suffolk Polls are good milkers as well as beef-producers. Colour a deep, rich red all over, rarely dun; nose flesh-coloured. Produced by crossing the old breeds of the districts with Scotch polls.

Sussex Breed are horned, and very like the Devon, but larger and coarser; good draught animals, and flesh producers, as well as milkers.

Shetland or Zetland Breed, very small, and like the Kerry, but not nearly so handsome. Small irregular horns, and colours various. The hocks go too close together, and the whole appearance is old-fashioned and irregular. The breed is very hardy, with first-rate milking qualities; will take on flesh readily, producing the finest beef.

BREEDING AND MANAGEMENT OF CATTLE.

Always have stock of good blood, though for ordinary purposes not necessarily the strain of blood most run on, and consequently commanding the highest prices. Dealing in fancy animals and fancy prices is more or less gambling, and is not for the ordinary farmer.

Calves, however reared, should have their mothers' milk,

and that only, for the first three or four days. Beastings or first milk is best for the calf, and unfit for anything else. It often contains streaks of blood, especially from heifers of the first calf. Good butter can be made from "green milk" rather earlier than good cheese.

Calves may be—(1), tied by the neck; (2), kept in small cribs singly; or (3), let run together, loose, in a large, dry, well-ventilated place. When loose they often suck each other about "the parts," which causes enlargement and often sores. To prevent this they are sometimes muzzled by putting on a bridle with sharp prongs over the nose, to prick other calves and prevent them standing to be sucked. It is better to give artificial food, as cake, immediately after the milk, to take up the attention until the strong instinctive desire to suck passes off. Hay-racks and small boxes for cake should be fitted up at convenient heights.

Concrete makes the best floor for all cattle houses, being easily cleaned. Sufficient fall should be had into gratings opening over covered drains, to prevent urine standing in pools. The drains should be regularly swilled out.

Three Methods of Rearing Calves.—*1st*, Allowing the calf to suck its mother. This is most natural and makes the best calf, but it is expensive, and the calf grows up wild unless handled frequently. There is greater mortality from foot and mouth disease among sucking calves than hand-fed ones, as a change to healthy milk cannot be made if the mother gets affected, and the virus of the disease in milk acts as a blood-poison. Bulls and pedigree show-

stock, especially in beef-producing breeds, are often allowed to suck. Less milk, given in this way, suffices; farrow cows with little milk may rear good calves. Two calves are often fed by the same cow. Sometimes the last of the milk is drawn away by hand. This is richer in cream than the first part. A cow which suckles a calf, say this year, is none the worse for milking next, although some dairymen are prejudiced against them.

2nd Method.—Giving full milk alone newly drawn from the cow (then the milk is about 90° F.) Taught to drink from a pail by giving the finger at first. An ordinary shorthorn should get for a day or two $\frac{3}{4}$ gal. divided into three meals (small breeds less). A little at first encourages the calf to drink. Increase should be gradual. Some only feed twice a day, although it is better to do it three times. From the second week, increase to 2 gallons by the end of the fourth week, and $2\frac{1}{2}$ at three months; then wean by gradually reducing. Some go on, especially with bulls, for six or nine months. Dry cake and long food are gradually given when old enough. This method is also expensive and not much practised. Fattening calves should have as much milk as they will drink, and be kept quiet and in the dark.

3rd Method.—Giving the full milk of the mother for ten days. We believe in rubbing the calf dry with straw, or simply covering it up with straw, and not allowing the cow to lick or see it, as it unsettles her when removed. Many allow the calf to suck for three or four days and then

take it away, but the cow is apt to fall off in milk, which does not always come back to the full amount. When ten days to a fortnight old, gradually reduce the new milk and substitute skim-milk made up to the standard of full milk by artificials, as boiled gruel, at a temperature not exceeding 100° F. Begin with a tablespoonful of burst linseed: a larger quantity would cause indigestion until the stomach gets accustomed to digest solids. About the best mixture is half and half linseed-meal and pea-meal. Linseed-cake ground to meal may be used, and then it may form two-thirds of the mixture. Oatmeal is good, but it is more liable to cause acidity if the feeding is not well and regularly attended to. Cotton-cake kills calves; they cannot digest it. One gallon of skim-milk per day with mixed meal gradually increased to one pound and then to two pounds, is enough for an ordinary calf before weaning. Sweet whey is sometimes substituted for milk at the end, or one-quarter of the meal may be Bewick's Lactina. Calves like it, but it is rather dear, and requires great care to have the water for mixing quite boiling, else calves scour and get thin. Much less milk is often made to suffice. One Ayrshire cow has been known to rear sixteen calves in one summer aided by artificials, and in the summer of 1884 a good shorthorn, close to Horsham, reared twenty-four shorthorn crosses.

White scour (and "hoven" from indigestion) often breaks out even in calves sucking, just when they begin to eat hay. The stomach is too small, and unsuited to digesting any

quantity of such food. Give green food or silage in place of hay, or a little fine hay very gradually, and in hand-fed calves the milk oftener than twice a day. The undigested curd causes the light colour of the fæces; the acid in the stomach having expelled the whey, and made the curd hard like cheese. *Remedies*:—In young calves, diet by feeding often and reducing the quantity, giving boiled starch and less cream if the milk be rich. Administer a stimulant and purgative, as magnesia, rhubarb, or castor oil, with a little ammonia. When older, 4 to 6 oz. Epsom salts, and $\frac{1}{4}$ oz. gentian and ginger.

All calves should be taught to eat linseed-cake before weaning, so as to make the change as slight as possible at that time, and each should have 1 lb. per day all summer, especially when the land is subject to black-leg. It keeps the animal thriving all the time, and less liable to disease. A seton is put into the dewlap also to prevent this. Castration should be done when the calf is about a month old. If much later it goes off thriving for a time. When not performed till strong masculine characteristics develop, the animal (then called a "seg") is reduced in value. Bulls should be taught to lead by "bull-dogs" or "humbugs," or by a ring put through the gristle between the nostrils, before a year old. At a year they may serve small queys, but if not quite large enough should not be allowed to take an advantage, say on a hill side or slope, as they are apt to fall and injure their backs. Bulls are now more docile than of old, owing to being more

gently treated. While at service they should be in good store condition, and each may have daily, according to size, up to 5 or 6 lbs. mixed meal or bruised grain. They are more sure, and get better calves, than when fed on cake.

Calves should be housed for the winter early in October, as soon as cold nights come, to save flesh and prevent "hoose," or render it less severe. Treatment of "husk" or "hoose" (which is recognised by the unthriving appearance of the animal and a husky cough): keep warm, feed well, and give turpentine ($\frac{1}{2}$ oz. to 1 oz.) soaked into dry meal and then mixed with cold gruel; repeat once, or perhaps twice.

Young cattle particularly, if in poor condition (as imported Irish often are), are liable to ringworm in winter. White scaly patches without hair appear (most abundant about the head and neck), the result of the growth of a vegetable parasite (*trichophyton*), which may be destroyed by applying paraffin oil, carbolic acid, or hot lime made into a thin paste and spread on with a flat pointed stick. The inside walls of the cattle-shed must be whitewashed with lime, else the cattle wintered in it next year will take it.

Lice of two common species appear on British cattle—(1), the large or broad-bodied, or sucking ox-louse (*Hamatopinus eurysternus*), which lives by piercing the skin and sucking blood; and the small or biting ox-louse, which has biting-jaws in place of a sucking mouth, "and feeds on the decaying portions of the cuticle and hairs," and not on blood. Both are insects with six legs, and both do injury

by causing irritation, the sucking one to the greater degree. If cattle of any age are allowed to get too lean, kept too hot in a close house, or fed for a time on insufficient food, as barley-straw or flying-bent (*molinia*) hay, they are more liable to become infested with lice, usually both varieties together, most abundantly about the rump, head, neck, and shoulder tops. Lice may be destroyed by one or two dressings, well rubbed-in, of trainoil, sour buttermilk, black soap, or any of the various carbolic dressings. Paraffin oil is effectual, but requires care. Anything that would injure the animal through its licking the skin, which it should do regularly, must be avoided.

Weak cattle are kept back from feeding by the others, and therefore do badly, and should be removed and kept separate.

The first winter a moderate amount of cake may be continued, say 1 or 2 lbs., if fed on straw. If plenty of good roots is given, the cake may be reduced or done away with altogether.

GRAZING CATTLE.

It is more difficult to judge store cattle than fat ones. The most important rules for this cannot be written. A man must come to understand animals instinctively, and through long experience, to be able to judge of the outcome from the present appearance. In buying, one ought to learn how the beasts have been kept for some months,

and never take those from a better climate or better food. Cattle moderately fed, and not kept too warm in winter, do better by the end of the grazing season than those well fed and in close byres, where the hair comes off, leaving them too little cover when turned out in spring. Those that lie out all winter often do best if not too lean to start with. The extra constitution gained by being out enables them to make up more than the winter loss. To those not fed on cake in winter, a few pounds per day, given for five or six weeks before turning out, "comes out" afterwards in extra condition, by giving them a good start. Cattle three or four years old feed faster than two-year-olds, and kill better than they look, having more internal fat—are "better made up." These ages are difficult to get unless from poor or cold districts, where it would not pay to force by feeding, and where maturity is more slowly reached.

The propriety of making beasts prime at two years, or allowing them to be three or even four before finishing, must be determined entirely by the quality of the natural products of the farm, the climate, and the habits of flesh of the animals suited to those surroundings. It would be absurd, and would never pay, to try to force a Galloway or West Highland to maturity at two years, when kept in its native conditions. Time must be allowed to overcome those natural disadvantages. It would be equally poor practice with the best of everything in the way of food and climate, where animals of a breed accustomed to mature

rapidly would do best, to keep them a year longer than necessary. A large proportion of food (and in this case expensive food) is burnt up to supply the waste of the system; so that by keeping animals till three years old, when by proper management they could have been off at two, increases the loss by at least one-third.

The points of a good feeding animal are very much those already described, under general points applicable to all flesh producers. M'Combie says, the following denote slow feeders: "Deep neck; thick legs ["trousery"] and tail; thick skin, with hard hair and hollow eyes."

Grazings in England may be divided into three qualities—(1.) *First-rate pastures*, rented at £3, 10s. per acre, more or less (much of it let each year by auction), reduced from £5 or more a few years ago: limited in extent. Found in Leicester, Nottingham, Somerset (the marshes), the fen land in Lincoln and Cambridgeshire, etc.; parts of the Old Red Sandstones of Herefordshire, and many small areas along the banks of rivers. These feed large bullocks without cake, and often keep fully one to the acre. Sometimes an extra sheep is put on per acre, but we do not believe in the practice. The sheep do all right, but the cattle would be better without them. The grass season is from May 1st till November 1st. At first, if grass is not fully come, a little hay is given. Thistles, nettles, and all large weeds are cut regularly before seeding; tufts of coarse grass also mown. Dung is either spread or carried off to prevent the growth of dark green "tathy"

patches. It is considered a sign of good land to have a perfectly even surface, and a very close cover, which should not be allowed to get too long. Very fine pasture has a velvety feel under foot.

Shelter is provided—natural, as hedges, trees, etc.; or artificial, as shelter-sheds. In Leicestershire, straw is sometimes thrown under the hedges to make a comfortable bed. Two lots can be made prime fat on the same land in one season—the first going by the 1st and 2nd week of July (without being caked), having put on from 8 to 10 stones of beef. The land is cleaned by resting for ten days. The second lot would not be so good, as the first in spring, and would be kept for a time on pasture slightly inferior to that described. These require a few lbs. of cake, as the grass begins to fall off in quality at the end of September and in October. Some think it pays to give cake to cattle on the best pasture throughout.

A few rough beasts (perhaps one for four or five acres) bought to clean up rough grass, run out all winter, do remarkably well if sheltered from cold winds, and if a little fodder be given in time of storm.

(2.) *Second quality pasture*, rented at from £2 to £2, 10s. per acre, suited to keeping lighter breeds or smaller animals. If these are being finished they should have cake all the time, beginning with 3 or 4 lbs., and ending with 6 or 7 lbs.; given in troughs moved regularly to distribute the manure equally. By feeding cake, beef is

made faster, and of better quality. The land is also improved and will keep more stock.

(3.) *Third quality pasture*, rented at from nearly £2, down to a few shillings per acre, only suited to keeping store cattle or sheep, or, in some localities, dairying. The land is often good, but the climate unsuited to fattening beasts. Besides hill and mountain lands the various downs come in this class.

Symptoms unnatural to healthy Cattle at Grass, and that may be seen without handling:—

(1.) An animal going by itself, if accustomed to be with others, and perhaps cowering behind a wall with its back up.

(2.) Not stretching itself on being quietly raised.

(3.) Hair standing on end: "Staring."

(4.) The absence of lick-marks on the hair.

(5.) Saliva flowing from the mouth.

(6.) Not feeding or chewing the cud for any length of time.

(7.) Hollow sides consequent from want of food; or

(8.) Blown out by gas forming through stoppage of digestion.

(9.) Quick breathing, or a cough.

The hollow condition of a heifer "in season," from want of settling to feed, must not be mistaken for disease. She will then stand quietly while another jumps on her, and again try to jump on others, which, however, do not stand.

HOUSE FEEDING.

Three ways of arranging cattle—

1st, Tied by the neck in a byre, either in stalls or without stalls.

2nd, Put in loose boxes, one in each.

3rd, Untied, several together in a shed, with an open door and an outside (uncovered) court.

In a byre they may be arranged, if in more than one row, either with the heads looking towards the centre of the house, or the heads to the side walls, with or without a feeding passage in front. It is a mistake to have stalls to hold two, even large cows, more than $7\frac{1}{2}$ feet wide; for smaller ones 7 feet, and for Ayrshires 6 feet. Six feet is long enough for the largest stall. When too long the animal lies in its droppings and gets dirty on the thighs and legs. The manger, 2 ft., 6 in. extra in front, gives plenty of space to hold fodder. The bottom should be shaped so that cake when given would be within reach of the animal, to prevent it trying to put its feet into the trough, which may be of glazed earthenware 18 inches wide. Ventilation is of great importance, and can be secured by holes low down in the walls and openings in the roof. Where the heads are close to the wall, it is well to have a $1\frac{1}{2}$ -inch pipe through it, low down between every two cows in a double stall.

Boxes (each 10 ft. square, to hold one) are best for all kinds of stock except young stores, only they are more expensive, as they take up more space. Litter, cut

if convenient, 6 or 8 inches long, is given, 20 lbs. per day to each animal in a box, and 40 lbs. in an open yard. In a byre it is not positively necessary to allow any. Cattle keep rather cleaner behind with it than without it.

Open sheds, with uncovered courts, may be—

1st, Large, each accommodating 10, 12, or more.

2nd, Small (these called Hummels), each containing two to four together.

Sheds are best for stores or for feeders in very hot weather. The great objections to these are—(1.) The loss of manure by washing with rain; (2.) The extra straw wanted; and (3.) Strong cattle starve the weak ones. Beasts that are to be fed in such places should be horned when young. This is often done with Irish cattle.

Cattle are housed in the north by the end of September. In the south they should be in before the beginning of November. A man at 15s. or 16s. per week can tend 30 bullocks tied in stalls, if the food be handy. He can do 40 if they are untied.

Regularity in Feeding is the first thing, not giving too much at once; carefully removing any food that is left. Each feed should be eaten before the animal leaves. This allows time to rest and chew the cud, and to prepare for the next meal. All changes of food should be gradual. Large feeds of turnips at first cause scour. Clover, if wet and in quantity, produces hoven, and often death from suffocation.

White and yellow turnips should be used first, as swedes are sweeter and keep better. One can never go back

with success to an inferior food with fattening cattle. Mangels keep best, and are best in spring. Roots should be stored in time, for if frosted they are bad for all animals, especially when in the house. They are now only given in quantity to supply water, 1 cwt. per day to an ox is about the limit, while $\frac{3}{4}$ cwt. is often enough. Potatoes should never be washed (earth aiding digestion), and are only given in moderate quantities.

Roots are given whole, to amuse the animals, or sliced to save waste of energy, or pulped and mixed with chaff the day before, so as to ferment slightly and raise the temperature in cold weather. Some think cattle like the mixture best when newly prepared. The concentrated food should be fixed on according to what is cheapest in the market, cotton or linseed cakes, maize-meal, Indiana or Paisley meal, wheat, oats, barley, beans, peas, lentils, or linseed, all ground into a fine state of division, to be more easily digested. Whole grains come through cattle undigested. (In the Western States of America pigs are often kept solely on Indian corn, which they pick out of the droppings of cattle.) All may be given dry, spread on the top of the chaff in the feeding-troughs. The rough and short food then go down together. A little locust bean-meal may be added to the mixture to sweeten it, but not too much, else it makes the animals neglect the unsweetened food. Treacle is a good fattener, and may be used, when cheap, as a relish. Cane sugar* is better liked by cattle than

* See a paper by Sir J. B. Lawes in the Royal Agricultural Society's Journal, 1885.

treacle, and is more easily manipulated, but is too expensive for ordinary feeding. As a rule, the mixture is half cake and half mixed meal. Some prefer giving pure cake for one feed in the day to make greater variety. Having begun with little, say 2 lbs. per day, if given for the first time, gradually increase every few weeks. A fixed quantity of concentrated food would lose its effect. Eight or 10 lbs. per day is an average amount to get up to with an ordinary bullock near the finish; more than 10 lbs. is a waste. The return after a certain point is in inverse proportion to the amount supplied. Much forcing of young animals, even for fattening, is a mistake. It is much worse if for breeding. It is best just to keep them thriving all through. Heifers feed faster than bullocks, especially when young. The drawback is their coming in season and not feeding for a day or two, and, if loose, keeping others that jump on them from settling.

Tied-up cattle should be groomed regularly, especially about the rump and neck, where they cannot lick themselves. They should be kept quiet, and at a uniform temperature of 60° F. If the hair be very rough when first put up (as is often the case when kept the first part of winter in a straw-yard, until room is got in the stalls by sale of those first made prime), the back, half-way down the ribs, and all of the thighs and tail, may be clipped bare. This prevents excess of sweating, which would take place at first, and they can be more easily kept clean, and consequently feed faster.

A heifer or bullock that would weigh 40 to 45 st. dead-weight if killed, put up to increase $12\frac{1}{2}$ lbs. of dressed beef per week, should get on an average 6 lbs. of cake and meal mixed per day (beginning with 4 lbs. and finishing with 8 lbs.), $\frac{3}{4}$ cwt. roots, $1\frac{1}{4}$ st. straw (partly chaffed), or a small portion of this replaced by hay of equal money value—a small foddering once a day. It will not pay to feed much on hay worth £4 or £5 per ton.

At 6 A.M., or earlier, give half the artificial mixture; when this is eaten, in an hour or so, one-third of the roots. At 12 o'clock give another one-third of roots, and at 5 P.M. half the mixture of cake and meal; at 9 P.M. the remaining roots and perhaps a little rough hay in the racks. Uncut straw should be provided through the day as well as chaff. Depending on the condition at first, three to five months may be taken to finish prime.

Calculation of Feeding per Week.

	s.	D.
3 lbs. cake ¹ per day @ 1d. per lb. × 7, .	1	9
3 lbs. meal „ @ $\frac{3}{4}$ d. „ × 7, .	1	$3\frac{3}{4}$
$\frac{3}{4}$ cwts. roots „ @ $4\frac{1}{2}$ d. per cwt. × 7, .	1	$11\frac{1}{2}$
$1\frac{1}{4}$ st. straw „ @ 3d. per st. × 7, .	2	$2\frac{1}{4}$
Attendance,	0	6
Cost of producing 12·38 lbs. of beef, .	<u>7</u>	<u>$8\frac{1}{2}$</u>

Or about 8s. 9d. per imperial stone of 14 lbs.

¹ Cake at 1d. per lb. = £9, 6s. 8d. per ton; meal at $\frac{3}{4}$ d. per lb. = £7; roots at $4\frac{1}{2}$ d. per cwt. = 7s. 6d. per ton; straw at 3d. per st. = £2 per ton; litter at $1\frac{1}{2}$ d. per st. = £1 per ton. For cake and meal the price

Sir J. B. Lawes showed by experiment many years ago that it required from 12 lbs. to 13 lbs. of dry food to produce 1 lb. of increase of live-weight in oxen, but his more recent investigations make this amount of dry food too high by a few pounds.

Applying this reduced rule (of say 1 lb. live-weight to 10 lbs. of dry food) to the calculation given—

(1.) *Concentrated Food*—

Cake 3 lbs. — 12 p. c. water	}	average, 13 p. c.
Meal <u>3</u> lbs. — 14 p. c. water		

6 lbs. per day

× 7, to bring to weeks.

100 : 42 :: 87 : 36·5

(lbs. natural cake and meal). (p. c. dry). (lbs. dry cake and meal).

Dry cake and meal, . . . = 36·5 lbs.

(2.) *Roots.*

$\frac{3}{4}$ cwt. = 84 lbs. — 89 p. c. water.

× 7, to bring to weeks.

100 : 588 :: 11 : 64·68

(roots, natural). (p. c. dry roots). (total dry roots).

Dry roots (nearly) 64·5 lbs.

Concentrated food and roots (carried forward) = 101·0 lbs.

is rather above the present market rates, but as these vary so much it is thought advisable for convenience not to alter the even figures.

Concentrated food and roots (brought forward) = 101·0 lbs.

(3.) *Straw.*

$1\frac{1}{4}$ st. per day = $17\frac{1}{2}$ lbs. — 14 p. c. water.

× 7, to bring to weeks.

100 : 122·5 :: 86 : 105·5

(lbs. straw, natural). (p. c. dry). (lbs. dry straw).

Dry straw, 105·5 lbs.

Total dry food, 206·5 lbs.

$206·5 \div 10 = 20·6$ lbs. increase of live-weights. Live-weight brought to dead-weight at 60* p. c. = 100 : 20·6 :: 60 : 12·4 (lbs. dressed beef laid on per week).

A larger bullock, getting in proportion more food, may be calculated to lay on 1 imperial stone of 14 lbs. per week.

From the foregoing figures it will be seen, that there is little profit in the actual amount of flesh made by cattle that are highly fed with this expensive food in passing from store to prime condition. That which pays the farmer is raising the quality of the rough beef he began with, and consequently its price in the market; also getting a market at his door for the least marketable products of his farm, straw and roots, and in making manure.

* Warington gives 60 p. c. as the proportion of dressed beef from a fat bullock's fasted live-weight, but this is rather little for the increase of weight through feeding at the finish.

DAIRYING.

Conditions, suitable and unsuitable.—The climate is the only limit to success in dairying in this country, and that on account of wet and cold on the higher of the hilly regions. All other difficulties, as little rainfall, clay soil, etc., that were at one time (and not so long ago), thought to be unsurmountable, can be overcome by adapting to the prevailing circumstances one of the many varied systems which are practised. There is a choice (1), of “soiling,” or keeping the cows entirely indoors and carrying all food, green or otherwise, to them; or (2), pasturing during summer: besides many combinations or variations of the two plans.

The favourable conditions in some localities make dairying more remunerative in certain places than in others, but the want of some of these does not prevent the practice. The districts of most renown are—parts of the counties of Cheshire, Derby, York, Leicester, Gloucester, Somerset; and in Scotland, Wigtown, Kirkeudbright, Ayr, Renfrew, and Lanark. Such places have the soil and climate suitable for growing good grass, which is the best and cheapest main supply of food for dairy cows—grass for summer, and hay for the winter months. Roots were at one time considered indispensable, and it was thought that, if roots could not grow, dairying need not be tried; but now that the smell and taste of the products are more looked to, roots, for reasons to be explained later, are not so popular, and the success

of silage in many places too high for root-growing, has increased the feeling against them. Extremes of either heat or cold are disadvantageous, but these are not so great in this country, except on high cold mountain ranges, but that they can be easily overcome by providing shelter. Summer shelter is necessary against the sun and flies in warm weather, and wind and rain while stormy, and this may be got from high hedges, belts of plantation, high stone walls, or cheap low-roofed shelter sheds. The winter shelter given is usually by housing, except in a few of the milder districts; as in Cheshire, where cows lie out all winter, and where the shelters provided in summer prove valuable. Extreme cold reduces the flow of milk; and excessive heat, with its various accompanying irritations, lowers both quality and quantity. There is no animal product of the farm so easily affected by adverse circumstances as milk. Materials for its secretion are only provided by the cow after every other want of the animal system has been supplied; consequently the maximum of milk production can only be attained when the cow is free from all annoyances or discomforts, so that she may settle to consume a proper quantity of food and then make the best use of it. Moderate exertion, as browsing in a field, is advantageous, keeping the limbs and the constitution generally in a good healthy condition, and preventing running to fat, as cows tend to do if tied up all the time. Excess of exercise is immediately noticed in the reduced quantity of

milk ; as if cows “startle” and run frantically from the gad fly (*Tabanus bovinus*), and the little gray horse fly or cleg, also one of the *Tabanidæ* (*Hæmatopa*), which appear in July; or, if in season, viz., “bulling;” or if hunted in any way, or even driven a long distance to pasture, especially if not allowed to go at the slow pace natural to a cow. More food is necessary under these circumstances to make good the extra waste of system, and all this comes off what should have gone under more settled conditions to the formation of milk. The milk secreted is also inferior in quality, being poor in heat-producers, especially butter-fat (cream), and more liable to spoil in keeping or in the manufacture of its products : this is supposed to arise from the presence of an alkaloid which appears in the systems of all animals that are excitable or over-heated, as in a fit of bad temper or after being hunted. The amount of milk given by a cow in the morning as compared with the evening (twelve hours elapsing in each case after the previous milking), varies with varying conditions. When cows lie out all night, and when day and night are both mild, there is usually more milk at the evening meal than in the morning. When the nights are cold this is more marked ; but should the nights be warm and comfortable, and the days too hot and cows unsettled, there will be most milk in the morning. In moderate weather cows feed more by day than by night, and the result of this is immediately seen in the milk-production.

A Cow-pasture is better undulating than flat—

the banks not being too steep, to avoid accident. It is a mistake to have it all thoroughly drained as if for arable land—unless it be arable land that is soured from stagnant water. It should be dried sufficiently to enable cows to walk over the surface without breaking and poaching it, but the hollows should be left moist enough to encourage the growth of different food-plants and grasses than those seen on such land when thoroughly dried. These provide a variety of food during the whole grass-season, and are particularly serviceable in a scorching hot summer, and at all times in autumn. Deep drains are better than open surface-drains where the land is good enough to stand the expense. Large open ditches, especially with steep banks, are most objectionable in cows' pasture, as there is always a danger among horned cattle of their being pushed or "dunched" into them.

The water supply is of extreme importance, as animals giving daily such large quantities of fluid produce require to drink deeply. The smallest inconvenience from want of water is seen immediately in the diminished flow of milk. It must be pure as well as abundant, as with contaminations from decaying organic matter, more particularly if it be of animal origin, the milk and its products do not keep so well, and are liable to objectionable tastes and smells; besides, outbreaks of typhoid fever are every now and then traced to sewage in cows' drinking water. A pure running stream, with a hard bottom and gradually sloping sides, is the best possible watering-place; but where

drainage or river water is not plentiful, it should be safely stored in tanks in times of rain against the dry season, and in such a way as to keep it clean. A stagnant pool which cows can walk into and stand in, is extremely undesirable. Droppings are left in it, and it soon becomes filthy. Cows are fond of standing in water in hot weather, which is not only injurious, inducing rheumatism, but it is a waste of feeding-time, and a loss of produce in the end.

Natural herbage from good old pasture, being a mixture of the best matured grasses and leguminous plants, makes the finest quality of dairy products; forced grass from high manuring or irrigation is watery and imperfect; and when that and young "seeds" grass are used alone, perhaps because there are fewer varieties, there is often a difficulty in the manipulation of the products, more especially in the case of cheese. Young grass has one advantage in coming earlier in the season, and it is very good in conjunction with old pasture. There are many hill grasses and plants, on which mountain sheep live, that must not be considered inferior for dairying; as light hardy cows often do exceedingly well on very wild-looking pasture in upland districts, rented at 6s. to 10s. per acre, if plenty of room is given, so that they may have a choice—say between three and four acres of pasture, and the aftermath of two acres cut for hay. This hay meadow should produce a little over 2 tons, or sufficient fodder for a small cow during winter, without roots or any artificial food till after calving in spring, when each cow would require

of mixed meal and cake up to the value of 20s. to 25s., to keep up the flow of milk till grass came.

Of weeds that give a taste and smell to milk or butter, the different species of garlic (*Allium*) are perhaps the worst and most common, besides being very difficult to get rid of. Garlic mustard (*Alliaria officinalis*), and several other varieties of wild mustard, also camomile (*Anthemis*), and ivy (*Hedera*), give a taste to milk. As several of the latter grow mostly in the shade and shelter of fences, the injury may be minimised by frequently cutting the weeds along such places. Buttercups (*Ranunculaceæ*) are thought by some to give a rich golden tint to butter, and by others to produce an acrid taste in milk. Most probably both ideas are wrong. Grass-butter in May and June, the buttercup season, is naturally yellow from any good pasture, even when free from them. The change to the yellow colour is more noticed at this time, coming in contrast with the pale house-butter of winter and spring. Cows do not, if they can avoid it while grazing, eat the flower stalks and heads. Buttercups are said to be an indication of good land, but they appear abundantly on both good and bad. As a rule, it is not the presence or absence of weeds that indicates the quality of land so much as their size and habit of growth; for instance, a well-developed thistle (*Carduus*), or a large cowslip (*Primula veris*), will not grow on poor land. Small and inferior specimens only, although often in great abundance, are to be seen there.

Dairy Land.—Three acres of good grass (rented at not over £2 per acre, including taxes) is sufficient to set aside for the keep of each cow during both summer and winter: rather more than an acre would be cut for hay, and the remainder, along with the aftermath of the hay land, would be grazed.

About $\frac{1}{6}$ acre of roots is often made to replace so much grass, but there is a danger of milk-fever, if roots are given along with a full supply of hay, if this is of very fine quality.

If roots are given without concentrated food in autumn before going dry, more milk is produced, but cows are thus made much leaner and are more difficult to winter. The average return of a well-managed dairy of good shorthorn cross-cows should be about 550 gallons of milk under the treatment described, with some artificial food in spring. Really good Ayrshires on such land are not far behind. The ordinary Ayrshire on poorer land should give about 450 gallons or upwards. Pure bred shorthorns do not, as a class, even taking only milking strains, milk quite so heavily as their crosses and non-pedigreed, though often well-bred, relations, which are usually found in English dairies.

When the "soiling" system, and higher feeding and farming generally, are adopted, the yield of milk may be raised by 150 gals. each or more, which will repay the extra labour should conditions necessary for such a system be present.

Data for calculating the amount of cows' food in a mixed system of summer pasturing and soiling. As in the grazing example, 3 acres go to one cow, but the grain

grown is sold, if it is not thought advisable to use it as concentrated food which, in the other case, had to be bought. Each cow requires, besides summer pasture, 2 tons of straw and hay for fodder, = 25 lbs. per day, during the six winter months, besides concentrated bought food given in spring, as cake and meal, which might cost from £1 to £2, or more if cake is continued on the grass, also the following roots and forage crops at the various seasons all the year round:—

(1.) One-third cwt. roots per day, for 4 winter months (18 weeks)—given mostly when cows are dry=(2 tons 2 cwts., or 1 acre for 10 cows—swedes 15-ton crop, mangels 27 tons—average 21 tons per acre).

(2.) One-half cwt. of rye per day for 3 weeks in April=(10 cwts. per cow in 20 days, or 1 acre for 10 cows, with a 5-ton crop).

(3.) One-quarter cwt. per day of crimson clover, rape, vetches, etc., for 21 weeks in summer=(37 cwts., nearly, per cow, or roughly 5 cows to 1 acre, with a 9-ton crop).

(4.) One-half cwt. cabbages per day, for 10 weeks in autumn=(35 cwts. per cow, or 15 cows per acre, with a 26¼-ton crop).

Plan of Arrangements in feeding 100 Cows on 300 acres by the above System.

100 acres arable on a 4-course rotation.

150 „ permanent pasture grass.

50 „ permanent grass-meadow, cut for hay.

Annual Crops on the Arable Land.

(1.) 25 Acres. Wheat or Oats, followed by 20 acres winter catch-crops and 5 acres winter fallow.	(4.) 25 Acres. "Seeds" cut for hay, 20 acres latter-math pastured, and 5 acres cut for forage.
(2.) 25 Acres. Roots and forage crops following catch crops, etc.	(3.) 25 Acres. Oats, as a "nurse" for the grass "seeds."

Analysis of Root and Forage Crops, including Catch Crops.

10	acres roots.
6 $\frac{2}{3}$	„ cabbages.
10	„ rye.
20	„ vetches, clover, and rape.
<hr/>	
46 $\frac{2}{3}$	„ Total root and forage crops.

Winter Catch Crops and Fallow after a Grain Crop.

5 ac.	cleaning for mangels to be sown next spring.
<hr/>	
10 ac.	trifolium and vetches.
10	„ rye.
<hr/>	
20	„ Total catch crops.

Root, Green, and Forage Crops in the Regular Rotation.

10 ac.	roots (5 ac. mangels and 5 ac. Swedes).
6 $\frac{2}{3}$	„ cabbages.
8 $\frac{1}{3}$	„ vetches and rape.
<hr/>	
25	„ Total.

The above totals make 45 acres of root and forage crops including catch crops, but $46\frac{2}{3}$ acres are required, and can be made up by taking a second cut off 5 acres of "seeds" land, which is an equivalent of $1\frac{2}{3}$ acres of vetches. A second cut of "seeds" will give 3 tons per acre, or one-third of a good vetch crop.

Treatment of Dairy Cows.—It is of the utmost importance to have the cows, byres, and everything connected with them, kept scrupulously clean, not only because produce is so easily spoiled by the presence of any dirty impurity or smell, but on account of the necessity for perfect health and comfort in the animals to attain the maximum of production. Good ventilation keeps the temperature at about 60° F., which prevents cows losing their hair and being too bare and susceptible to cold when turned out for water in winter or to grass in spring; and it also keeps the atmosphere pure and sweet. This may be aided by swilling the gutter daily with water, where means admit of the practice. Regular grooming during winter is necessary with cows, as with all animals that are tied up, and thus prevented from rubbing or licking, or getting licked by others, on tickling or itchy parts. General comfort means more produce, or better condition, with a given amount of food. March and April is the usual calving time for cheese or butter-making summer dairies, so as to have cows coming to their "flow" within two months on getting a full supply of grass: May, June, and July being the three best months

for abundance. Heifers calve usually a month later. Pedigreed breeds calve at any time, but this is wanted as soon after the New Year as possible. Where milk is sold, more cows are "calved-down" in autumn to provide for the winter demand. Milk-making then is expensive and does not pay, but is arranged for by milk companies in their contracts with farmers. Cows go to pasture for good either before or after 1st May, depending on the climate, having been gradually prepared by a short daily run over young grass, which is usually early. The amount and kinds of forage crops sometimes given while cows are being milked have been already stated. Three pounds or four pounds of cake given to each daily while on grass no doubt increases the amount of produce, but, unless in special cases, where the pasture is insufficient or wants manuring, it is a question if the practice pays when dairy produce is at ordinary prices; for cows thus treated are more difficult to keep up to the mark in winter, and age more rapidly.

Milking is usually done twice a day, in the house if possible, as cattle are more at rest in the shade and free from flies, besides milk is kept cleaner, especially in wet weather when rain would wash dirt into the pail from the skin. All dirt adhering to the udder (more usual in winter than in summer) should be wiped or sponged off to prevent taint in the milk. The only sufficient excuse for open air milking is when cows pasture at a great distance from the farm buildings; and, again, if cows are milked in

a very close warm byre, they run the risk of being chilled when turned out at night in autumn.

It is sometimes necessary to milk three times a day, as when the vessel is hard and swelled soon after calving, or where there is an excessive flow of milk, or when milk runs from the teats. More milk can be got on the whole, but the additional expense debars the practice unless when the cow's comfort urgently demands it.

Cows are kept in at night, as nights get frosty and cold, to prevent the quantity of milk falling off rapidly. For the first few nights the yield is less, but it increases as the animals become accustomed to the change, and remains pretty constant for a time.

During winter they are only let out once each day, or better twice, if their fodder is salted, to drink and lick themselves, unless when the ground is frost-bound and slippery, when water should be carried to them. A walk of a quarter of a mile before drinking, and the same back, prevents shivering, which appears frequently when cold water is given in the house. The exercise also keeps the limbs in good condition.

If cows are constantly milked by one person for a length of time, they often "keep up their milk," or "don't let it down," should another milker try. It is a usual rule in dairies to change the milkers regularly each time to avoid this. The custom has other advantages: it gives each milker the same share of the "stiff" or difficult, as well as the cows easy to milk, and prevents an inferior milker

“putting the milk off,” or “drying” certain ones by constant bad milking.

Cows get into the habit, especially if going always on the same pasture, of generally finding the way towards the milking place at the right times, which should be constantly kept, and should divide the twenty-four hours equally. Each knows its own place in the byre and goes to it, unless it is induced at times to steal food from a neighbour.

One of the greatest difficulties of the dairy farmer is to get good milkers.

Milking should be done as quietly, quickly, and thoroughly as possible. If all of these requisites are not attended to, the quantity of milk soon falls off.

A cow must not be struck or frightened in any way ; as, in addition to the small quantity given, the quality is so injured at times that it has been known to affect the milk of a whole dairy when mixed with it.

A calf takes about three or four minutes to suck a cow dry. Milking by hand should come as near this as possible. A good man (or woman in Scotland) milking ten cows (a usual and sufficient number) will finish in an hour, if the work is done by contract, except when at the full flow of milk, for a week or two. When milking in the ordinary way, on the master's time, nearly two hours are taken up. An hour and a half may be stated as a good average.

A milker sits on a stool close to the animal, and holds firmly between the knees a “handy” or pail large enough to

contain all the milk, to do away with the necessity of rising before the finish. The hand next the cow's hind leg should be kept close to it, to be ready to hold it back should she attempt to kick. Some tie the hind legs together at the hocks. If it were always done without pain this would be harmless, but there is always the risk of workpeople doing it roughly. It is better to "dry-milk," or handle young cows for some weeks before calving to break them in, and be kind to them and coax them to stand. More care is necessary at first, while the udder is hard and painful. Sometimes a nervous or wicked cow, or one with sore teats, from cowpox, or hacking with cold east wind, or kept raw by flies, will stand in no other way than with a man holding round her head, with a finger and thumb in her nostrils. After a time, in many cases, the presence of a person near the shoulder, without holding, is sufficient, showing that if care had been bestowed at first, this unnecessary expense might have been avoided. Sometimes such a cow is secured by "bulldogs," or "humbugs" put in the nostrils, and tied up by a rope.

There is no right and wrong side on which to milk. In double-stalled byres the milker gets between two cows, milks one from the right side, and turns round and takes the other on the left. It is well to train a cow, especially a show animal, to milk from both sides. This keeps the vessel hanging "square." It usually gets heavier at, and hangs to the milking side. The near-hind and far-fore, and far-hind and near-fore teats should be milked together,

alternately. Cows with very small teats, especially when swelled after calving, are very hard to milk and tiring for the hands, as the forefinger and thumb only can be used.

Others are difficult to milk, from the passages of the teats being small. These can be widened by inserting an instrument which opens like a glove stretcher. The cutting surface is on the outside of one of the blades, and the work is accomplished by opening and suddenly withdrawing it. When overdone, milk flows without the action of milking, which is a loss. A safer method of improvement, in ordinary hands, is by using a small ivory cone, which is left in the canal of the teat between milking times, to distend it. The cutting instrument is sometimes used, but not often successfully, when a cord forms at the neck of the teat, through the contraction or growing up of the milk diaphragm, usually the result of suppuration. Sore teats should be well greased, before and after milking, with vaseline. If a teat is very tender, the milk may be withdrawn from it for a few days by a silver milking-tube or syphon, while the sound teats are being milked. A piece of red yarn or tape ought to be tied to the tube to prevent its being lost if dropped among the litter.

Milking Machines are all unsatisfactory, as the rubbing action of the calf, which encourages milk-secretion, has not yet been properly imitated. There are many varieties following one or other of two principles—1st, Letting the milk flow by means of syphons inserted into the teats: this is too slow, apt to do injury, and troublesome to fit on.

2nd, Sucking the teat in imitation of the natural method. This is likely to draw blood at the finish, and thus requires much care; it also necessitates finishing the milking by hand.

The usual Period of Lactation is between nine and ten months, giving the cow a rest of two or three months to prepare for the next milking period. Cows naturally take this time, more or less; it is also affected by the kinds and quantities of food given, and the general treatment. Some would milk right through till the next calving, but are not so good the following year.

M. Guenon's "Escutcheon" or "Milk-Mirror" theory holds that the extent of surface of the udder and thighs that is covered with hairs turning up and out in place of down like the rest of the body is an indication of the amount of milk the cow will give. If the surface covered by the reverse hair is large and broad above the udder, extending far on to the thighs, the cow should be a good milker, and if it be broad and smooth up near the setting on of the tail, the flow should last well out at the end of the season. Great attention is paid to it in America and France, but it is never thought of in England. The explanation given seems a very doubtful one, viz., that the arteries supplying the udder terminate in the skin and turn up the hairs, and if there is a large surface, this shows there are larger arteries which have more terminations.

The size of the milk-vein, taking away the refuse blood which passes through the udder in the process of milk

secretion, is a much more reliable indication of the "depth" of a cow's milking.

De-sexed or "Spayed" Cows milk on constantly for years, and give, on the aggregate, a larger yield than in the usual way. They are specially suited to outlying districts in the colonies, where there is grass all the year, and where settlers' single cows are many miles from a bull. The milk resembles that of farrow cows, being richer than when cows are some months gone in calf.

The best way to put a Cow dry, without risk of losing a quarter through suppuration, is to stop milking and reduce the food for a time. Milking once a day, or every second day, or after a few days, when the vessel swells up, is now found to be a mistake. The action of milking causes the secretion of milk, which would otherwise never form, and only retards the drying process. Bleeding is at times adopted, and a dose of Epsom salts is not infrequently administered. This is the only time that salts may be given to a cow in milk, as they most effectually reduce the quantity, and that in a great measure permanently for that season. These more extreme measures are most applicable to cows with a considerable flow of milk, or that have been out to grass. Inferior fodder should be used up when cows are not in milk. If very bad, a few roots may have to be given as well, or it might be necessary to sprinkle it with treacle-water from a rose-can if the taste and smell are objectionable.

Three points that a Farmer should satisfy himself

upon before determining on food stuffs:—*1st*, That the market price, according to feeding value, of whatever has to be purchased should not be more than those of equally suitable foods. This is too often neglected by the farmer, which accounts at times for the prices of certain well-known foods being far above the real values. Farmers are slow to learn and loath to make changes, especially in matters where scientific advice has to be called in to determine the quality.

2nd, He should take those foods that do not give a taste to milk or butter, as cabbages, mangels, and the more common meals and cakes, and avoid using turnips. Swedes are not quite so objectionable. Soft turnips, especially, give a disagreeable taste and smell to milk and its products. The proper time to give such is when the cows are dry, or, in a case of necessity, in small quantity immediately after milking; then they are thought to be less hurtful. It is asserted that cutting off the part close to the base of the leaves is a preventive. Palm-nut cake or meal, unless in small quantities, flavours milk, but not very objectionably.

3rd, Use the proper foods to suit the condition under which an animal is placed. Cotton-cake given in quantity to cows in calf will at times cause the death of most of the calves when about ten days old. Three pounds per day may be given with safety; undecorticated, if on grass, as it has astringent properties. Decorticated cake, ground fine, as it is hard to chew if in lumps, is better in winter, or mixed with maize-meal, if used on the grass.

Bean-meal, perhaps to the greatest degree of any, increases really good milk. Meals, especially of leguminous seeds, have a binding or costive tendency, being deficient in oil. Bran counteracts that, and is itself excellent for milk production. Brewers' grains, costing 4d. to 5d. per bushel (a sufficient day's allowance), are also opening, and greatly increase the flow of milk, but it is of very poor quality. When used freely they injure the animal's breeding powers, and are of most service in dairies near towns, where cows are being fatted off. A small quantity of malt dust in a mixture gives it relish, and as a food is also a first-rate milk producer. Clover, green and wet, unless in small quantity, is most dangerous for cattle not accustomed to eat it, producing hoven, especially in cows which are ravenous feeders. The giving of clover should be begun gradually, and when it is dry.

A mixture of good permanent grasses and other plants, grown on soil naturally fertile, but in a state of nature, is by far the best food for making the most perfect dairy products. Grass or forage crops from highly improved land or irrigation meadows, although they may increase the quantity, diminish the quality of milk, and more particularly its products, and make it often much more difficult to manipulate in manufacture. The same remark applies to cakes and the most of other foods given to cows while on the grass. If there is not inferiority of taste or smell, the natural conditions are changed in some other way, and may appear, for instance, in the altered

texture or keeping power of butter, or a greasy condition of cheese.

Breeding, and Calving for the first time. — The ordinary dairy farmer should not buy but always breed his own stock if possible, paying the greatest attention to select the calves of the best milkers, both for bulls and heifers. There is then less risk from imported disease, and animals of the quality wanted are not in the market. The milking powers of a herd can be vastly improved within a few years by this means. To fill up the places of old cows, and those that have proved unlucky or unsuitable, young heifers, to the number of between one-fourth and one-third of the total of the dairy, should be available each year. Whether it is right to calve-down at a little over two years old or a little over three years, is simply a question of feeding. If cattle are kept in thin condition, as the ordinary Ayrshire is in its native county, the best results are got by calving at three years off. At two years an animal, if poor, is too small, will not milk satisfactorily the first season, and is very likely to miss the bull and remain farrow the second. If heifers are well fed, and made to calve at two years off, then the natural development and growth, which go on for even years after, are led into the lines of milk production, and the organs which are then most active are not allowed to become stunted from want of use, or gorged with fat in the attempt of nature to get rid of a superabundance of material in the circulating system. Nature gives an indication of the proper course

to follow, in well-fed animals, if not over-fat, coming in season sooner and more regularly than poor ones. Very fat ones are most uncertain, and usually produce small calves.

The usual period of gestation is nine calendar months.

Signs of Pregnancy.

1. The cow does not come in season once in three weeks. The exceptions to this are, when extremely poor or very fat "eild" cattle do not come in season, and some few continue to bull although in calf.

2. The right side of the belly gets large, and after a time the calf, as a hard lump, can be felt with the hand near to the flank, and seen to "jump" or "quick" at times, especially when the cow is drinking cold water.

Signs of approaching Parturition.

1. Enlargement and firmness of the udder and teats.

2. Fluid may be drawn from the teats more milk-like and less watery.

3. Loosening and enlargement of the hinder parts, as the external portions of the organs of generation, and relaxation of the pelvic ligaments. Large heavy cows then find it difficult to rise or walk about. (These signs often last for days.)

4. Within a short time of calving, which might extend to a few hours, a cow becomes restless, lies down and rises often, and whisks her tail, as if in pain.

5. The right side gets flatter as the calf goes into the pelvic bones.

Calving.—It is wrong to assist a cow too soon, and it is equally bad to leave her in difficult labour until she is worn out and the pains become weak. The young within the mother has its head and legs doubled up, and takes the form of a ball enclosed within a bag called the “amion,” “clean,” “foetal-membrane,” or “after-birth.” The bag contains a watery fluid in which the calf floats. The fluid lubricates the passage on the membrane being broken. When assistance is given, the hand and arm are well rubbed with carbolioil, if they have to be inserted. The right position for the calf is with its head and fore-legs “forward,” in the position of a man diving. When the hind-legs come first, there is greater difficulty, but it is not often so necessary to turn the calf before pulling, as with many other false presentations.

The cow should lie on her side, and the pulling, which is done by the fore-legs, should not be straight, but slightly towards the houghs of the cow: one man distending and freeing the os-vagina with his hands. A cow should be raised immediately after calving to prevent after-straining. She may have a small drink (say 1 gallon) of cold water with a little oatmeal thrown into it, and this repeated every few hours until thirst is quenched. It is an unnecessary precaution and a mistake to warm the water, as a cow will often not drink it. All that is necessary is not to give too much at a time to chill her.

In protracted labour stimulants are necessary, as one pint bottle of whisky, a quart bottle or more of beer, or $\frac{1}{2}$ oz. of carbonate of ammonia. A mouthful of cold water is often beneficial.

Common Causes of Protracted Labour.

1. False presentations.

2. Death or deformity of the calf, at times necessitating cutting and removing it in pieces. Sometimes it gets mummified and remains for years: the cow coming in season, but unable to breed. At other times it rots and comes away gradually in small pieces or as putrid matter. In this case the animal gets into a very lean condition and poor state of health, and may even die of blood-poisoning.

3. Disease, or abnormality of any of the internal reproductive organs. The "cleansing" hangs for a time, but should come away within a few hours. *Treatment*—give opening food stuffs, as linseed (made into tea), bran-mashes, and treacle.

Abortion.—"Casting," "slipping," or "picking" calf is when a cow calves before her time. The calf is usually dead, but it may be alive and live even if so early as the seventh month. In any case the loss is great, as there is usually no adequate preparation by the cow for milking.

Causes of Premature Labour.

1. Eating ergotised grass in autumn.

2. Injury, as from hunting by dogs, crushing out of

narrow doorways, shaking and bruising on a railway journey, etc.

3. Walking through a dung heap, or over boggy or soft land.

4. Very cold or foul water, or too many frosted turnips, especially if given in the house while the animal is not moving about.

5. Superpurgation, either natural or induced by physic.

6. Any contagious, febrile disease of a serious character.

7. Sympathy, which appears very like an epidemic arising from association with newly aborted cows, or from bad animal smells.

The last is perhaps more common and dangerous than all of the others put together, because its work is being done unseen and it often cannot be easily avoided, even when known of.

Symptoms are usually seen for some days, or even a week or two, before it comes on. A cow should be taken out of the lot whenever this is noticed, which may be done by taking the temperature if a man is on the outlook for it. The normal temperature of a cow in a byre is usually a little over 101° F., and it goes higher as abortion is coming on. Quiet, and proper dieting, may sometimes avert it, if the calf is not dead.

In cases of abortion the after-birth usually adheres firmly to the button-like connexions (cotyledons) with the uterus, and part often remains rotting for weeks. The cow falls off in condition, and if not attended to there is danger

of absorption of the foetid matter, blood-poisoning, and death. Should the opening-food treatment not succeed in two or three days, the bulk of what is left is sometimes removed by the hand, which should be well smeared with carbolic-oil before being introduced to sever the connexions. Tepid water, containing 1 per cent. of pure carbolic acid, should then be injected to wash out twice a day. This is not a practice to be recommended at any time, but is most dangerous if decay of the "cleansing" is going on and putrid matter is present. The points of attachment to the uterus are left more or less open sores, by which poison may get into the circulation. Cows thus treated do not readily conceive.

Means of Preventing Abortion.

1. Cut over in the pasture the seed stems of grasses, like rye-grass, liable to ergot.
2. Prevent fright or injury of any description.
3. Whitewash the inside walls of byres twice each year with fresh lime, and disinfect now and then with carbolic acid, chloride of lime, or hot lime.
4. Remove all decaying animal matter that is within reach of the cows.
5. Have the floors of the stalls as nearly horizontal as possible.
6. Remove at once from among the others all aborted cows, and those that threaten to go wrong.
7. Get quit of all such unlucky ones before another calving season.

“**Pressing,**” “**straining,**” or “**after-pains,**” producing inversion of the uterus, is very frequent after difficult parturition, being caused by injury or irritation. Injecting laudanum and carbolic-oil,—carbolic 1, in 7 to 10 of oil,—if taken early, suffices to allay it. Carbolic-oil alone has been known to increase the irritation in the case of a scratch or injury, and to drive the cow almost frantic.

When discovered before the uterus is far out, it is easily replaced by closing the hand to prevent injury by the finger tops, and pressing gently but firmly, after washing, if required—using tepid water, as it gives less pain than cold. The hand is withdrawn after the right position of the uterus has been got. The most effectual way to prevent its reappearing is to stitch over from each hip, so as to pass over the lips of the vagina and give support, clean, white tape or wire drawn through three holes made by a pen knife in the skin on each side. The treatment appears cruel, but is the only effectual remedy in serious cases. Amputation is the only course when the ailment is allowed to go very far. To insure safety, before any symptoms of pressing appear, and also in mild cases, cow-breeches are of great service, but are of little use when it is severe, as they cannot be put on very tight.

Protrusion of the Vagina (or the “body” in common language) occurs both before and after calving, when some animals that are in high condition and well fed lie down. The proper treatment is,—bathe for the purpose of cleaning, and wash with a solution of chloride of zinc to stimulate

the relaxed parts and prevent smells. The floor of the stall should be a little higher at the heels than at the knees of the animal.

Milk-Fever or Parturient Apoplexy occurs not so much in fat cows as is usually supposed, as among cows that are being well fed, and are full-blooded and thriving rapidly at the time. Many fat cows are in this condition, but very many that die of milk-fever cannot be said to be fat. Deep milkers are more liable than others, and only cows of more than one calf. It usually appears within three days after calving, but sometimes, though rarely, before it. Digestion stops, there is high fever, also pressure of blood on the brain, with consequent loss of power. In severe cases there is little chance of recovery unless bleeding is resorted to in time. Eight lbs. of warm treacle, and a teaspoonful of saltpetre (nitrate of potash), should be given as soon as practicable. This acts quite as quickly as Epsom salts, and is more suitable for a cow in milk. Stimulants (as a pint of whisky, or, if not at hand, an equivalent in strength of beer) are indispensable; also turning three or four times a day, friction, ironing, or a mild blister, mustard or turpentine, to the back, cold water to the head, and very frequent milking. It is often induced by giving cows their own milk to drink at first, when it is of little value, especially if not mixed with an equal amount of water. With poor cows this is a good practice.

An attempt at prevention is best, though at times

all precautions fail, and it is difficult to see why. Restrict the amount of food for some time before (as by shutting up at night without anything), keep the bowels open by bran or grass. Green food in moderation is less to be feared than that which is hard, woody, and indigestible, as rye-grass hay, which perhaps has been over-ripe when cut. If the udder is very large and troublesome, milk regularly, even ten days before calving. Should these preventives not prove sufficient, as shown by one cow of a number similarly treated becoming affected, the most likely specimens may be bled and physicked a day or two before, or only physicked with, say, fully 1 lb. Epsom salts, followed, in fourteen or fifteen hours, by a pint of linseed oil to counteract the costive after-tendency of the salts. This may be repeated. All the above treatment is directed to reducing the plethoric condition of the blood, and keeping the digestive system in good working order, without at the same time doing anything to permanently reduce the natural flow of milk after calving.

Trembling, or Loupin' Ill, in cows is very like milk-fever in symptoms and treatment, though the cause is quite different. The disease is described under sheep, page 156.

Weed.—Lean cows often go down within a few days after calving, especially if exposed to cold or draughts, and are quite as helpless as those in milk-fever. The great difference as compared with milk-fever is, there is no fever and no flow of blood to the brain, and the animal often eats and drinks well, and will even milk

heavily for a time. The method of nursing is the same, only part of the other treatment is varied to suit the different condition. Bleeding, or cold water to the head, is unnecessary. It is altogether prevented by keeping in a warm and comfortable place after calving, and throwing a sheet over the back for a few days.

Inflammations of the Udder.—*1st, Udder-Clap* is an affection which attacks cows that have given milk, but are at the time yeld or dry. Heifers with fleshy udders, but which have never bred, have been known but rarely to take it. It is thought to be produced by the “striking” of a gad-fly, which sets up inflammation, followed by suppuration. It appears usually in or after hot weather in August. One-quarter of the vessel swells and becomes painful. If not treated in time, two or more quarters may become affected, high fever is set up, and a hind limb becomes involved. At times it extends along the belly and down the fore-legs. Death is often the result in extreme cases, and at least the loss of one-quarter, and from one-third to one-half the value of the animal. *The treatment* is,—give a dose of salts, rub, bathe, and draw the quarter every day until pus disappears. Should it be too far gone, or if daily attention cannot be paid, the teat is either cut off by the neck or a good opening made with a knife in the flesh of the udder near to it. The only difficulty after that would be flies on the wound, unless the weather became cold for a few days. Udder-clap is effectually prevented by rubbing the vessel at least three times (two weeks

between) with a mixture of Archangel-tar and butter or grease, half of each. By beginning in July, the fly is kept off, and, besides, the tar acts as a stimulant, although the grease dilutes it sufficiently to prevent blistering.

2nd, Common Inflammation of the udder comes when cows are in milk, and have been badly managed or injured in some way. It most frequently follows "hefting" for sale or show. *The treatment* is,—rub well with grease (this stimulates and softens the part), milk very frequently, and foment with hot water, or, in an extreme case, use bran poultices. Give oil or treacle to open the bowels.

Impaction of the Rumen or first stomach is not uncommon, if cattle get into very poor condition, or if too short food is given, as when altogether fed on cut straw and pulped roots, or when much dry concentrated rich food is used (as cotton-cake or bruised grains), or if cattle are turned out to bent land on the hills in spring. *Treatment*,—withhold bulky food, and give gruels, which digest without necessitating chewing the cud; give stimulants and repeated doses of oil or treacle to keep the bowels open.

Persistent impaction may be caused by something hard, like a piece of old shoe leather which had been swallowed. This can only be got rid of by cutting a hole into the stomach and removing it, and giving very little food for a few days till the wound heals.

Choking is most frequent when animals are fed on whole potatoes or small turnips. A lump of the un-

chewed root slips over the throat and sticks there, the gullet spasmodically closing before it. A "probang" is a dangerous means of relief unless in very skilled hands, the gullet being so easily ruptured if force is applied. The most simple and most effectual plan is to gag the animal by fastening a stick across like a bit, to keep the mouth open to avoid choking by saliva which then runs from the mouth, and to prevent the formation of gases in the stomach.

Lameness may be caused by something hard, as a small stone sticking between the digits, or scalding in wet seasons. A hind-leg can be held up for examination and treatment by a man on each side standing in close to the cow, and lifting by means of a stick about the length and strength of a single-horse whipple-tree, which is put across between them in front of the hough.

A strip of strong canvas, drawn backward and forward between the hoofs, clears away all dirt or foreign matter; when Ewing's footrot-mixture, or some other acid stimulant, should be applied by means of a thin splinter of wood.

Cows or bulls which do not go out much, get lame through the hoofs growing very long and turning up at the toes. The surplus horn may be removed by sawing, and then using a pair of long-handled powerful shears for the purpose of finishing.

PIGS.

PIGS are divided into two groups—*Sus Scrofa* and *Sus Indicus*.

The latter, or Chinese pig, is by far the more improved of the two.

The Scrofa, or the European pig, is sprung from and resembles the wild boar. As compared with the Indicus type, it is longer, leaner, narrower, coarser in bones, hair, and in every way, the nose longer, forehead narrower, but with a hardier constitution.

Improved pigs in this country are divided into two classes, White and Black.

The Whites prevail in Scotland and the north of England; the Blacks in southern England. Between the two, in central England and Wales, are mixtures of two colours, the result of crossing. All have been improved by crossing the ancient native pigs with the improved Indicus, and by selection. The Berkshire and Essex breeds, for instance, were improved about half a century ago with an Italian breed, the Neapolitan, which had a dash of Indicus blood.

Improved breeds have a much greater tendency to

fatten, have finer forms, but are not so active and hardy of constitution as older kinds. Close breeding shows itself by want of sufficient hair, or that too fine, inability to breed, or deformity of structure. There are many mixed or small local breeds in Britain, but we shall only describe a few of the leading ones.

POINTS APPLICABLE TO ALL IMPROVED BREEDS.

In judging, begin at the feet and legs; these are most important, having to carry the weight when fat and heavy.

Feet small and neat.

Legs perfectly straight, fine boned, and fleshed down as far as possible, before and behind.

Back broad before and behind, not drooping too much at the rump when walking out. Back-line straight, and extending over the neck; belly-line parallel, and continued below the jole.

Ribs well sprung and deep.

Neck thick and of medium length.

Ears, in most, not too large or flapping.

Head small, broad between the eyes; nose short; the under jaw shorter than the upper; cheeks very full; eye not too small, quick, but mild.

Tail long, and a tuft of long hairs on its tip.

Body well covered, all over, with flesh, and of a rectangular shape from all points; deep and wide before and behind.

Skin medium thickness, and covered with pretty strong hair, which should be abundant.

DISTINGUISHING CHARACTERS.

White Breeds.

The Large Yorkshire is slow of maturing; is the largest in the kingdom. When full grown, one will weigh as much as a good-sized bullock (50 st. and over). It makes good bacon, but is not a favourite, requiring more food to produce a given weight of carcass than other breeds. The nose is longer and stronger than in other Yorks. It has good hair, and a hardy constitution.

The Small Yorkshire is much less in size, finer in bone, and in every way. It is more delicate, and requires greater care while young: comes very fast to maturity, and is thus well suited to making into "porkers." Its flesh brings as high a price as any. Its great peculiarity is its pug-like nose, or dish-face much exaggerated, and its head being set on lower than usual.

The Middle-Bred Yorkshire is a more recently formed breed. It is a cross between the large and small, which combines their good qualities without having the defects. The nose when young is straight, like the "large" breed, but becomes after a time like the "small" sort, though not so much turned up. It is, perhaps, as good a breed as

any in England, having, in addition to its fattening and flesh qualities, more constitution than many.

Lincolnshire White Pigs are large and good. They have long straight noses, with an abundance of curly hair. They are often a little light in the forequarters.

The Common White Pigs of Scotland have some of the characters of the large Yorkshire; are hardier than improved pure breeds; have longer noses and legs. They are slower feeders than south-country pigs, but milk well, and breed excellent crosses by the more highly improved boar, as Berkshire, etc. The crosses when fat, and weighing about 12 stones, have about 1 stone less offal than the pure Scotch pig.

Black Breeds.

The Berkshire is dark-brown or black, with a pinkish skin; a little white on the nose, forehead, feet, and tip of the tail; the nose straight, only the face a little dished, as is the case with all pigs; size intermediate between small and middle Yorks.

Defects that are frequently met with:—

The Quarters droop from being too short, and the *Tail* is then consequently too low set.

The Ribs flat, causing deficiency of girth.

The Skin furrowed, with deep lirks down the sides.

The Flank light, and the animal leggy.

The Absence of white on the tail shows presence of Essex blood.

The Hair, when too hard and strong, shows want of breeding; when too silky and not abundant (especially in the boar), want of constitution.

Berkshires are great favourites, the boars being most valuable for crossing, and are widely spread over both England and America.

The Essex is much like the Berks, but is altogether black. Though not so widely known, it is as well-bred and has as good points, with perhaps a finer head. It, like other varieties of the same black type, Dorsets, Devons, Shrops, is by natural selection made well-suited to surrounding conditions in its own district. All these breeds are improvements on the old forms of the localities which give the names.

Tamworth or Staffordshire Breed, Birmingham district, has some old Berkshire blood. The colours are chestnut, red, or red and black. (Crosses between Berks and Scotch whites are sometimes red-and-black spotted.) It is fast going out of fashion, owing to not maturing quickly enough, but it is hardy, and crosses well with improved breeds.

GENERAL MANAGEMENT.

The **Breeding Sow** should be lengthy rather than short, yet not out of proportion, but with the good points of her breed. She may be put to a young boar for the first time when big enough, say five or six months old. If missed, she will come back in three weeks exactly. A sow goes sixteen weeks with young. Breeders should run out till near farrowing to get plenty of exercise and green food, and to save expense. There should be six or eight pigs reared the first litter, and ten to twelve after, or even more, if there are teats enough. A bad milker, or one that kills her young, ought to be fatted off. Sows kept to breed pigs for fattening pay best to feed for bacon after the second or third litter. Usually two litters are got in a year. Pigs are weaned about six to eight weeks old, and a sow comes in season for the first time after breeding (according to condition) about three days to one week after the pigs are removed. Forty-six to fifty weeks are thus employed, according to the age of weaning. They may be made to have five litters in two years by beginning to feed the young on milk at two or three weeks old. Gradually thicken the milk with oatmeal porridge, and, after a little, turn the mother out during the day, and feed her well. She should then take the boar before the pigs are weaned, and when about five weeks old. When milking very heavily, an animal is not in that condition in which

she is most likely to come in season or conceive. All pig-houses should be warm in cold weather. No animal of the farm does worse than the pig with cold or damp. "Sows" should be managed so as to have the young ready when there is most food for them, and when the weather is mild.

A few days before farrowing, a sow should be put by herself into a place about 10 feet square, which has been fitted round with strong planks placed horizontally, and projecting 8 or 9 inches from the wall, and elevated the same distance from the floor, to keep the sow from lying close to the wall and killing the young pigs by overlying them. One corner should be floored by a raised wooden platform of 1-inch planks to keep the bed dry. The person who is to attend at farrowing should take charge from the first, and the place should be well bedded with straw. The sow takes up straw in her mouth and makes a nest within a few hours of farrowing. The operation may extend over hours. The sow is very sick and quiet, and should lie all the time. (It is rare to see a pig dropped while the sow is standing.) When restless, she is very troublesome. Sometimes the young are put at once into a warm basket, to be safer, in place of to the mother's side. They should have a suck as soon as possible, and be watched day and night for three days. A good stable-lamp may be left hanging at night after this for some time. The food of the mother should be sloppy, not too bulky, but nutritious, and never quite cold. The young grow very quickly for the first few days. The ones sucking nearest the forelegs are usually the

largest and strongest. Each has its own teat or teats, although they steal from each other when possible. They cannot draw milk at all times; only when the sow wishes it. Then she lies flat on one side, and utters every now and then a subdued grunt.

Fatting Pigs.—A farmer or dairyman should breed his own pigs. They vary much in price—12s. to 30s., or even more, at weaning: £1 is a good average, and pays well. Pighouses should face the south, and be in a sheltered and dry position, and have an inner compartment and outer court, each 8 to 10 feet square, to hold five or six pigs. Six pigs, of 12 stone each, can feed from an 8-foot trough at one time. It is better to feed in the outer court rather than inside, as pigs then keep the place they lie in cleaner, by leaving their droppings outside. No bedding is required if the floor is smooth concrete with a fall inside of 2 inches to 3 inches towards the door, and swept out every day. The outer-court floor should have more fall into a sinkhole in the centre over a covered drain. Feeding-troughs are best of fire-burnt clay, and with a division for each, to prevent the weak being driven out and starved by the strong. At milk factories, etc., where fifty or sixty pigs are kept in one large house and fed from long troughs, some weak ones are always kept out till the others finish, and do not thrive. Male pigs are castrated when about four weeks old, but not when there is frost. Those for bacon or breeding are turned into a yard or field, and left

for a few months to grow. A ring is put through the gristle above the nostrils to prevent their digging. Roots, cabbages, clover, vetches, or silage may be given uncooked, alone, or with a limited supply of other food.

Feeding.—After weaning, which should be done gradually, as before described, pigs can be fed for months on sour whey only, and do well. Skim-milk should also be soured. Sweet whey and milk cause constipation. It pays, when feeding with these or with buttermilk, to thicken with meal, boiled or steamed. A mixture of meal is best, and may be of beans, peas, lentils, vetches, wheat (including bran, germs, and pollards), barley, oats, maize, indiana (the refuse from corn-flour works, viz., the outside or best part of the grain). The selection should depend on which are cheapest at the time. Usually small and inferior grain is taken. Costiveness is avoided by mixing bran with the food. The dung of a thriving pig should be soft and unformed. Roots are given, as small potatoes, mangels, turnips, carrots, parsnips (extra good), also cabbages. All should be cooked for fatteners. A little common salt is a necessary seasoning. Any “fallen” flesh (horse or other animal of the farm) improves the boiled mixture; but if there is much of this (as at a slaughter-house), or if the other foods are given without enough meal, the pork will be soft and inferior. Leguminous seeds, particularly, make the flesh solid. All should be given slightly sour, and cool but not cold. Fattening pigs are fed at least three times a day, but it is

better to feed four times, and when newly weaned, five or six times daily. As much as is eaten up, and no more, should be given. A few coal ashes or earth thrown into the outer yard now and then for the pigs to eat improves digestion. Sometimes they are washed or brushed once a week. Pigs thus kept perfectly clean will not roll in the mire, unless it is to cool when very hot. They go into mud to clean themselves. The mud cakes when dry, and in falling off takes scales and dirt with it.

Warington says that "83 per cent. of the fatted live weight of a pig (fatted for pork) should be butchers' carcass;" and also that "91 per cent. of the increase from 100 lbs. to 200 lbs. will be carcass." About 5 lbs. of meal eaten should give 1 lb. increase of live-weight. Pigs are the most economical meat producers on the farm. They consume more food per 100 lbs. live-weight than either sheep or oxen, and have much greater capacity for assimilation in the intestines, though their stomachs are small. They consequently require concentrated and digestible food.

Crosses between the Berkshire and Scotch pig will, if properly fed and managed, in summer time, when the weather is mild, weigh each 6 stones dead-weight at four months old; at six months, 12 stones. They are usually killed for small bacon when they would dress to 12 stones or 14 stones, and sold at from 6s. to 7s. 6d. per imperial stone. A twelve months pig should weigh 24 stones, or about $16\frac{1}{2}$ score = 14 lbs. less than 1 lb. of increase per

day for the last six months (182 days—168 lbs.); while for the sixty-one days, between four months and six months, it lays on 1·377 lbs., or roughly, $1\frac{1}{3}$ lbs. per day of dead-weight (84 lbs. \div 61).

A pig lays on flesh fastest when from about 9 stones to 12 stones weight, and will then take per day about 10 lbs. to 12 lbs. of meal, and increase over 2 lbs. live-weight, or nearly 2 lbs. dead flesh. It is thus most profitable to kill when 12 stones to 14 stones dead-weight. A Berkshire, or any of the improved breeds, should do about the same as the above.

The price of mixed pig-meal should not average more than £7 per ton = $\frac{3}{4}$ d. per lb., which gives the following cost of producing a stone (14 lbs.) of pork, with labour estimated at 7s. 6d. on a 12-stone pig:—

Calculation of Cost per Stone.

Labour, £0 0 $7\frac{1}{2}$

14 lbs. \times 5 (lbs. meal) = 70 lbs. meal at $\frac{3}{4}$ d.

= 4s. $4\frac{1}{2}$ d.; *ergo*, 83 : 100 :: 4s. $4\frac{1}{2}$ d. : 0 5 $3\frac{1}{4}$

Average price of a young pig, £1 = 3

stones live-weight = $2\frac{1}{2}$ stones of

pork at 6s. = 15s.

20s. — 15s. = 5s. for the life; 5s. \div 12 (num-

ber of stones) = cost of life per stone, . 0 0 5

Carry forward, . £0 6 $3\frac{3}{4}$

Brought forward,	£0 6 3 $\frac{3}{4}$
Deduct for offal 1s. per £1 of the price (12 stones at 6s. = £3, 12s.), viz., 3s. 6 $\frac{1}{2}$ d. ÷ 12 (stones),	0 0 3 $\frac{1}{2}$
	£0 6 0 $\frac{1}{4}$

*Average cost per stone, not calculating
manure,*

One gallon of sweet-milk whey is worth $\frac{3}{4}$ d., or is equal in value to 1 lb. of meal. Say that 550 gallons of milk be taken as a good yield per cow in a dairy. One gallon of milk weighs 10 lbs. 4 oz., and 1 lb. of curd is removed in cheese-making from 1 gallon of milk. About $\frac{1}{6}$ is left in whey, or 495 gallons \times $\frac{3}{4}$ d. = 30s. 11d., or roughly, 30s. per cow.

Number of Pigs that may be kept with a dairy of 60 cows, giving sufficient meal to make good pork:—70 pigs killed at six months old, weighing 12 stones each; 50 finished in the summer half-year, and 20 in spring and autumn; 10 young breeders and a boar. The extra pigs not required to feed being sold at six to eight weeks old.

Diseases of Pigs are not so numerous as in most animals. Pigs are much more difficult to treat when ill. If fat, they should generally be killed on the first symptoms appearing, if the flesh is fit for food, as at the best there will be no improvement for a time.

By improper housing, or exposure to cold and wet, pigs take rheumatism, inflammation, and cold.

Diarrhœa often follows bad feeding. Treatment—change to good food; give a purgative (Epsom salts) and tonic (powdered ginger).

Foot-and-Mouth Disease is got by contagion from cows or other farm animals, to which pigs can also give it. It is not dangerous, though a heavy loss. The hoofs are cast. Salicylic acid lotions are applied to the feet, and Epsom salts, with soft food or milk, given.

Scrofula.—Tubercles form in the lungs, and the animal dies of consumption. Most seen when pigs are in-and-in bred. Prevent by importing fresh blood.

Protrusion of the Rectum, from having too much flesh diet. Wash well and return; stitch across the anus from each hip; and feed altogether on milk and treacle for a time.

Measles, also called “pig typhoid” or “swine fever,” is the most common disease, noticed by a red rash, a cough, fever, and from the animal not feeding. Keep warm, open the bowels with castor or linseed-oil, and the skin with sulphur, and act on the kidneys with sweet spirits of nitre.

THE HORSE.

THE early history of the horse is unwritten. Its remains have been found in the Swiss lake-dwellings, showing it must have existed in very remote times. There is no really wild horse, although some have broken away from civilisation, as in America, and, in a few generations, have assumed very much a wild character. A horse can endure great extremes of cold and heat. When the ground is covered with snow, it scrapes with its fore-feet to get at its food, showing it must have originally belonged to a cold country. Arabs have come to great perfection under very different conditions of temperature.

FARM HORSES.

British work-horses are usually classed as belonging to three breeds,—the Clydesdale, the Shire, and the Suffolk Punch.

Clydesdales are the Scotch agricultural horses, and vary much in size according to the kind of work expected of them. Though not so dear as they were a few years ago, large prices are yet got for really good blood. The

Duke of Portland paid £1200 for "Cairnbrogie Keir" in 1883. This horse took the first prize in the Clyde Stallion class at the Royal Agricultural Society Show (Shrewsbury) in 1884.

Points of a Clydesdale.

Colour usually bay or dark brown, sometimes black or gray, more rarely chestnut.

Height, average, about 16 hands.

Temper mild, with plenty of muscular vigour and nervous energy.

Head medium size; the face and jaw-bones not too large or loaded with flesh.

Nose bones, if not straight, slightly arched; not "dish-faced."

Nostrils wide.

Eye bright and dark, full and prominent.

Forehead broad.

Ears a good size, neither hanging, showing sluggishness, not "prick-eared," but with frequent motion, indicative of a good disposition.

Neck medium length and thickness, and slightly arched.

Back straight and broad, and not so long as to make it weak.

Tail not too drooping.

Ribs well sprung, barrel-like; the last one a good length.

Hindquarters long, well packed, and rounded.

Second thigh well developed and broad.

Girth round the heart good ; the body is then deep, and the height is greater than it looks.

Chest broad and deep.

Shoulder (scapula) oblique, though not necessarily so much so as in a hunter.

The humerus should form a very obtuse angle with the scapula, else the animal cannot get its leg well forward in moving.

Fore-legs strong, and not too far back under the body, showing the humerus is rightly placed.

Knee-joints large.

Muscle of the arm broad and well developed.

Leg bones flat, clean (not knotted), and plenty of them.

Feathering, or long hair on the back parts of the legs, neither deficient nor too abundant, spreading round in front ; if fine and silky, is an indication, along with a fine skin, of good breeding.

White feet, though common, are objectionable, being softer than the others.

Fore and hind legs and feet all set on straight ; they look better and are stronger. It is better to have a toe pointed slightly in than out.

The hocks broad in front and not too straight, else there is liability to thorough-pin ; nor too crooked, as they do not look well although they are quite strong. Any defect in a hock constitutes unsoundness.

Pasterns medium length. If long, they are weak ; if

short, they are more liable to bony exostoses. Splints often exist without producing unsoundness. The feet cannot be too large, if not thin and flat or down in the soles.

The action is quite peculiar, being very free and active.

Step long; walking, when unloaded, as nearly as possible 5 miles an hour.

The sole should be almost inverted each time it is lifted in either trotting or walking.

The Shire, or English Black Horse is the largest breed in England. The larger sorts, bred in the Fen country, are more for dray-work than agricultural-work. The points are very much like those of the Clydesdale. The ordinary varieties of the two breeds differ more in appearance than the better sorts, which have now been acknowledged in many cases to be crosses of good specimens of the two original breeds.

The differences in the Shire horse are:—

Lower and more sluggish action.

The belly or middle larger, the animal being a greater feeder.

The quarters shorter, and the plates consequently steeper and flatter.

The pasterns shorter, and the hoofs more upright, giving a stilty look. Long pasterns are now sought for in the best horses, no doubt to try to counteract the general weakness in this point.

There is more rough hair on the legs, and it extends round in front. Howard's paper in the Royal Agricultural Society's Journal for 1884 shows this to be a defect.

The Suffolk Punch.—Named from its county and from its compact rounded form. The colours are chestnut (dark and light) and iron gray (sorrel). The body looks much too heavy for the limbs, which are clean and fine, with little long hair. The back is often hollow, but this allows of a finer style of neck and shoulder. Suffolks are slower than Clydes, and twist their legs and feet more when moving. They are steady pullers, and suited alike to farm and dray work.

BREEDING.

Select good, sound animals of the right blood, and with good tempers.

Three years old is young enough to put a mare to the horse ; if younger, or if too old, the foal will be small and weakly. The period of gestation is about 11 months. May is the best month for foaling, as there is sufficient green food, and the weather is mild enough for brood mares to lie out. At going out, shelters ought to be provided for a few nights to prevent their taking cold. Give small but increasing amounts of green food for a few days before, to accustom the digestive system to the change, and thus prevent colic.

A farm-mare should be continued at moderate work, as ploughing, on till the day of foaling, but should not be put between shafts, as there is risk of injury. Restrict the quantity of concentrated or rich food some little time before. Wax is seen on the teats within twenty-four hours of foaling; after that the mare should be regularly watched, to prevent injury to the foal at birth by her lying down with her tail against the wall. A roomy loose box is the best place, and she rarely requires assistance.

The foal should be helped to suck very soon. If this is not managed, milk a little into a spoon, and put it into its mouth, as a foal cannot live long without food. See that the anus is open; give the mother frequent small drinks of cold water, with a little oatmeal thrown into it.

No nursing mare should work: this precaution prevents souring and rickets in the foal. In any case, she should have a clear month before working, and after work be milked a little each time, before the foal is allowed to suck. The milk which collects in the udder while at work changes its character, and an alkaloid is developed, which is injurious to the young.

A mare takes the horse from seven to ten days after foaling, and is then most likely to conceive. If missed the first time, she comes in season every three weeks during the summer, remaining in use from four to eight days. By the second time there is a large flow of milk, which so far reduces the system. When going out of season she is most likely to "hold." One good jump is better than more,

and she should be kept quiet and away from other horses for a few days.

A foal brought up by hand should have cows' full-milk. Such horses are often spoiled through being played with. In Norfolk, sometimes, after the foal is two weeks old, it is fed on skim-milk, boiled linseed and bean-meal, getting up to two gallons of milk, and four pounds of the mixture per day.

A foal is weaned when five or six months old, say early in October; then it should be housed at night, and a halter should be put on its head, and left to lead by. Haltering is difficult, and requires great care. A cattle-shed with bare walls and a few inches of dung under foot is the best place. A cart rope is fastened round the neck, and the animal drawn up to a fixed point, and made to know that he is held. The struggle at first is often severe, and perspiration runs off freely with the fright and the exertion. He must be kept in a warm place till thoroughly cooled.

Kind treatment and constant handling are necessary to give confidence. Leading should be done as often by the off-side as by the near, to accustom him to turn as readily to the one side as to the other.

Young Horses should never be too highly fed, as this softens the constitution, and they get too fat and heavy for their legs. They should be kept thriving to encourage growth, and prevent disease and injury from internal parasites. A little linseed-cake mixed with the oats is an improvement, and salt should be within reach of

all young stock, which should also have plenty of exercise to develop muscle.

Castration is usually performed when a colt is about one year old, then there is least risk; or at two years if a more masculine appearance is wanted. In some districts of England from four to six weeks old is considered a safer and better time. Sometimes the operation is done with the animal standing on its feet and simply backed into a corner, but he is more commonly cast by means of ropes. The great danger in this is the possibility of injury to the back, brought about by the struggling. The testicles are usually removed by firing, but sometimes by means of clams or by torsion. Bathing well with warm water should be resorted to, if the animal is stiff the next day.

Breaking is attended with danger from rearing, kicking, bolting, or sulking on the part of the horse; and carelessness, drink, or bad temper on the part of the man. Horses are more easily broken while quite young than when a few years older. They ought to run out the second winter, and be taken up for breaking in autumn, when about $2\frac{1}{2}$ years old. Heavy work strains and stiffens young horses. The backbone often gets bent and stands up, if an animal is made to draw too heavy loads. Harrowing or light ploughing is a good, safe form of work; but not so carting on the hard road till after five years old. Horses ought to be broken to every description of farm work when about three years old or before.

Mouthing, done by tying a horse up with a large bit

and side-reins, is far too little practised among draught-horses. After this has been done for some days, long ropes should be taken out to an open field and fastened in the position of draught chains, and pulled by men well behind, to accustom the animal to the chains rubbing against its hind legs while turning in the plough. Next yoke to a log by ropes, and when accustomed to this, put in double with an old, steady, but active-stepping horse.

Breaking to the cart must come after all this, as it is often a difficult task, especially with nervous animals.

The greatest care should be taken with all horses, although reputed to be quiet. A man on each side of the head should hold a long rein to keep the horse, if startled, from jumping on the top of the other. Another man on each side should fasten the attachments, the draught chains first. The kicking strap or rope should cross over just at the root of the tail. This is far more effectual than when in the usual place, further along the top of the hind-quarters. A fifth man lets down the cart behind when the horse has been got into position. A long pole is placed between the body of the cart and the axle-tree, and projects well behind to prevent rearing.

A young horse should be tired, but never fagged by too much work, else he may develop temper. In a display of this an animal which urinates is usually difficult to overcome. The mouth should not be subjected to sudden checking or tugging. An animal which has been thus ill-treated tries to move away, and holds up its head on the approach of a man.

The shoulder and back, under the pressure of the collar and saddle, often get "fired," hot, and painful, especially in warm weather. *Remedy.*—Bathe with tepid water, rub dry, and soak with whisky or white lotion—1 oz. sugar of lead and 1 oz. sulphate of zinc dissolved in a quart bottle of water. This is the best common remedy for broken or irritated skin.

While teething a young horse often has a tender mouth and refuses to eat. Do not cut or fire the gums as for *lampas*.

Do not feed a young horse too highly. If off food through being feverish from work, coax him by giving varieties of food, little at a time, and always new and fresh.

Young horses pastured along with cattle, gallop after them at times and prevent their thriving. Some cattle get into the bad habit of eating the hair off the tails of horses and their mates.

In horses with small feet, paring the edges of the hoof, now and then, and blistering the coronet encourages the growth of horn.

Idle horses rub, bite, and break gates, and get out to do damage to growing crops.

The age of horses able to do work may easily be determined by the teeth, if not more than eight years old.

At 3 years the two central permanent incisors are up.

At 4 ,, the next pair, or lateral ones.

- At 5 years the two corner ones are come, making a full mouth; also the tushes in the male.
- At 6 „ the hollow on the top of each tooth of the first pair is worn out.
- At 7 „ the second pair is levelled.
- At 8 „ all have usually got worn nearly level, or lost “mark of mouth.”

Indications of greater age are gray hairs about the head and deep hollows above the eyes.

To make an animal look young, the teeth are sometimes “bishopsed” by low dealers—that is, artificial hollows made in them.

MANAGEMENT OF WORK HORSES.

Winter Season.—Full work lasts for about seven months in the year: fully three months, on from the latter part of August, including harvest and autumn ploughing and cleaning, and nearly four months in spring, including part of February on till into June; embracing spring cultivation and ploughing, planting of grain crops, and preparing the root land. The food should be full and liberal, and consist of a mixture made equivalent to three bushels of dressed oats (40 lbs. per bushel) per week. Grains should be all bruised or broken, especially for old horses. Unless extremely dry and kept in a dry place, only a little should be prepared at a time, as the ingredients, especially oats, mould and spoil. The mixture should consist of several

kinds chosen from the following, according to what is cheapest in the market:—Oats, beans, peas, lentils, barley, maize, a little malt or desiccated brewers' grains to assist the digestion, along with bran or linseed-cake (one pound per day) to keep the bowels open. Dry bran prevents a horse bolting its food too fast. A little fenugreek meal acts as a good spice, but is dear as yet at 30s. per cwt.

As a horse has a small stomach, it should be fed at least three times a day—morning, noon, and night.

Cold bran mashes are better than boiled food, which is dangerous for colic, although it produces a fine glossy skin. Saltpetre (2 to 4 drachms) is given at times in a mash on a Saturday night, to prevent stocking of the legs, or Monday-morning-evil, in hard-worked and highly-fed horses.

The food for the slack season of five months may be averaged at one bushel of oats per week.

A large horse at full work will eat, in addition to short food, 18 lbs. to 24 lbs. per day of "seeds" hay. A few lbs. may be saved if it is chaffed. Hay is dusty if much heated in the stack or cut when in flower, and then it injures a horse's wind.

When clover hay is given *ad lib.*, 2 to 2½ bushels of oats or the mixture is considered to be enough. New oats are not good for horses till after the New Year; they make impure blood and produce liability to grease. Straw is often given during winter, and hay in spring when hard work comes on; but the best results are got by using a mixture of the two all the time.

It is good practice to give a few raw swedes, carrots, or mangels at night. Potatoes are apt to cause colic. Furze or whin is sometimes grown as a forage crop to provide green winter food for horses, but it requires to be chaffed or thoroughly bruised between rollers. 30 lbs. may be given to each per day.

Two drachms of powdered sulphate of iron, mixed in a full feed once or twice a day, is a good tonic for a horse, and is frequently wanted along with careful feeding in the "fall," after he goes into the stable. The system seems to get down with the change of food. It is owing to this peculiar condition that roadsters often become weak and "come down" at this season. Tonics are better than physic, unless worms have to be cleared away.

Water should be given before feeding to encourage eating, and to prevent colic and the washing of the food too soon out of the stomach. It is safer to give it when an animal is warm, if not over-heated, than if it is allowed to stand till it is cold and the circulation is less active.

There is danger of inflammation if a horse's belly is wet when the animal is not accustomed to it.

Mud-fever is the result of too frequent washing of the legs, adopted because it is the easiest way of cleaning. If practised, the legs should be thoroughly dried, or the animal be made to walk a mile or two before going into the stable, so as to quicken the circulation and prevent chilling of the skin through the rapid evaporation of the water.

Thorough grooming of farm-horses is far too little prac-

tised. They should be well rubbed down with dry straw on coming in, and thoroughly groomed when the hair has dried, to get rid of dust, which is the remains of dried-up sweat. Good grooming, by increasing its comfort, is as good as so much more food to an animal.

Barley straw is objectionable as litter; 12 lbs. to 14 lbs. per day of wheat or oat straw is much better. Bedding should never be stored during the day under the manger. When a good market can be got for straw, moss litter may be substituted at a much cheaper rate. This costs about 45s. per ton, in 4-ton lots, carriage paid; and 1 cwt. is sufficient per horse per month while in the house. If moss is allowed to get too wet before it is removed, there is danger of injury to the hind feet; the ammonia produced from the urine acts upon the weaker parts of the horn, and sores break out about the heels.

Summer Season.—If horses are too highly fed when on green food and not doing full work, they are much more difficult to support in winter. Along with green food 7 lbs. of oats, in two feeds per day, is enough. When at hard work this may be doubled. Some horses do not care to eat much corn when on grass; the teeth get affected in the same way as those of a man eating green apples.

There are two common summer systems of feeding: *First*, Soiling or cutting and carrying home the green food, and turning horses loose into a large open yard with shelter-sheds. Clover, grass, vetches, and cabbages are all used in their season when most plentiful. This is the

more economical way if food is not plentiful, but it requires more labour.

Second, Turning out to pasture at night and while not at work. This is the easier and more common practice. The disadvantages are, horses gallop and cut up the grass, rub down fences and gates, and, besides, there is risk of founder if carelessly turned out when too hot.

In the south of England horses often go loose in yards during winter. They get gentle exercise and plenty of fresh air to keep them healthy.

If a horse gets lame, do not work him, else he will get worse. Rest, cold water cloths, or fire and blister are the usual treatments.

A winter out at grass without his shoes, and allowed to get down in condition, but not too far, renovates an old or any horse of whatever breed. He gets sufficient exercise and goes so quietly about, that a weak part strengthens. It is thought that the frost also aids in the recovery.

A horse highly fed before will get much poorer when turned out than if he had been moderately kept, showing the mistake of excessive feeding during summer.

A stallion will serve 80 mares in the season. Some valuable horses, when well cared for, cover over a hundred. A horse with one testicle down can get foals.

The average English work horse might be very much improved if farmers' clubs would go more in for securing the services of good horses in special districts, and not leaving it to chance or private enterprise, which is always selfish.

SHEEP

BELONG to the genus *Ovis*. They have been subjected to domestication for a very long period. They are classed in various ways in this country: Horned and Hornless, Black-faced and White-faced, Mountain and Lowland, Long-wools and Short-wools. A general character is the presence of only one pair of teats.

POINTS APPLICABLE TO MOST BRITISH BREEDS OF SHEEP.

(Exceptions will be named.)

1. *A good carriage* and springy style of walking.
2. *Neck* thick towards the trunk, tapering to the head, arching slightly, and not too short.
3. *Body* deep, back and belly lines straight, well over the fore-legs.
4. *Back* level and broad behind and before, except in Cheviots and Lonks, which have sharp shoulders.
5. *Ribs* well sprung and rounded.
6. *Shoulders* well covered with firm flesh. The parts behind the shoulders well filled up.
7. *Thighs or gigots and foreflanks* well fleshed down.
8. *Rump*, or part near the dock, well developed, though

not too large, as sometimes seen in Cotswolds and Border Leicesters, etc.

9. *Legs* straight, not too long nor bone coarse. The hocks are much better slightly out than at all in or "cow hocked."

10. *The body*, and particularly the belly, well covered with the characteristic wool of the special breed.

CHARACTERISTICS OF DIFFERENT BREEDS.

First—Long-wools without Horns (other than Mountain Sheep).

The Border Leicester was bred at first from Bakewell's Leicester by crossing with the Cheviot, but now ranks as a pure breed, and is one of the best of the Leicesters.

Special Points.

(1.) *Head* well set on, long, broad between the eyes, but not up on the crown, nor too heavy behind the ears, which would cause difficulty in lambing.

(2.) *Muzzle* large, open, and black.

(3.) *Hair* on face and legs, white and hard, but not so wiry as in the Cheviot, extending well back behind the ears.

(4.) *Ears* not too large nor drooping, white inside and out. Black spots appear sometimes with age.

(5.) *The belly* comparatively light, said to "carry little offal," giving a leggy appearance when without the wool.

(6.) *The wool* long, soft, and in little locks, not too open coated.

(7.) *Fat tegs*, at thirteen to fifteen months old, weigh 24 lbs. to 26 lbs. per quarter.

The Improved English Leicester is the smallest of the Leicester breeds, and has been longer an improved breed than any long-wool except the Cotswold. Bakewell did this by selection. It has been much used in crossing to improve other breeds.

Special Points.

(1.) *Mild tempered*, and thus suited to laying on fat.

(2.) *Head* not too short, though smaller than in the Border Leicester; the face white with a blue tinge, and hair not so hard as in the Border Leicester.

(3.) *Bones* very fine.

(4.) *Hindquarters* often not so large as they ought to be.

(5.) *Great aptitude to fatten early*, both in the pure breed and its crosses.

(6.) *Mutton* best when not over twelve to fourteen months old (weighing perhaps 20 lbs. per quarter), being greasy and inferior if well fed till two years old.

(7.) Ewes not first-rate milkers, and lambs inclined to be tender on account of the close breeding.

The Improved Lincoln is white-faced, and as large as any sheep in England,—a shade larger than the Cotswold, got by crossing the old Lincoln, which was famous for great length and quantity of wool, with the English Leicester. There is still a tuft of wool on the forehead, though not so much as of old. The fattening qualities have improved, although the wool has deteriorated. The staple of well-bred sheep is about as broad as two of a man's fingers.

The Long-wool Devon is very like the Lincoln, but is not so large. It is coarser boned, and does not show so much breeding. The face is white, with a lock on the forehead, and woolled well on to the cheeks. It has a mixture of Leicester blood, and is sometimes dashed with the Cotswold, which it also resembles.

The Cotswold is named from the Cotswold Hills, and is one of the oldest breeds, with very distinct characteristics. It, too, has been improved by introduction of Leicester blood, and is now large and hardy, and well suited to feeding on stiff land, even when pretty wet. The flesh is coarse. When sheep are aged, or over fifteen months old, then they ought to weigh 25 lbs. to 28 lbs. per quarter. Tegs more moderately fed, and “run over” till two years old, get up to 35 lbs. or more per quarter.

Points.—Strong faces, usually white, sometimes gray, with legs to match. Dark colouring makes it more like a Down

cross, and helps to sell the mutton. A large tuft of wool covers the forehead. The ewes are fair milkers, and prolific when not too fat or the rump too large. The clip of wool averages 6 lbs. to 8 lbs. for ewes. The staple long, neither close nor too open, and rather coarse in quality. The belly, and particularly the scrotum or "purse," should be well covered.

Through being an old breed of good size, it is well suited to crossing with ewes of short-wools and smaller and finer varieties, provided the heads of the rams are not too large.

The Wensleydale is a large blue-headed Yorkshire-Leicester, the different strains of blood of which differ much in quality. The best are very stylish, long-woolled, rather open-coated sheep, with less tendency to lay on masses of external fat than many others. The rams are largely imported into Scotland to cross with mountain sheep on the less exposed hill-pastures.

The Kent or Romney Marsh is a hardy white-faced breed, which is related to the Cheviot, and much resembles it in general figure. It has been improved much by crossing with the Leicester, and is rather larger than it. Kent sheep are often not fed in winter when on natural pasture, and do not lamb till April. A lamb to each ewe is thus a good crop. The wool is good, and it is one of the closest coated of the long-wools. The forelock is some-

times wanting, and on account of various irregularities the type is not very distinct, though the form of the best class is very compact and symmetrical.

The **Roscommon** is an Irish breed, seen in Connaught. It was improved from the old form by selection and crossing with the Leicester. It is quite as large as, if not larger than the Cotswold or Lincoln, and the mutton is no finer. The fleeces are long, heavy, and silky.

Second—Short-wools; all Hornless except where stated.

The **Sussex** or **Southdown** is the breed through which all the other Downs have been improved by crossing with the old-fashioned varieties of the different districts. It is short-legged, and all round most compact and symmetrical, but particularly good in the hindquarters. The present form of the breed has been attained by selection from the original breed, which was light in front, and leggy.

The face and legs are a gray-brown. Head small and very neat, woolled close up to the ears and on the forehead; naked ears are most objectionable.

The fleece weighs about 3 lbs. or 4 lbs. from ewes, and is short, close, and of fine quality, and should be free of hard projecting fibres. Open, long, coarse wool has been imported in the attempt to increase the sizes by crossing, and it is very objectionable.

The flesh is excellent quality, but can be easily made

too fat. The average weight for well-kept tegs should be about 18 lbs. to 20 lbs. per quarter at twelve to thirteen months, and the offal is little in amount as compared with others. Some wethers rising two years old, belonging to Lord Bathurst, sold in Cirencester market in the first week of December 1884, dressed to 138 lbs. per carcass, or 34·5 lbs. per quarter dead-weight; and yielded 65·83 per cent. dead-weight to live-weight.

The original habitat of this breed was the region on the low chalk-hills of Sussex and neighbouring counties. Away from this they are usually kept as ornamental sheep in parks, where they are at times made into five-year-old mutton. They are not good rent-payers, except in their native district, being so small, and also liable to foot-rot.

The Shropshire Down breed of the present time has been produced by crossing the old form with Southdowns to give quality, and Leicesters to keep up the size. Now any imported blood spoils the type.

The face is longer and larger than in the Southdown; the nose slightly Roman; and the ears larger, and set on to give a more sprightly appearance. The face and legs are of a blackish-brown; the latter often darker than the former, which is usually tinged with gray (more at some seasons than at others) round the nose, eyes, and on the jaw. White spots on either are objectionable. Transparent ears are bad, showing a want of the necessary hairy covering.

The wool should be free from black, of fine quality, and closely set, although a little longer than Southdown; and the skin underneath a pinky flesh-colour. A good average of fleece in an ordinary ewe flock is 7 lbs. or 8 lbs.; ram tegs and highly fed ewes more; poor ones less. Heavy clips are often coarse. Dead-weight, 22 lbs. to 23 lbs. per quarter at thirteen or fourteen months old.

This breed has spread quickly in England within a few years. They were extensively tried in Scotland to cross with native sheep (about 1882). The crosses, like the pure breed, are remarkably well covered on the back with flesh, and make excellent fat lamb, as they come forward early, but they have not been a success to keep as hogs, being much smaller in size than the Leicester cross, which they were expected to supersede. Another disadvantage for crossing with sheep on the hill pastures is their being so bare for the first few days after birth; they cannot resist the cold in very stormy seasons.

The Hampshire Down breed has its natural habitat on the chalks of Hampshire and the immediate region lying north and west; hence called the *West Country Down*. It was improved from the old Wilts and Hants sheep by Southdown blood and selection.

It is larger, coarser looking, and lower set than the Shropshire, and not easily fed to "handle fat" when young, though often forced by high feeding. The ewes perhaps

get 1 lb. per day of a mixture of equal parts of linseed-cake and peas or Egyptian beans, until the lambs begin to eat ; then this is gradually taken from the ewes and given to the lambs. With abundance of natural food besides, a lamb should increase from 19 lbs. at dropping, in January, to 150 lbs. live-weight on 1st August. Lambs can be got early, as the ewes come in season sooner than most sheep. If kept for tegs in an ordinary way, they should weigh 23 lbs. to 24 lbs. per quarter at thirteen to fifteen months old. The flesh is of fine quality, and all over firm to the touch.

Points.—Head large, with strong Roman nose, and free from “slugs,” “snags,” “snigs,” or budding horns. Faces and legs almost black ; light faces show recent crossing with the Southdown. The wool should be free from black patches, close up to and round the ears, close and fine all over, shedding white, with a pink skin under. Weight of fleece, $4\frac{1}{2}$ lbs. to 5 lbs. each for ewes.

Ears a good size, and more pointed than in the Southdown ; of a dark mouse colour behind, and free from light specks.

The forequarters are particularly good, and the top of the shoulder very broad ; sometimes a little defective in the hindquarters and at the girth.

The Suffolk Down resembles much the Hampshire, but is a shade darker in the face and ears, and not so compact or low-set. It has only recently been much

heard of, and is not extensively kept. The breeders claim that it is the hardiest of all the Downs. Specimens may usually be seen at the annual shows of the Royal Agricultural Society of England.

The Oxford Down is a breed recently formed by crossing Hampshire ewes with Cotswold rams. It is the largest Down, although Hants tegs, being older, weigh more at the London Christmas fat shows. The mutton is good quality, weighing 24 lbs. to 26 lbs. per quarter at twelve to fifteen months old.

Points.—The face is not so dark, nor the shoulder so broad, as in the Hampshire. The type is not so well defined, showing more of the crossed origin. Rams from old-standing flocks cross well with hill-breeds and inferior sheep, but those recently crossed are not to be depended on.

Flocks of cross-ewes are sometimes kept for breeding fatting tegs. When they get light-faced, a pure Hampshire ram is turned in for a year, and when rather dark a Cotswold. A Shropshire ram on a cross-ewe produces a sheep much better covered with flesh along the back.

Oxford wool is longer and more open or loose than that of other Downs, fleeces of ewes averaging 6 lbs. or 7 lbs.

The Clun Forest Breed, from the Clun district of Shropshire, the south of Radnorshire, and the adjoining portions of Montgomery. Sometimes called the Radnor-forest or Kerry-hill sheep in these localities. Bred from

the tan-face sheep that at one time abounded in that region, by crossing with hardy Shropshire and black-faced Longmynd mountain rams. The Longmynds have been quite supplanted by them. Ewes are excellent mothers; crossed with a Shropshire ram they produce Easter fat lamb, which would weigh, if kept till early summer, 17 lbs. to 18 lbs. per quarter. Ewes and two-year old wethers get up to 28 lbs. per quarter. The wether-mutton is sold in the "West End" as Welsh; dressed with a tuft of wool left on the tail, which is naturally long, on account of the breed being semi-mountainous.

The wool is about the same weight as Shropshire, but a little coarser.

The Dorset is a horned, white-faced breed, with a close, short fleece, and a tuft of wool on the forehead; clip 4 lbs. or 5 lbs. The nose, hoofs, and legs are white. In size it is a little larger than the Southdown.

The great peculiarity of the breed is, that ewes take the ram as early as April, and breed "house-lamb" ready for Christmas. They tup again soon after lambing, and thus give two crops each year. The ewes are often tugged for the last time by a Southdown ram, so as to get the lambs sooner ripe, and with dark faces and no horns.

Downs or Down-crosses are usually supposed to give the best quality of mutton, so that there is a run on dark faces and legs, as butchers can more easily dispose of the mutton of dark-faced sheep.

The Ryeland Breed (named from the Ryelands of Hereford, an upland poor district), is perhaps the breed of longest standing in England. Merinos are said to have been improved ages ago by crossing with Ryeland rams. The breed now refuses to be improved by crossing with others. It is small, compact, and hardy, and fattens readily.

Both rams and ewes are polled, have white faces and legs, and a tuft of wool on the forehead. Wool short and fine, but there is little of it.

MOUNTAIN BREEDS.

The Cheviot, named from the range of hills on the Scotch and English border, its native district. The ewes pasture on the lower and less exposed green hills all over Scotland; Cheviot wethers and Black-faced Highland ewes going to greater heights.

The face and legs should be well covered with short, hard, wiry, pure-white hair, which extends over the ears and well back behind the head.

Horns in the ram, though not always present, are not objected to, being thought a sign of hardiness, if "clean" and not thick like those of the Black-faced breed. The nose of the ram is highly arched or Roman. The nostrils are black, and the eyes dark, very full and bright.

The wool is moderately long, very close set, not open or

curly, but straight and free from "kemp" or dead hairs, covering well all parts of the body, including the belly, breast, and legs, down to the knees and hocks. Ewes clip $4\frac{1}{2}$ lbs. to 5 lbs. of washed wool.

The tail is long, and should be very rough. It is cut so that the point reaches the hough. (The tails of all mountain sheep are left long to protect the udders in cold weather, and because, on natural food, they are not so liable to scour and get dirty, like sheep on turnips and artificial foods.

The shoulders are high and sharp at the withers.

The fashionable form is shorter, smaller, and more compact, and the wool closer and thicker set, since a series of bad seasons, down to 1879, showed that the larger varieties with loose fleeces are not so hardy. The old, original Cheviot was a very close-coated, short-woolled, and remarkably hardy sheep.

The ewes are good milkers if not starved, as in bad seasons, when the natural food on which they subsist is late in springing.

Cast ewes fed on turnips from twelve to fourteen weeks, and wethers from the hills at 3 years off, weigh, killed and dressed, 70 lbs. to 80 lbs.: wethers a year younger, and finished on turnips, come up to about the same weight.

Cast or draught, or cull ewes, at five years old, go into the low-country and better food to be "milled," or crossed, with Lincoln, Border Leicester, or Wensleydale rams.

The produce is called "Half-bred," or "Leicester-Cheviot." Those kept for ewes produce "Three-part-breds."

Half-breds, when fat at twelve to fourteen months old, weigh 16 lbs. to 18 lbs. per quarter, and the flesh is leaner and of better quality than that of Leicesters.

The **Scotch Black-faced Highland Breed** is smaller than the Cheviot, much hardier, and thrives better on coarse pasture, as on black, heathery land. The wool is curly, loose and shaggy, down nearly to the ground, and more hairy and kempy: valuable for carpet making and coarse manufactures; and, as it is less liable to foreign competition than other wools, fluctuates less in price; usually clipped unwashed, the fleece averaging 3 lbs. to 3½ lbs. from ewes. Much is exported to America when the price is not over 6d. per lb. Then it can be imported with a much smaller duty. Black or blue spots on the neck, tail, or other parts are objectionable.

The face and legs are black or mottled (but the colours distinct and clear), smooth and glossy, and no wool among the hair.

The nose is strong and prominent, but not so much arched as in the Cheviot, and the nostrils are wide and black.

The horns of the ram are large, coming out flat from the head, not rising above it or joining together at the base, but taking one or more spiral turns, projecting forward, leaving room between for the face.

In the ewe they are small, thin, flattened and curved, but not spirally twisted.

The ears are short and small, but hidden by the horns in the ram, and not much looked to. The back is broad all the way, including the shoulder top. The tail is naturally short, not often hanging lower than the hock, and does not require cutting. Old ewes should have rough tails. When they lose the wool and become "whip-tailed," they are not worth so much in the market.

The mutton is of the finest quality, especially from three, four, or five-year-old wethers. A wether fat from the hill at three years off should weigh 16 lbs. to 18 lbs. per quarter.

The "Black-faced" sheep is wild and active, and when thriving best must travel about much; suiting it to its native pastures better than to a low district, where it is liable to take foot-rot. It is supposed to have come originally from Ettrick Forest.

The produce of a Black-faced ewe and Leicester ram is called a "Cross;" by a Cheviot ram a "Half-long" (the latter because a Black-face is sometimes termed the "short" sheep, and a Cheviot the "long" sheep). As ewes these are good milkers.

The Herdwick Breed is the hardiest hill sheep; seen in Cumberland and Westmorland on the most exposed and barren pastures. Rams and wethers are horned. The faces and legs are much speckled, the shade varying from almost black to light gray.

The ears are small and pointed, and woolled close up. This extends into a top-knot on the forehead. The wool is very coarse—quite hairy in old sheep. A ewe's fleece averages about $2\frac{1}{2}$ lbs. to 3 lbs. Wethers three or four years old and fat ewes weigh 12 lbs. to 18 lbs. per quarter. The mutton is of very fine quality.

The Lonk Sheep is a native of the Lancashire, Yorkshire, and some of the Derbyshire hills. It most resembles the Scotch Black-face, but is leggier, has a larger body and bigger head, and in the ewe stronger horns. It is often light in the forequarters, and the hind-quarters have a tendency to droop. In constitution it is not so hardy as the Black-face, but has a shorter, closer, finer, and heavier fleece—weighing 4 lbs. to 5 lbs. from ewes.

The rams have been used to cross with Black-faced ewes to try to increase the size and improve the wool, but it has not succeeded, the constitution being softened. The fat weight is slightly more: 18 lbs. to 20 lbs. per quarter for wethers three years old off.

Welsh Mountain Sheep are very hardy, hornless, and white-faced, with more or less of a brown tinge, also seen on the legs. They are very active and difficult to fence, on account of their jumping proclivities, when brought down to the low country to breed the last crop of lambs, as is usually the case with mountain sheep at five years

old. The mutton is very fine, but the weight small—12 lbs. to 14 lbs. per quarter.

The wool is coarse but not very close : weight between 2 lbs. and 3 lbs. from ewes.

The Tan Face is a very old Welsh mountain breed yet met with, but in smaller numbers than formerly, in Radnorshire, about Abbey-cwm-hir¹ and St Harmon, and shown as a distinct class at the Radnorshire Agricultural Show, annually held at Pennybont. A short-legged, hardy little breed, with close fleece of fine wool on the back and sides, but rather coarse underneath.

Exmoor Sheep somewhat resemble Dorsets. They have white faces, with black nostrils, and the horns slant more back. They are more hardy. The wool is very close and fine, weighing 4 lbs. or 5 lbs. a fleece. Exmoors are larger than Welsh sheep. The mutton is also very good.

MANAGEMENT OF SHEEP ON CULTIVATED LAND AND LOW COUNTRY PASTURE.

“**Tupping**” or “**Rid**” time commences usually where the climate is moderate, and plenty of food can be got in spring, about the first week of September, or at any later period, varying with the district, till about 22nd November (Martinmas), when hill-rams go to the ewes. The

¹ Cwm-hir (pronounced *coom hère*) Welsh for valley-long.

date is often governed by the time the ewes begin to come in season : for instance, Hampshires will tup in the beginning of August, whereas hill ewes frequently do not come in before the end of October.

Cast ewes (four-year-old) and "culls," or those unfit for breeding, are "drawn" out when the lambs are weaned, or at any more suitable time before the ram goes among them. By putting on good food, such as rape or mustard, for ten days before tup-time ewes get into an improving condition and produce more doubles.

The ewes and rams should be all arranged together according to their different qualities and characters, to get the flock to have a type of its own. One ram goes to sixty ewes, or more if he is kept by himself, and a "chaser" or "teaser" lamb, with a cloth sewed on to his belly, put out to find the ewes as they come in season.

A shepherd should notice if ewes come back at the end of sixteen days. A mechanical way of finding out is to use three colours of paint, usually blue, red, and black. The breast, or sometimes the inside of one fore-leg of the ram is rubbed with blue, for rather more than two weeks at first : red is used for the next period of sixteen days, and black for a third. The ewe's rump is marked while being tupped, and according to the colour of the last marking the time of lambing is approximately known. A ewe marked twice should be put beside another ram for the third trial, as she is less likely to hold to the first ram than to another. This is often accomplished by putting

several lots together. Ewes go with lamb between twenty-one and twenty-two weeks. At the end of six weeks, when the tups are taken up, they should run over stubbles and poor pasture, or follow fattening sheep to clean up turnips, etc.: kept thriving, but not made fat.

Ewes going on pasture during winter should have $\frac{1}{2}$ ton of roots per 100, per day, up till lambing, and 1 ton per day, = 22·4 lbs. each, after lambing, along with 1 lb. or 2 lbs. of hay or good oat straw in racks—increasing this slightly should snow cover the ground. Ten days before lambing begins, each should have $\frac{1}{2}$ lb. of a mixture of concentrated artificial food: as crushed peas, Egyptian beans, and cake, with oats (whole), and bran, varying in quantity to suit the condition of the bowels. Heavy milking ewes, as those with doubles, should have this increased, but not to more than 1 lb. The mixture is gradually taken off as the lambs learn to eat more. Some give no extra food, and some give too much, and set it down to bad luck if the lambs do not thrive. It is as great a mistake to have stock too fat as too lean: there is more risk in producing young which are smaller, and there is less milk for them. On an ordinary farm, 25 lambs to every 20 ewes is a good crop; 30 lambs very good. With extra care, and breeding only from ewes that were twins, even 35 lambs may sometimes be got.

Sheep not in lamb (eild) may be noticed near to or in lambing time—

1. By their jumping and playing in good weather.

2. Being less bulky, and no lamb being felt when turned up.

3. Having no show or increase in size of the udder.

4. A considerable amount of yellow waxy excretion on the bare parts about the udder, that does not look like cleaning off; and

5. The wool is more firmly attached near to the udder.

The lambing pen is an open well-littered yard made of hurdles thatched with straw, to give warmth and shelter to the young lambs in stormy weather. Small covered pens or boxes, each $4\frac{1}{2}$ feet square, ranged round the north, east, and west sides: 30 to 35 for 200 ewes. The cost of the labour of erecting one of the size named is from £2, 10s. to £3. It should be placed on dry ground, in a sheltered place if possible, and on a slope sufficient to let surface water run off.

Ewes "coming near their work" are brought in at night, so that they may be more carefully tended. Ewes do not lamb nearly so frequently at night as late in the evening and early in the morning. Lambing is more easy in moist weather.

The shepherd lives in a wooden house on wheels, fitted with a stove, and placed close to the pen to be handy.

Assistance by hand should never be given too soon. Should the head appear, immediate action is necessary to prevent the death of the lamb by strangulation. When natural, the two fore-legs, then the head, come first. A steady pull is usually successful. In false presentations

lambs have often to be turned round before they can be got out. The hands, after washing, should be oiled with carbolic oil, one part of pure (Gresser's), not the crude or brown carbolic, to eight or ten of sweet oil. Half an ounce to one ounce of the mixture should be put into the vagina afterwards, to prevent inflammation (the result of injury, or the presence of putrid matter, as when the lamb is dead), which causes "straining." Inversion of the uterus (commonly called the "lamb-bed," or in Gloucestershire, the "wither" or "wether") is thus prevented. When this does occur, wash with tepid water (cold water gives pain) and press gently back, with the hand held flat, taking care not to pierce it with a finger. The oil should in such a case have a few drops of laudanum in it to help to soothe. Locks of wool may be tied tightly across from each hip, or the lips of the vagina may be stitched together.

When it is necessary to bring lambs that have been chilled into the house, they should not be put too near a fire, because a sudden change of temperature gives an injurious shock to the nervous system. The full cows' milk, without water, given warm (blood heat), should have in it a little gin or sweet nitre to aid urination. Stricture, the result of cold, is most common in male lambs, and is relieved by gently rubbing the belly with the hand while the lamb is held up by the fore-legs.

A motherless lamb, while young, should be fed five or six times a day to prevent scour. Giving a little cows' milk

to a lamb while sucking its mother often causes diarrhoea or constipation, and in cold weather swelled and stiff joints.

In "twinning on" a double lamb to a ewe which has a dead one, the skin of the latter is often put on the living lamb for a day or two to give it the smell which the ewe knows well, and can distinguish if she has been allowed to lick her own lamb. Should she not have licked it, another lamb may be at once substituted for the dead one, without any precaution. Whisky rubbed on her nose and on the lamb destroys her scent sufficiently to deceive her soon after lambing, when the instinctive fondness for the young is strongest.

About the end of March or beginning of April, ewes on arable land are removed from around the ewe-pen, where they have had sprouting, white-swedes, or late sown green-round turnips, which stand the winter well, to encourage the flow of milk. The lambs run a break in front by getting through the hurdles.

One acre (15-ton crop) is usually set aside per week all winter for every 200 ewes, = 24 lbs. each per day. Shelter is got from thatched or wattled hurdles set up thus +. Put for a week or 10 days on to early pasture ("seeds"); then on to rye for 3 weeks, to finish before the end of April; then on to clover, vetches, etc.; swedes or mangels, and later on cabbages, being thrown to them on the field to supply a change of food.

Lambs are taught to eat cake and corn before being

weaned by enclosing their troughs within hurdles, through which only they can pass. This is most important in feeding for fat lamb. Store male lambs are castrated at 2 or 3 weeks old, but not during frost, which would make them stiff, nor in a very hot sun, which might cause excessive bleeding if the testicles are pulled. Lambs at times faint after castration, but soon recover. Marking by taking nips from the ears, if not done before, is now performed, and the tail docked to keep the sheep clean.

Three common ways of Castration:—*1st*, The scrotum is either slit or the top cut off by a knife, and the testicles drawn by the teeth.

2nd, By iron clams and the actual cautery. If one is stiff next day it should be bathed with hot water.

3rd, By hazel-wood clams spread with lard inside and dipped in powdered sulphate of copper, and left on for half-an-hour to prevent bleeding after the testicles have been cut away.

The two latter are not so liable to cause inflammation, and there is no danger of rupture, or bleeding in the region of the kidneys, as when drawn, causing a lamb to pine, though it does not cause death at the time. The third method is the safest, but takes much more time than the others. It is the most suitable to adopt, if old lambs or old sheep are to be castrated.

Washing 10 days before clipping is usual in the case of most lowland breeds of sheep, though not with Black-faced Scotch. It is never done in salt water, as it spoils

the wool for keeping. There should be a watertight box in the centre of the pond for the man doing the washing to stand in, in place of in the water. He gets hold of a sheep and keeps it moving about until the "yolk" or "eik" is washed out. Yolk is a skin excretion which keeps the wool soft and greasy to touch. It contains much potash, and is most abundant on the Merino breed. Hill sheep, as Cheviots, are simply thrown into a large pond and made to swim through it once or twice.

Clipping or Shearing is dependent on the weather, and, in the case of lean sheep, on the "rise" of new wool. Unless for special purposes, sheep are clipped in the new growth of wool.

Eild sheep, or those not giving milk, are shorn first: on from the beginning of May in the south, and ewes three or four weeks later. Exposure to cold by early clipping greatly diminishes the flow of milk, and might also cause death from inflammation.

The new wool left is not so close as in sheep of higher condition. Show sheep are clipped in early spring, but are kept under cover. Fat sheep clipped for the early spring market have woollen sheets put on them if the weather is at all cold. Neglect of this causes the liability of the exposer to a fine.

Lambs are not shorn the first year, except in a few districts: then they are highly kept, and are a good size by summer.

Twenty-five to thirty stock sheep of large breeds is a

good number for a man to clip in a day, at a cost of 3s. per score, when done by piece-work. If restricted to twenty per day, as in fat sheep for market, which have to be clipped over the back, and done bare and well, 4s. per score.

They are usually "buisted" or marked by a large iron letter dipped in hot Archangel tar, darkened in colour with a little lampblack. As the wool gets pretty long, these markings become first indistinct and then unreadable, and paint or red keel is rubbed on the wool, after mixing either with water, or, if wanted to be more permanent, with linseed-oil.

Each fleece of wool is carefully rolled, after all earth and dung ("clarts") are removed, inside out, except in such as Black-faced wool. The neck end is last rolled on, and made into a band by twisting, to tie the whole together. It should be packed in bags at once while warm, as it is more easily and better accomplished.

Certain lands and climates produce better and finer wool than others, whatever be the breed of sheep. The Australian fine-woolled Merinos imported into this country grow it much coarser, and produce young which grow it coarser still. Rich and heavy soil grows strong wool; light soil, as down land, a finer quality. Wool "wauks," "mats," or "felts," *i.e.*, sticks very closely together on the backs and necks of lean sheep in wet winters, lowering its value. The best wool is got from sheep that constantly thrive; there is then no break in the staple, as when sheep get very poor.

Weaning, in the south of England, is done about the beginning of May and onwards: in the north, the end of June and beginning of July and later. Lambs should have the pastures often changed, if turned out in a field at the breadth, and should never follow ewes or other sheep, as they pick up parasites which have come from these, and are seriously injured. Sheep doing badly from ordinary causes, as grass scour, etc., may almost invariably be "set going" by a change to sainfoin. Ewes with the extra feeding taken off run over the poorest and barest pasture to dissipate the milk, which causes swelling of the udder for a few days. It is quite unnecessary to milk after by hand, as was at one time the custom even in hill districts. Ewe-milk cheese is very fine, and of a rich green colour; but as ewes are milked from behind, the operation is not one of the cleanest either for the milker or the produce.

When lambs are to be fed on a bulky well-grown forage crop, as clover, rape, or vetches, they should at first go on gradually for a few hours each day, and be perhaps turned out into a grass field at night for a time. This should also be done in wet weather if possible, especially if the land is at all inclined to be heavy. There is risk of hoven, ending in "bursting," if put on to wet clover suddenly; or of impaction, ending in "stomach staggers," if very dry and on clover alone, or if there is not a proper supply of water. Sheep drink much in very dry weather, and those giving milk more than others.

Sheep in the south are penned between two sets of hurdles, the first moved forward at least once a day, and the ones behind every second day. The grass is thus eaten off at once, and, if properly attended to, need not be eaten so closely as to injure its future growth. It is then left to grow again without any further bleeding, which ensues each time it is nibbled by sheep. When the crop is a moderate size, larger breaks are given, and the hurdles are not so often lifted. In Scotland and the north, sheep get all the field at once. No doubt this is more wasteful, but there is less expense, and Scotch sheep are more active and require to be at liberty to move about.

In the end of September or beginning of October (and in some few districts even earlier) fattening tegs, and on arable farms stock tegs, go on to soft turnips, whites, graystones, etc. If not quite ripe, these are pulled a few days before the sheep reach them. This makes them sweeter and prevents scour. Soft turnips are followed by yellows, green-rounds, and swedes, then mangels in spring, and on into July. Roots, as a rule, unless when thrown on the grass in spring and summer, should be cut, as they go further, and it pays in the end; and tegs, if made to bite them, break their milk teeth in frosty weather, and then cannot feed satisfactorily. A mixture of concentrated artificial food (bruised cake and grain) prevents scour and other diseases in fattening tegs. Begin with little, and increase to about $\frac{1}{2}$ lb. at the New Year (average $\frac{1}{4}$ lb. to $\frac{1}{3}$ lb.), then increase in the proportion of $\frac{1}{2}$ lb. per 100 lbs. live-

weight till sold. This is often mixed with chaffed hay or straw. One ton of hay is set aside per acre of roots = 1 ton of hay to 15 tons of roots, or a little over 1 lb. of hay per sheep per day.

Turnip - troughs should be almost square, in cross-section, and ample in size. There should be a second set of troughs for the artificials, which do not require to have such capacity; the cross section of this might be in the form of a right angle. Troughs, when not in use, should be turned over to keep them clean and dry. A length of 8 inches to 9 inches is necessary for each sheep, in the case of the larger breeds. As these stand on both sides, each will have at least twice that space. A man can easily cut roots for, and take full charge of, 200 sheep, or attend to 400 if not cutting.

Stock tugs should have little, if any, artificial food, which might injure them for breeding.

Urinary disorders appear in some districts among sheep on turnips, especially swedes, late in spring. All the food then requires to be changed, and linseed-cake given, and $\frac{1}{2}$ drachm of nitrate of potash per day. And, to induce warmth, the back should be covered with a piece of strong canvas-cloth, 2 feet to $2\frac{1}{2}$ feet square, which has had boiled linseed-oil brushed on to one side of it to make it waterproof.

Sheep feed faster in a well-ventilated house or shed than in the open, especially in stormy weather. The cost of building precludes this, except for rams or show sheep.

With a number together they are very liable to foot-rot. In that case it is well to have a platform, a few inches high, covering most of the centre of the floor, and to sweep it clean every day. Hay-racks, feeding-troughs, and water-troughs, are also necessary.

Two hundred sheep are as many as ought to be together in one lot on roots. In Gloucester and some other districts that number would be divided into two or three lots by low hurdles, or 4-inch mesh-nets.

Amount of Food.—A Cotswold teg, or one of any of the larger breeds, from eleven months old (1st Jany.) till fat, will eat, along with the other food mentioned, 24 lbs. roots per day, if fed three times—younger ones less in proportion. Lean sheep eat more for their weight than fat ones, and a Cotswold cast ewe will consume up to 35 lbs. per day.

One average acre of turnips, or 15 tons, will keep 200 sheep for one week, at 24 lbs. per day.

Experiments by Sir J. B. Lawes showed that Cotswolds give the largest average increase per head per week, also per 100 lbs. live-weight. Hampshires came next, after Crossbreds, then Leicesters, and last South-downs, the increase in all but the Leicesters being in inverse proportion to the quality of mutton. Under cover, three sheep, of 100 lbs. live-weight each, consume the same amount of food as two sheep of the same age and breed, weighing 150 lbs. each. The mixture consumed per 100 lbs. live-weight per week was $4\frac{3}{4}$ lbs. cake, $4\frac{3}{4}$ lbs. hay, and

about 70 lbs. roots = about one-seventh of the live-weight, after deducting the moisture of the food. The increase was nearly 2 per cent. live-weight = 2 lbs. per week for a 100 lbs. sheep. A usual increase is 1 lb. live-weight to 8 lbs. or 9 lbs. solid food, without its moisture. About 58 per cent. of the fatted live-weight of sheep, moderately fat, is butchers' carcass (Warrington); very fat, 6 to 8 per cent. more in fine breeds, like Southdowns. Lean sheep give about 50 per cent., and old ewes, unless of the more fleshy breeds in good condition, often little over that proportion. In ordinary sheep passing from store to fat condition, 68 per cent. of the increase is carcass.

The calculation following shows the amount of mutton produced from the food already recommended. The amount is reduced to percentage to correspond with Lawes's 8 lbs. or 9 lbs. dry food example. A little more food is allowed for sheep kept outside. This drawback is so far made up for by the advantage gained from giving a mixture of corn and cake.

Food per day, per 100 lbs. live-weight, would thus be $\frac{1}{2}$ lb. cake and corn, 12 lbs. roots, and 1 lb. hay; or per week—

$3\frac{1}{2}$ lbs. cake.

7 lbs. hay.

$10\frac{1}{2}$ lbs. — $1\frac{1}{2}$ lbs. moisture (= 14 p. c.) = 9 lbs. dry.

Roots 85 lbs. — $76\frac{1}{2}$ lbs. do. (= 90 p. c.) = $8\frac{1}{2}$ „ „

Total, $17\frac{1}{2}$ lbs. dry.

This should give 2 lbs. increase of live-weight = 1 lb. in $8\frac{3}{4}$ lbs. dry.

By doubling the above figures, we get rather over what a Cotswold teg would do from 1st Jany. till killed at thirteen to fifteen months old, weighing 25 lbs. to 28 lbs. per quarter. With 200 lbs. live-weight, the increase would be 4 lbs.; and if we apply the 68 per cent. rule in passing from store to fat condition, the mutton would equal 2.47 lbs.; whereas in reality a sheep of the larger breeds only lays on about 2 lbs. of mutton per week.

In calculating the cost of artificial food, it is usually taken roughly at 1d. per lb. = linseed cake @ £9, 15s. per ton. Seeing half of the mixture is grain, this price would pay all carriages, and be too much at present prices.

From weaning till 1st Jany., 30 weeks = 210

days @ $\frac{1}{3}$ lb., or in money $\frac{1}{3}$ d. per day = . £0 5 10

From 1st Jany. till fat, 12 weeks = 84 days @

$\frac{3}{4}$ lb., or $\frac{3}{4}$ d. per day, 0 5 3

Total cost of cake, etc., £0 11 1

Sheep are sometimes sold by the farmer to the butcher (either rough or clipped) by the lb., "sinking the offal," viz., 6d., 8d., 10d., or 1s. per lb. of dressed carcass, according to the quality and range of prices in the market. The butcher gets head, feet, skin, and intestines, including "web tallow," all into the bargain. The web tallow, or

store of fat which surrounds or encloses the bowels and stomach of a fat sheep, often weighs 10 lbs. to 14 lbs., and in Down breeds even more.

In English markets they are usually sold by the "hand and eye," or a guess is made at the weight—a great disadvantage to farmers, who have not the constant experience of butchers. The American plan of selling by live-weight would be much better.

Dipping is practised at various times during all of the four seasons on a dry day and with the wool dry, as after clipping, or better a fortnight later (when the wool has grown a little to retain the material—lambs should also go through at the same time), or usually in autumn or spring, depending on the custom of the district. Ewes and tups should either be dipped after tup time or one clear month before it, to prevent "firing" the rams. The object is to ameliorate or prevent altogether the attacks of parasites, viz.,—the kade or tick, *Melophagus ovinus*; the grass-tick, *Ixodes ricinus* and *redurivus*, and perhaps other species; the louse, *Trichodictes sphaerocephalus*; the black fly, *Anthromyia* (several species); the flesh or maggot fly, four species, *Musca caesar*, *M. vomitoria*, *M. canaria*, *M. cadaverina*; and the scab-mite or itch-mite, *Dermatodictes ovis* (an acarid).

Ticks (English), **Kades** or **Keds** (Scotch), are slightly-flattened, 6-legged insects, resembling flies without wings, which move about in the fleeces of sheep, and live by now and then biting and sucking blood. They may be

kept very much under, if not got rid of altogether. They are always most abundant on sheep in poor condition, and in winter when there is little sun, and they do not come out to the top of the wool to bask, and get shaken off. On man they bite a few times and then die.

Grass-Ticks are 8 legged, and fix themselves by burrowing their heads into the skins of sheep and other animals, as dogs, rabbits, etc., and also men. They do not often move about, but gorge themselves with blood, increase to the size of a large pea, and then drop off into the grass to pass one stage of their existence independently of the sheep as a host. It is consequently impossible to destroy them altogether, or even to keep sheep quite free at all seasons on land where they exist, especially in spring and sometimes autumn, when the young ones are about in the grass, and find their way to the bare parts about the head, neck, and legs.

Sheep Lice are much less in size than the two pests described, and much lighter in colour, except about the head, which is dark brown. They are usually in greatest abundance on the head and barer parts of the body, causing great irritation, and preventing sheep thriving. With a little care, and the new method of dipping over the head, they can be quite destroyed. Many well-managed flocks have been free from them for years.

Black Flies, such as swarm in thousands about the hats and heads of people in summer, do not bite, and cannot break the skin, but live by sucking any raw surface,

as an accidental cut made while shearing. When very numerous they irritate and unsettle sheep, and prevent wounds healing, especially if these be about the top of the shoulder, when the animal can do little to protect itself.

Maggot Flies, sometimes called blue-bottle flies, do damage by laying their viviparous ova, during warm showery weather, on any part of the wool which has been wetted or soiled with such as animal excreta. In a few hours after the sheep are thus "fly-blown" or "struck," the maggots are hatched, if the day be hot, and immediately find the way to the skin, which they devour rapidly—growing in size and strength until they are enabled to cause death within two or three days. The presence of maggots may be easily noticed by the wool on the parts attacked becoming dark and damp, by the restless and uneasy movements of the sheep, including turning round and attempting to bite the affected part, lying down often, then rising and running a little, and taking shelter by itself at the back of a wall or among rank undergrowth. A sheep may at times clear itself by rubbing in a loose sandy bank or scar, but the shepherd has usually to dress each carefully at least twice with a strong smelling solution, which at the same time destroys the maggots without doing injury to the raw parts—no ordinary dip is strong enough to kill maggots. Sores should be kept soft with carbolic oil. The spirit or oil of tar is very useful if there is no broken skin, or to sprinkle on the top of the wool or on any dirty

part to prevent a second attack in very bad cases; but it darkens the wool, and causes much irritation on a raw surface. Maggots may be almost surely prevented from appearing through keeping sheep clean by clipping away all dirty wool from behind, and dipping in time with a strong smelling solution containing so much of carbolic acid and sulphur. Where it is important to have the scrotum well covered, ram lambs are not kept in the dip the usual time, as it has a tendency to make the wool fall off those parts. Frequently they are not dipped, but a strong solution of dip material, with a strong smelling fly-powder added, is rubbed over the backs with a Banbury brush. Sprinkling the backs with a mixture from a rose-can is a common practice with large numbers of sheep together. They are first packed close in a fold. Maggots have been known to much improve a bad case of foot-rot by feeding on the diseased part, but they must be noticed before they have gone too far.

Scab Mites are microscopic; very much smaller than any of the other parasites. Patches of the wool get white, and the sheep by biting half-pull so much wool, leaving a rough surface. When felt with the hand there is a hard brittle scab on the skin at the roots of the wool. It can, as it must of necessity, be cleared out, to prevent the spreading of the disease, which is most contagious, and would ultimately prove fatal if not attended to. "The Highlands of Scotland," or north of the Forth and Clyde, was at one time the stronghold of

scab. In some places it still lurks. There is a fact about it which has not yet been scientifically explained, and which should be interesting to farmers buying Scotch Highland sheep, viz., that after a long drive or railway journey, where sheep are packed close and heated, scab is liable to break out in a few weeks, although there has been no such thing seen in the flock they came from for years. The rule is, to dip Highland sheep about ten days after coming off rail, and then there is not the slightest danger.

The common winter dips are preparations of arsenic, etc.,—for instance, Bigg's is mostly sulphide of arsenic, got largely from the chimneys of chemical works. Commercial arsenic (As_2O_3), boiled with a little bi-carbonate of soda to make it dissolve, does the work well, but hardens the wool. Oil, melted butter, or grease are used to counteract this action and waterproof the fleece.

Summer dips are mostly carbolic, with an admixture of sulphur, smelling strongly to unsettle flies. Carbolic is not only able to kill the living forms, as other dips do, but to destroy the eggs by coagulating their albumen. The so-called non-poisonous dips belong to this class. M'Dougall's and Cooper's are two commonly used in summer. Most dips require to be dissolved in hot water, which is an inconvenience. Little's is an example of dips that dissolve in cold water, but these, as a rule, are more easily washed off the wool by rains—the extra convenience often overbalances this. Sheep affected with scab are

dipped with tobacco-juice, and powdered hellebore-root boiled for fifteen minutes, in addition to the usual dip.

A dipper consists of a fold, tank, and dripper. The tank may be built of bricks drawn with cement, and have a concrete floor. The old-fashioned tub into which sheep were turned on their backs was a mistake. Heavy sheep got injured in lifting. Now, the best form of tank is made wide enough to let a sheep swim through without being able to turn easily: 15 feet to 20 feet long at the top, 5 feet deep at the plunge-end and for $\frac{1}{3}$ of its length, then slanting out to the dripper at the other end. Sheep are not lifted, but pushed forward and plunged over the head. They close their lips and swim slowly through. They should be in till thoroughly soaked; men are very apt to let them go too fast. The excess of dipping solution runs off them, and back to the tank by the floor of the dripper, which has a fall towards it. For a few minutes after dripping the sheep should go for a time into a fold, or bare place where there is no grass, to avoid poisoning the pasture, especially when an arsenic dip has been used. The cost of dipping, which is usually done by contract in Southern England, is about 1d. each, all over a flock, including lambs. The cost of dipping material for Scotch sheep is from £5 per 1000 (or a little more than 1d. each), down to half that price, but large discounts are often given by some agents.

A home-made dip, specially intended for water-

proofing the fleeces, may run up to 3d. per sheep, as follows:—

20 lbs. of a mixture of equal parts of soft soap and pitch-oil (the former boiled before mixing) @ 2d. per lb.	£0 3 4
10 lbs. tobacco powder @ 7d. per lb.	0 5 10
4 gallons Gallipoli oil @ 4s. per gallon	0 16 0
	<hr/>
Cost of material to dip 100 hill sheep,	£1 5 2
	<hr/> <hr/>

The principle in pitch-oil is carbolic acid and some chemically-allied substances. The pitch-oil and soft soap alone make a good, cheap, summer dip.

Pouring is running a concentrated solution of, say, 5 gallons per score, against 20 gallons in dipping, into sheds made by the hand, at intervals, in the wool along the back, sides, and belly of the sheep. This is more effectual in a case of scab, but is more expensive, and unnecessary for ordinary purposes.

Smearing¹ with a mixture of equal parts of American or Archangel tar, and grease, or better, butter, is a method of waterproofing the wool and destroying parasites that was at one time very largely and successfully practised in exposed hill districts, especially the Highlands of Scotland. It encourages more the growth of wool than any dip yet used, but wool is now so low in price that the increase

¹ The writer is indebted for many of the facts on this subject to Mr Stephen Brown, Killilan, Wester Ross.

will not pay the extra cost of the operation, and many have given it up. It darkens the wool, and often gives sheep, especially if lean, a "back-set" until the tar lifts a little from the skin. Smearing should not be practised before the middle of October, as a strong sun melts the smear and it runs towards the points of the wool, and, besides, rather sickens the sheep. In the process the smear should be laid well to the skin at the bottoms of sheds made in the wool, and as little as possible on it. The usual practice in preparing the material is to mix, a fortnight before the operation, as much as will do forty mountain sheep in a tub at one time, viz., 9 pints (Scotch ¹) of tar with 9 pints of butter, melted to enable it to mix, and well stirred together. Tar is a mild blister if applied alone to an animal's skin, and the grease is intended to dilute it. Hard grease like butter also gives it consistency. A man smears 20 sheep per day, and receives 2s. 6d. to 3s. per day, besides food; the cost of smearing is nearly 10d. each, as follows:—

9 pints of tar @ 8d.,	. . . . .	£0 6 0
40 lbs. butter @ 6d.,	. . . . .	1 0 0
Labour @ 3s. 6d. p. score, including rations,		0 7 0
		<hr/>
Cost of smearing 40 sheep,	. . . . .	£1 13 0
		<hr/> <hr/>

Internal Parasites and Common Diseases.—Besides these external pests, sheep are subject to numerous internal parasites. One stage of the development of *Tenia caninus*,

¹ A Scotch pint is about equal to $\frac{1}{2}$ gallon imperial.

a tape-worm found in the dog, is passed in the brains of sheep, causing "gid" or "sturdy." The remedies are of more consequence to farmers with lean stock, and ram-breeders, than to those who can send an affected animal at once to the fat market without much loss. A ram which has been cured of "sturdy" is none the worse afterwards for breeding purposes. The seat of disease is on the surface of the brain, at its base, or, in the writer's experience, frequently in the "lateral cavities." These cavities are situated one on each side of the forward brain, and there, in common language, a "water-bag" grows, containing many young tape-worms. This presses against the brain, causing absorption of that organ, with usually a thinning and softening of the skull in one or other of the hollows on the crown of the head, immediately in front of a line drawn between the ears. There the skull is very thin. Partial paralysis accompanies, and the sheep gets blind on and turns to the opposite side to which the "water-bag" inclines. Boring with a trochar and canula, to extract the blob and its contents, is easy in this case. When the disease is far back in the brain the skull is thicker over it, and there is not sufficient time, until death would occur, for the bone to absorb and become soft. In Scotland this form of the disease has the special name of "thorterill." Piercing then leaves little fractured pieces of bone, from the skull, on the surface of the brain, which, although the disease is cured, cause suppuration, and death some days after. Principal Williams, Edinburgh, recom-

mends the use of a little circular saw, called a trephine, to remove a minute round piece of bone. The skin is bared from the skull immediately over the spot to which the movements of the sheep direct. All detached pieces are washed carefully out before the external covering of the brain is broken. Piercing in the usual way through the brain to reach the bag is then done with comparative safety. In districts much subject to this disease the skulls of dead sheep should be broken up and buried with quicklime in a compost heap. The dogs ought to be dosed regularly with $\frac{1}{2}$ drachm to 1 drachm of areca nut. This frees them from tape-worms, and lessens the risk of sheep picking the embryos up with the grass.

Liver Rot.—Though there have been enormous losses in this country from “rot” in sheep, the full bearing and nature of the working of the liver fluke (*Distomum hepaticum*) or (*Fasciola hepatica*), which is the cause of the disease, does not yet seem to be quite understood. These worms are seldom more than an inch long, are broad, thin, and flat, attaching themselves by a sucker on the under surface. Sometimes hundreds have been found in the liver ducts of one sheep. Professor Leuckart in Germany, and A. P. Thomas in this country, traced, almost simultaneously, the life history of this parasite through all its different stages, and published accounts of their investigations in 1882. They find that it lives for a time, and changes its form in the body of a minute shell snail (*Limnæus truncatulus*), which thrives in an excess of wet.

The sequence of changes in the animal system is originated by irritation, and consequently inflammation, beginning in the biliary ducts, and extending through the liver, preventing it performing its proper functions to aid digestion; the stomach then gets disordered, imperfect blood is the result, and time is all that is necessary to exaggerate the consequences into a persistent anæmia ending in death.

The great means of prevention are, draining, and in stiff clays also keeping the arable land up in high ridges to aid surface drainage, keeping sheep off flooded land, having lumps of rock salt about the pasture, and giving liberal feeding. One fact is not generally known. The presence of flukes in the liver, in very large numbers sometimes, does not necessitate the appearance of the disease. Few sheep in Galloway, a large district in the south-west of Scotland, are killed without flukes being found in the livers, and sometimes in vast numbers. Yet "rot" to any extent is very exceptional. Rot certainly has done much damage, and will still do much in wet seasons, but there are good reasons for believing that much of the death from so-called "rot" was from a very different cause.

Scour or Diarrhœa in sheep, but more especially in lambs, is often caused by various parasitic worms attaching themselves to the inner surface of the stomach and bowels. There they set up irritation, and live, by absorbing what ought to go to nourish the sheep. *Cure*: No better or simpler remedy can be had than turpentine. A sheep is

very easily choked, and turpentine is one of the most dangerous drugs to administer, not only from its highly irritating and searching nature (causing death by spasmodic closing of the mouth of the windpipe should it enter), but from the fact that it will hardly mix with any ordinary drench. The administration must be done with great care. The turpentine ($\frac{1}{4}$ to $\frac{1}{2}$ oz.) should be thoroughly soaked into a little dry meal, and this again mixed in cold gruel, oil, or even water, and given with perfect safety. Should the scour be the result of an over-feed of succulent grass, or a sudden change of green food, the purgative and the astringent action of the turpentine is generally what is wanted. Laxity of the bowels, when there is no positive derangement of system, is easily remedied by altering the concentrated food from cakes, which contain large quantities of oil, to the seeds of leguminous plants, as beans, peas, lentils, etc., which are deficient in oils, and have a costive tendency.

“**Husk,**” or “**Hoose**” is a bronchial catarrh, the result of the irritating action of a number of long, white, hair-like worms (*Strongylus filaria*) in the bronchial tubes. It is most common amongst lambs, if they have been pastured on land recently eaten over by sheep, as they pick up the eggs (*ova*) with their food. The attack is evinced by a peculiar husky cough, which is made worse by exertion, and an unthriving appearance; the result is frequently death in weak specimens. To prevent, keep sheep in good, thriving condition, and do not have young

stock on land previously soiled by sheep. *Treatment* is directed towards the removal of the worms. A turpentine drench has been long considered most efficacious. Now the approved method is the injection, directly into the trachea, of, perhaps, 2 drachms of turpentine, $\frac{1}{2}$ drachm of tincture of opium, and 10 drops of carbolic acid. A hypodermic syringe is used, and the point is passed through the walls of the windpipe, between two of the tracheal rings, at a point near to the bifurcation of the bronchial tubes.

Lung Disease.—Cattle are subject to a contagious lung disease. Goats have also been found liable to a disease of the same nature at the Cape, and the writer has proved to his satisfaction, that sheep also take lung disease one from the other, and die, under certain circumstances, in great numbers. It appears to have very much the nature of a bad cold, and is most severe on old ewes. Should it break out in a flock in summer time, or in fine mild weather in winter, deaths are not numerous, but in a cold and stormy season, which aggravates it, one-third to one-half is no unusual proportion to die. *The symptoms* are a violent and painful cough, which seems to give no relief. When seriously affected, the animal falls off from the others, and gradually stops feeding. The breathing becomes increasingly heavy and laboured, with heaving at the flank, and moaning in the later stages, evincing the presence of acute bronchitis with severe pain. The ears droop in a peculiar manner, and the head hangs down,

while foam appears at the mouth, and a tough yellow mucus at the nose and eyes. None recover after these acute symptoms set in. Death supervenes generally about the third or fourth day. The *post-mortem* reveals a highly congested state of the air-passages, and large solid pieces of lung structure, usually the upper lobes, sinking rapidly in water.

The only efficacious treatment is, to cover the backs by sewing to the wool with stocking yarn pieces of strong canvas, 2 feet or 2 feet 3 inches square, which have been waterproofed by brushing one side with boiled linseed-oil, to keep off rain and in heat; and to have the sheep kept perfectly quiet in a well-sheltered place, and liberally fed. Any attempt to drug or fumigate simply increases the number of deaths. A few usually die of consumption some months after the acute stage of the disease has passed. It is necessary to state that Principal Williams and various other good men, believe that the origin of the disease above described is entirely parasitic, the special worm being *Strongylus filaria*.

The writer freely admits the great injury that these thread worms produce in an irritated condition of the air-passages, and that they might determine, in some cases, whether the affection would be severe enough to destroy life, or mild enough to pass off after a time, without much or any notice, should outside conditions be favourable to recovery; still, at the same time, he has not the slightest doubt of the existence of a contagious lung disease in

sheep, which is, however, so varied in its ultimate results by other and external influences, as climate, general treatment, and parasitic action, that it has not been generally recognised or acknowledged. There exist weighty reasons for the statement that much of the so-called death from "rot" in the United Kingdom in 1879 was due to this disease, and not to the liver fluke at all; although in many districts the latter was very prevalent and most destructive.

Trembling or Loupin' Ill is a deadly disease which is only known by a Scotch name, although ailments with much of the same symptoms have been met at times in England. It prevails most on certain rough grassy hills. Land growing hard or mat grass (*Nardus stricta*) being particularly liable to it. "Zündel, V.S., Strasbourg, describes a disease in lambs in which an organism is found very similar to that of Loupin' Ill, and which, he says, resembles the microscopic plant *Pleospora herbarum*."

It is spreading in Scotland, not rapidly, but surely. It has been diagnosed by Professor Williams as caused by a microscopic organism, which he found in the fluid around the spinal cord. As in the case of the microbe of anthrax, this form of lower life can be cultivated under suitable conditions, as in chicken or mutton broth or jelly. By such cultivation its virulence is gradually attenuated, and it is hoped that inoculation with the weakened germs will, in time, prove a preventive of the worst consequences of the disease. *The symptoms* are a loss of

power in the limbs and sometimes high fever, with affection of the brain. Usually the animal eats, and seems to be perfectly well in health, but is unable to rise. Others, again, drop down instantly and die, usually on being suddenly started. Spring and early summer is the most deadly time. The disease has been long known in many parts, but its cause was quite unaccounted for till 1881. Principal Williams made his discovery while working at the instigation of the Highland and Agricultural Society of Scotland. It had been noticed that in years when ticks (*Ixodes*) were most abundant there was most death from this disease, and on examination the ticks were found to contain the same organisms as did the spinal fluid. This is suggestive, but the full chain of facts necessary for confirmation of the theory has not yet been made out. Mr Brotherston, botanist on the Highland Society Loupin' Ill Investigation Committee, advances the theory that it is caused by ergot, a dark, horn-like parasitic-fungus which appears on grass.

The preventive means which have already proved useful in practice are advocated by both, viz., cutting, or burning at the proper season, all excess of rough herbage, and the pasturing of cattle along with sheep, especially during early summer.

The best treatment of affected animals, not actually down, is to keep them in a perfectly quiet place, and allow neither man nor dog to go within sight, so as to prevent excitement.

When down, fat sheep should be killed at once; poor ones may first be bled, if there is brain affection, then well fed, turned, and moved regularly. Very few recover after becoming unable to walk.

Brazy is a blood disease often described as *Anthrax*, although quite distinct; as inoculating with its virus does not cause death in the same way. It prevails much on certain lands in Scotland, usually in autumn and sometimes in spring, when there are sudden and severe white frosts at night, and the grass is of a succulent or rank growth. The rank herbage or "tath" from the droppings of cattle is very liable to produce it. It runs its course in a few hours, so quickly that no ordinary remedy is of much use. The blood becomes thick and dark, and stagnates in parts before death; so that bleeding, which is usually tried, is often impossible. Bleeding and moving the animal about is about the only chance, and that only in the very early stages. The flesh is very dark-red, particularly in the region of the abdomen, and has a high and peculiar smell and flavour. Ham made from the hind-quarters is considered to be rather a delicacy by those who have learnt to appreciate it in youth. Principal Williams considers it to be "nothing more than an acute form of indigestion, with inflammation of the bowels, and flatulence, arising from eating food in a more or less fusted and decomposing condition." It may be prevented, or greatly lessened, by not pasturing cattle along with sheep on land subject to it, or at least only in the early part of the

season ; by keeping sheep from all quickly grown grass at the dangerous season, or only allowing them into it for a time in the middle of the day, when there is no frost on the pasture.

Temporary Blindness is most frequently met with after a long time of wet, cold weather. A dim, opaque scum forms over the pupil of the eye. This would disappear naturally in time, but as the animal cannot see to feed, it falls off in condition, and might get into a hole. Bleeding at the eyes is usually practised: this has the desired effect within a few days. A pen-knife is inserted between the frontal bone and skin, immediately below the inner corner of the eye, and a large vein, which bleeds profusely, is thus severed.

Foot-Rot.—It was noticed that dipping with arsenic much improved sheep suffering from foot-rot, and from this sprung up the custom, for prevention as well as cure in mild cases, of driving sheep once a fortnight through a box containing a solution of arsenic. The drying and hardening action on the horn is injurious if done oftener. In very bad cases, all horn that has separated from the inner part of the foot by suppuration must be carefully removed with a sharp knife, and the raw parts, which would grow proud-flesh if not attended to, dressed with a caustic or acid mixture, as that of Joseph Ewing, Dumfries, as arsenic is hurtful to a large open sore. The arsenic box should be 12 feet long, 1 foot deep, 8 inches wide at the bottom, and 14 inches at the top, but the ends

only 3 inches deep. The sheep then easily step in, it being placed level on the surface of the ground, between two rows of hurdles or paling, wide enough for them to pass between. The solution (strength, one pound of arsenic, dissolved by boiling with a little carbonate of soda, in five gallons of water) is put in the trough, 1 to 1½ inches deep, not to come above the horny part of the foot, else it would blister the skin, and cause the hair to come off. The sheep, having first had all long or loose horn cut away, are driven quietly through to prevent splashing of the liquid against the uncovered skin. Crude carbolic acid is sometimes used instead—strength 3 or 4 parts to 100 of water. The box should have a tight-fitting lid, to close when not in use, to prevent poisoning by stray animals drinking from it. Lime in the powdery, caustic state is sometimes laid down at gateways or places where the sheep often walk. The usual cause of foot-rot is dung or some foreign matter getting at the tender structures of the internal foot in virtue of some softening, decay, or weakness of the outer horny box; suppuration and fungoid growth following.

True foot-rot is not considered to be contagious, but the writer is inclined to believe that there is sometimes a derangement in the systems of sheep, showing itself by symptoms almost identical with those of foot-rot, which might one day be found to be contagious, or, at all events, induced in a whole flock by unsuitable or possibly excessive feeding, without any external cause.

The feet of sheep that have been affected are always more susceptible again ; thus it is very difficult to get rid of when once well established.

Blotches, causing lameness, originates in wart-like growths, which in the first stages are hard and scaly exteriorly, and gorged with blood within. They appear in some seasons about the coronet and lower parts of the legs. The affection is not contagious, although it breaks out in a flock suddenly, and at times attacks more or less seriously the greater number of them. It is thought to be produced by some irritating cause which shows its effect most frequently when sheep are on pasture in autumn, and usually disappears when the flock is put on roots. Sheep fall off much in condition, and in some of the more aggravated cases die of blood-poisoning, pus having got into the blood by absorption of the foetid discharge which comes from the sores in the later stages of their development.

The remedies are—remove the sheep from the conditions under which it broke out, and dress the affected parts in time with strong caustic, or acid applications, or fire.

Dew-rot is a cause of lameness which appears in April, and even to a greater extent in autumn, in damp, foggy weather, or when there are sudden changes of temperature at night, resulting in frosts or heavy dews. It appears at first in the form of white blisters between the digits, or on the anterior surface of the coronet. The hair falls off the affected parts and they are left bare, and in a short

time become open sores. If not at once treated by using a stimulating embrocation, after opening them with a knife, the inflammation and irritation spread until the whole foot-structure is involved, and the ultimate condition becomes something like an aggravated form of foot-rot, the whole of the horny parts sloughing off. When it takes this serious form, the proper treatment is poulticing with tar, bran, or linseed-cake ("burst" with hot water) to reduce the inflammation, allay pain, and keep dirt from the wounds.

Sheep thus affected fall very much off in condition, but there is no fear of death, if proper precautions are taken. It is reported to have appeared in Gloucestershire, for the first time, about 1870.

Some places are more subject to it than others. The pastures are frequently worst which have not a good aspect, as lying away from the sun. Instant and constant attention is positively necessary to prevent the development of the mature form of the disease; and the whole flock must be removed at once and put on arable land which is not under pasture. Dew-rot very frequently appears among ewes that are going with the rams, and are consequently better fed at the time. A rapidly-improving condition may make the system more susceptible of the disease, as is the fact with many other diseases. Sheep that are being forced, in cases of high farming or for show purposes, are always more liable to give the shepherd trouble than those fed in a moderate way; and the death-rate, as a rule, is much higher.

Another common cause of an excessive death-rate is the allowing of sheep, through bad management or want of proper food, to get into an unthriving condition, or, in common language, to get a "back-set."

If hoggs are kept, more particularly late into spring, on a turnip crop which has not been properly cleaned of weeds while growing, very alarming death-rates are often prevalent. There is a pretty widely-spread belief in Gloucestershire, both amongst farmers and shepherds, that chick-weed (*Stellaria media*), if abundant, is most hurtful to young sheep stock.

TYPICAL EXAMPLES OF THE STOCKING OF FARMS IN SOUTHERN AND MIDLAND ENGLAND.

Data of Use in the Calculations.

Horses.—3 kept per 100 acres arable on light land ; 4 kept per 100 acres arable on heavy land ; cost per annum of feeding each horse, £25 ; with shoeing and sundry bills extra, £30 ; 1 man and pair of horses, £100 to £110 a year.

Grass at 3s. 6d. per week for 22 weeks, = £3, 17s., which would pay the rent of $1\frac{1}{2}$ or 2 acres. One acre at least of good old pasture should be set aside per horse.

Hay, 24 lbs. per day for 7 months = $2\frac{1}{4}$ tons per horse. Consuming value, taken at half the sale value, = £2 to £2, 10s. per ton ; or use 1 ton of hay and $1\frac{1}{2}$ tons of good oat straw. (A little straw would be rejected if not chaffed.)

Litter, $1\frac{1}{2}$ tons to 2 tons for the winter season. Averaging the yield of oats at 52 bushels per acre, 2 acres are consumed per horse when 3 bushels are given per week in winter and 1 bushel in summer. (So much of this might be sold, and beans, bran, etc., bought to take its place.)

Sheep.—2 ewes with $2\frac{1}{4}$ lambs (a fair crop), or $2\frac{1}{2}$ lambs (a good crop), kept per acre on medium pasture in summer.

Roots, $\frac{1}{2}$ ton given per day to 100 ewes on grass till lambing time, and 1 ton per day after lambing, or = 1 ton per day for 4 months, or $120 \text{ tons} \div 15$ (average of ton per acre) = 8 acres per 100 ewes.

Ewes not on grass, also clipped sheep or hoggets after Christmas, consume 24 lbs. per day; therefore 200 eat 1 acre (15-ton crop) in one week. Beginning with lambs put on in September, it is approximately right to say 1 acre will keep 300 per week on an average during the first root season = 16 lbs. of roots per day, which would not be quite enough for the larger breeds.

Hay is also allowed = 1 ton per acre of roots.

Cake = $\frac{1}{4}$ lb. to each per day for six months comes to 70 lbs. more than 2 tons for 100 sheep. It is near enough, practically, to say 2 tons.

Bullocks.—One acre of good pasture, or $1\frac{1}{4}$ acres to $1\frac{1}{2}$ acres, according to quality, should keep one fattening bullock all summer. One store animal might be sufficient stock for 1 acre of second-quality land.

Turnips, $\frac{3}{4}$ cwt. per day, or 7 tons in 6 months, is nearly $\frac{1}{2}$ acre for each bullock. If giving 1 cwt. per day, $1\frac{1}{2}$ bullocks may be kept per acre of turnips (15 tons) between 6 and 7 months. The price at 7s. 6d. per ton = $4\frac{1}{2}$ d. per cwt.

Hay, 1 stone (14 lbs.) per day for 26 weeks = $22\frac{3}{4}$ cwts. A large-sized fattening bullock should eat about $1\frac{1}{4}$ stones = $17\frac{1}{2}$ lbs. per day. An ordinary crop of "seeds" hay = $1\frac{1}{2}$ tons per acre; a good crop, 2 tons.

Of natural hay, $1\frac{1}{2}$ tons is a good crop. Heavier crops get white at the bottom, and are not such good quality, except on some rich, moist meadows where the larger grasses greatly predominate.

Of straw, a bullock in a yard will eat and trample down 3 or 4 tons in 6 months; 1 or 2 tons more could be trampled down if necessary.

Of meal and cake mixture, 6 lbs. per day to each bullock for 6 months gives a total of $\frac{1}{2}$ ton, less 28 lbs. Say, $\frac{1}{2}$ ton each.

Cows.—One cow can be kept summer and winter on $2\frac{1}{2}$ acres of superior dairy grass land, while 3 acres of ordinary quality are necessary, and in a hill dairy district up to 5 or 6 acres.

Hay cut from 1 acre of natural meadow = $1\frac{1}{2}$ tons, or 19 lbs. per day per cow for 6 months, plus $\frac{1}{2}$ ton to 1 ton of good straw, is enough fodder for an average dairy cow: 24 lbs. of hay per day = $2\frac{1}{4}$ tons in 7 months; 25 lbs. of hay per day = 2 tons in 6 months.

Mixed concentrated food, given in spring after calving and before grass comes, may vary in cost from £1 each cow (ordinary feeding) to £2 each (high feeding).

Cotton cake given in summer on the grass, 3 lbs. per day for 6 months = (nearly) 5 cwts. per cow, and at £6 per ton costs 30s. per cow.

Root and forage crops for all the year round are already given at page 59.

Tithe may be none, or varying from 2s. 6d. to 6s. or 8s. per acre. This should be considered as so much rent.

Rates and Taxes amount to 3s. to 5s. per acre.

Implements.—Total cost per acre, £1 on a farm half arable and half pasture, up to 30s. if all arable, or even £2 per acre if many new and expensive implements are bought, or in the case of a small holding. A 500 acre farm might thus have £500 to £750 or £1000 of capital sunk in implements.

Capital in an ordinary farm = £10 or £12 per acre: in high farming it may mount up to much more.

EXAMPLE No. 1

Is given as an answer to the first three questions set in the examination for the English Royal Agricultural Society's Diploma in 1884.

(1.) "What capital is required for a farm of 500 acres (half arable and half pasture). The arable being turnip and sheep land. The grass, 50 acres good feeding land, the rest suited to young stock?"

- (2.) "What proportion of capital would you apply to—
1. Cattle.
 2. Sheep.
 3. Horses.
 4. Implements and Machines.
 5. Tillages, etc ?"
- (3.) "State the most suitable course of cropping."

In all farm calculations the rotation is the first point to settle.

Question (3.)—Rotation for 250 acres arable.

A Five-Course Shift.

1. Wheat, 50 acres.
2. Oats, 50 acres (better straw for fodder than barley).
(Catch crops following more or less; as rye, trifolium, vetches, rape, etc., for sheep food in spring.)
3. Roots, 50 acres, mostly eaten on the land by sheep; part carted to the yard for cattle.
4. Barley, 50 acres (part might be oats instead).
5. "Seeds," 50 acres, all cut once for hay and the latter-math eaten by sheep.

Question (2.)—To find the numbers, and affix the prices, of the Horses, Cattle, and Sheep, that the foregoing 250 acres of arable and 250 acres of grass-land will keep.

Cattle.

250 acres, total of grass.

50 „ (the best) keep 50 fattening bullocks, worth £17
 ————— to £20 each.

200 „ left.

75 „ keep 50 bullocks 1 year younger, £11 to £13
 ————— each.

125 „ left.

16 „ (second quality) to graze 8 horses.

109 „ left.

34 „ cut for hay.

75 „ left for sheep.

Horses.

Being light land, 3 per 100 acres cultivated = 8 horses.
 At £40 each = £320.

Sheep.

75 acres of grass left for sheep.

2 sheep per acre with their lambs.

150 Ewes @ £4¹ each = £600 total capital in ewes.

One hundred and fifty ewes get 1½ tons of roots per day
 on grass for 4 months or 120 days = 180 ÷ tons 15

¹ Rather high for an ordinary flock at current prices.

(average crop in tons per acre) = 12 acres turnips required for the ewe flock.

Tegs, 200 eating 16 lbs. turnips per day consume 18 acres in 6 months or 26 weeks.

Turnips.

12 acres set aside for ewes.

18 „ „ tegs.

—

30 „ total for sheep.

20 „ for 50 cattle = 70 lbs. (fully) each per day for
— six months.

50 „ total turnips disposed of.

—

Fodder.

(1.) *Straw.*

150 acres of grain crops @ $1\frac{1}{4}$ tons straw per acre.

× $1\frac{1}{4}$

—

187 tons straw (50 bullocks eat and trample down $3\frac{1}{2}$ tons each).

175 „ for cattle.

—

12 „ horse litter, and to go to the cattle-yard after.
(Some of the cattle straw would first be used for thatching, which would not spoil it for litter.)

==

(2.) *Hay.*

50	acres seeds @ $1\frac{1}{2}$ tons of hay per acre.
× $1\frac{1}{2}$	
<hr/>	
75	tons total seeds hay.
34	„ cut from the 34 acres of natural meadow
<hr/>	(rather a light crop).
109	„ total hay.
18	„ for 8 horses = $2\frac{1}{4}$ tons each.
<hr/>	
91	„ left.
30	„ allowance of 1 ton per acre of turnips for
<hr/>	sheep.
61	„ left to be sold, or a little more given to the
	sheep and a small foddering per day to the
<hr/> <hr/>	bullocks.

Where a good market for hay cannot be got, it might pay better to pasture half of the “seeds” land instead of cutting it.

Capital = Spring Valuation of Stock, etc.*Cattle.*

50 bullocks @ £20 each,	.	.	£1000
50 „ @ £13 „	.	.	650
		<hr/>	£1650
			<hr/>
	Carried forward,		£1650

	Brought forward,	£1650
<i>Sheep.</i>		
150 ewes, with lambs, @ £4 each,	.	£600
200 tegs @ 60/ each (a high price),	.	600
		1200
<i>Horses.</i> —8 @ £40 each,	.	320
<i>Implements.</i> —£1 per acre all over,	.	500
<i>Tillages.</i>		
50 acres wheat @ 50/,	.	£125
100 „ oats and barley @ £2,	.	200
50 „ “seeds” @ £1,	.	50
50 „ turnip land @ £3,	.	150
(This includes catch crops and manures for the same.)		525
<i>Half-year's Rent, Tithe and Taxes @</i> 28/ per acre, per an.,	.	350
<i>Cash in hand</i> to pay wages and expenses,	.	455
		5000
	<i>Total capital,</i>	£5000

Question (1.)

Capital required per acre = £10.

EXAMPLE No. 2.

The following calculation will show the rotation which might be adopted on a 300-acre farm in the south of England, two-thirds arable suitable for sheep, and the rest pasture for grazing or dairy purposes; the stock kept, and the amount of capital required per acre, apportioning the amount for horses, cattle, sheep, implements, etc. Also the number of labourers required, their different duties, and the necessary amount per annum paid for wages; also a Michaelmas valuation and a statement of receipts and expenses for a year.

A four-course rotation adopted for the arable land.

- 50 acres wheat (or part oats to produce better fodder).
 50 „ roots, mostly swedes; average 15 tons per acre
 (5 acres of mangel, 20 to 25 tons per acre,
 would keep up the above average, and allow
 2 or 3 acres to grow potatoes).
 50 „ oats.
 50 „ clover or “seeds” all cut once for hay.

200 acres, the given amount of arable.

Pasture.

100 acres grass.

75 „ pasture should carry 150 ewes and their lambs
(say 200) in summer.

25 „ left.

10 „ keep 6 or 7 horses.

15 „ left for 10 cows' pasture = $1\frac{1}{2}$ acres each.

Or 5 cows might be kept, and their calves reared each year; the heifers coming into milk at two years off, and the bullocks of the same age put up to finish, in the autumn following.

Roots.

50 acres, average 15 tons.

12 „ for 150 ewes = $1\frac{1}{2}$ tons per day for 4 months during winter while on grass (by giving half quantity for 2 months at first, before lambing, the turnips may be spread over 5 months).

38 „ left.

1 „ for 10 cows = 30 lbs. each per day for 4 months in winter, including the time they are dry.

37 „ left (carried forward).

37	acres left (brought forward).
20	„ for 200 tegs (18 acres are consumed in 6 months by 200 tegs going on as lambs in September = 16 lbs. per day, being rather little for large breeds).
<hr/>	
17	„ left.
$\frac{1}{2}$	„ for 7 horses.
<hr/>	
$16\frac{1}{2}$	„ left.
$5\frac{1}{2}$	„ for 50 tegs, bought in autumn, to feed.
<hr/>	
11	„ left for bullocks (7 tons are consumed by a fattening bullock in 6 months @ $\frac{3}{4}$ cwt. per day, or 1 ton per acre over, after feeding 2 bullocks per acre, which would make up the possible total to 24 bullocks).
<hr/>	

Fodder.

(1.) *Straw.*

100	acres grain crop @ $1\frac{1}{4}$ tons straw per acre (this is a low average, but it is off light land).
×	$1\frac{1}{4}$ tons.
<hr/>	
125	tons straw.
20	„ for horses (half for litter, and the remainder for fodder being sufficient with 1 ton of seeds — hay for each horse).
105	„ left (carried forward).

105	tons	left (brought forward).
10	„	for part of the cow-fodder = 1 ton per cow.
<hr/>		
95	„	left.
10	„	for cows' litter, which could be done without if
<hr/>		
		necessary.
85	„	for 24 bullocks = $3\frac{1}{2}$ tons each, to supply fodder
		and litter. The litter is supplemented by
		the rough stable cleanings being thrown in
		the open yard.
<hr/> <hr/>		

(2.) *Hay.*

	50	acres of "seeds" hay.
×	$1\frac{1}{2}$	(average number of tons per acre).
<hr/>		
	75	tons total hay.
	40	„ given to the sheep (a little over 1 ton per
		acre of roots consumed (37 ac.), or something
<hr/>		
		more than 1 lb. per sheep per day).
	35	„ left.
	10	„ for 10 cows, which with 10 tons of straw
		allowed provides the necessary 25 lbs. each
<hr/>		
		per day for six months.
	25	„ left.
	7	„ for 7 horses also getting part straw.
<hr/>		
	18	„ left, and might be sold at market or sale value
		(£4 per ton more or less). If there is no
		market, 10 tons given to the sheep would
		be $\frac{1}{4}$ lb. more for each per day, and a fodder-
		ing might go daily to the bullocks.
<hr/> <hr/>		

Michaelmas Valuation (29th Sept.)

150 ewes @ £3 each,	£450
200 home-bred tegs } @ 40/ each,	500
50 bought do. }	
7 horses @ £35 each,	245
10 cows @ £20 each,	200
8 pigs @ 30/ (fed on small potatoes and light grain),	12
24 bullocks @ £17 each,	408
100 acres grain crops (@ £8 to £10), say @ £9 per acre,	900
50 acres roots @ £5, 10/ (nearly 7/6 per ton),	275
75 tons hay @ £2 (consuming-value taken at half the sale-value),	150
Implements @ £1, 10/ per acre,	450
	<hr/>
	£3590
Petty Cash,	10
	<hr/>
<i>Total capital required,</i>	<u>£3600</u>

$£3600 \div 300$ (the number of acres) = £12 capital per acre.

Expenses and Purchases other than of stock bought to fill up the places of those sold that appeared in the first valuation.

Rent, Taxes, and Labour.

Rent (including tithe), 300 acres @ 30/,	£450	0	0
Taxes, 4/ per acre,	60	0	0
Labour, 35/ per acre, arable,	£350	0	0
„ 10/ „ grass,	50	0	0
	<hr/>		400 0 0
			<hr/>
			£910 0 0

Purchased Cakes and Feeding Stuffs.

For cows (@ £1 each),	£10	0	0
For 24 bullocks, 12 tons @			
£7, 7/,	88	4	0
For 250 sheep, 5 tons @			
£7, 7/,	36	15	0
	<hr/>		134 19 0

Seed.

Rye-grass, home-grown; clover,			
10/ per acre,	£25	0	0
(Wheat 5/, oats 3/ per bushel),			
225 bush. @ 4/=	45	0	0
	<hr/>		70 0 0

Manure.

Super, 3 cwts. per ac. for			
turnips = 150 cwts. @			
3/6.	£26	5	0
	<hr/>		<hr/>
Carried forward,	£26	5	0
			£1114 19 0

Brought forward,	£26	5	0	£1114	19	0		
Nitrate of soda and sulphate of ammonia for grain crops and potatoes, 2 tons @ £10 (average),			20	0	0			
			<hr/>			46	5	0
<i>Shoeing</i> (30/ per horse), <i>plus sundry bills</i> for repair of harness, implements, etc. = £5 each,						35	0	0
<i>Coal, etc.</i> , for the engine (a fixture belonging to the farm),						16	0	0
<i>Interest on</i> £3600 capital @ 4 p. c. =						144	0	0
			<hr/>					
<i>Total expenditure for the year (carried to page 180),</i>						£1356	4	0
			<hr/>					

Receipts from sales of farm produce for a year, leaving the numbers and value of stock as is found in the valuation at last Michaelmas.

From Sheep Stock—

Sale of wool (6 lbs.) at 5/ each on 150 ewes,	£37	10	0		
Death, 3 or 4 per 100, and difference in price of old ewes sold and about 50 tegs bought,					
			37	10	0
			<hr/>		

(The above balance each other.)

200 lambs (produce of 150 ewes) @ £2 each,	£400	0	0
250 tegs sold @ 60/ each, profit £1 each, .	250	0	0

(There is no loss on horses if young ones are broken in and others sold at their best.)

From Cattle—

10 cows (produce 600 gals. milk at 7d.= £17, 10/ each) =	175	0	0
10 calves @ 50/ each,	£25	0	0
Less loss through sale and re- purchase of 3 cows to prevent depreciation of the stock,	15	0	0
	<hr/>	10	0
24 bullocks @ 35/ per month of increase (for 6 months) =	252	0	0
8 pigs yield a profit of £2 each (food sup- plied by the farm) =	16	0	0

From sale of Grain—

(Wheat, 4¼ qrs. per ac. @ 35/=£7 8 9)			
(Oats, 7½ qrs. „ @ 20/=£7 10 0)			
100 acres grain crops.			
14 „ off for horses.			
<hr/>			
86 „ @ £7, 10/ per acre (after paying market expenses),	645	0	0

From Poultry—

50 hens and 20 ducks @ a profit of 2/6 each =	8	15	0
<i>Return from produce in the year,</i>	<hr/>	<hr/>	<hr/>
	£1756	15	0
<i>Total expenditure for the year (brought from page 179),</i>	1356	4	0
	<hr/>	<hr/>	<hr/>
<i>Total profit,</i>	£400	11	0
	<hr/>	<hr/>	<hr/>

The loss from death is assumed to be allowed for in stating the prices obtained. Should grain rise, say 10/ per quarter on wheat, the profit on the above farm, due to this item alone, would be increased by £200 a year, and in good grass seasons some of the bullocks might be bought in spring and during summer, and £60 or up to £100 of profit got for grazing them.

The foregoing do not pretend to be more than two of many methods which may be adopted of arranging the stock and crops on such farms.

The following Balance-Sheet and Revenue and Expenditure Account will enable the reader to follow more exactly the figures in the foregoing example (No. 2), and to verify the results. The accounts are framed on the footing of a tenant entering into possession of his farm at Michaelmas of an assumed year, with stock, etc., as on page 177, carrying on one year's transactions, as on pages 173 to 180 inclusive, and striking a balance at the Michaelmas succeeding his entry, with stock, etc., then in number and value exactly the same as at entry. In the Revenue and Expenditure Account, the value of grain, roots, and hay consumed is stated on each side, as well as the other receipts and expenditure described on pp. 178-180.

Dr.

BALANCE-

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
To Ewes,	450	0	0	450	0	0
„ Teds,	500	0	0	500	0	0
„ Horses,	245	0	0	245	0	0
„ Cows,	200	0	0	200	0	0
„ Pigs,	12	0	0	12	0	0
„ Bullocks,	408	0	0	408	0	0
„ Grain Crops,	900	0	0	900	0	0
„ Roots,	275	0	0	275	0	0
„ Hay,	150	0	0	150	0	0
„ Implements,	450	0	0	450	0	0
„ Cash in hand or bank,	10	0	0	410	11	0
	3600	0	0	4000	11	0

Dr. REVENUE AND EXPENDITURE ACCOUNT*

EXPENDITURE.						
	£	s.	d.			
To Ewes, Expenditure on their account,	238	10	0			
„ Teds, ditto,	233	0	0			
„ Cows, ditto,	82	0	0			
„ Ditto, Loss through Sales to prevent De- preciation,	15	0	0			
„ Bullocks, Expenditure on their account,	250	14	0			
„ Horses, ditto,	160	15	0			
„ Rent, Taxes, and Labour,	760	0	0			
This after crediting pasture rent, £150, debited above under proper heads,—Ewes, Horses, Cows.						
„ Seed,	70	0	0			
„ Manure purchased,	46	5	0			
„ Shoeing, etc.,	35	0	0			
„ Coals, etc.,	16	0	0			
„ Interest on Capital,	144	0	0			
„ Balance or Profit,	400	11	0			
	2451	15	0			

* For the arrangement of these facts and figures the

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
By Capital,	3600	0	0	3600	0	0
„ Revenue Account for Profit, 1898-9, . . . . .	...	...	...	400	11	0
	3600	0	0	4000	11	0

FOR YEAR ASSUMED, SAY 1898 TO 1899.

Cr.

REVENUE.

	£	s.	d.
By Grain Crop, sold or used,	900	0	0
If understated, so far as used on Farm <i>per contra</i> , correspondingly understated, so result not affected. Same applies to Roots and Hay.			
„ Roots, used,	275	0	0
„ Hay, ditto,	150	0	0
„ Ewes, for Lamb Crop, 200 at 40s.,	400	0	0
„ Tegn, disposed of at profit (subject to Expenditure <i>per contra</i>) of	250	0	0
„ Cows, for profit (ditto)			
Calves, and Milk,	200	0	0
„ Bullocks, disposed of, profit (ditto)	252	0	0
„ Pigs, ditto, ditto,	16	0	0
„ Cash, for Poultry sold,	8	15	0
	2451	15	0

Author is indebted to Mr A. T. Niven, C.A., Edinburgh.

The following Labour Note shows the particulars of the £400 stated as expense of labour on page 178.

Labour—		
3 carters.		
1 cowman.		
2 shepherds.		
4 labourers.		
<hr/>		
10 @ 13/ per week, average,	. . . . .	£338 0 0
1 bailiff @ £1 per week,	. . . . .	52 0 0
<hr/>		
11 men,	. . . . .	£390 0 0
3 extra hands at harvest for 3 weeks @		
24/ per week,	. . . . .	10 16 0
<hr/>		
<i>Total labour,</i>		£400 16 0
<hr/> <hr/>		

The bailiff, carters, head shepherd, and cowman are all supposed to have cottage and garden accommodation in addition to the above money wages.

In some districts wages are higher, while in others they are lower. The above may be taken as an average of the reduced wages of the present time.

PROSPECTUS

OF THE

COURSE OF EDUCATION

IN THE

SCIENCE AND PRACTICE OF AGRICULTURE

AND THE ALLIED SCIENCES,

*As Taught in connexion with the Chair of Agriculture and
Rural Economy in the University of Edinburgh.*

*Agriculture and Rural Economy, 100 Lectures,
4 GUINEAS.*

By Professor ROBERT WALLACE.

*Periodical Excursions will be made to the best Farms in
the Lothians.*

In addition to the Professor's Course, thoroughly competent and qualified Lecturers have agreed to conduct Classes, to give the Student of Agriculture the special training necessary to qualify him for the Examinations of the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, the Royal Agricultural Society of Ireland, and the Surveyors' Institute. The Course will also be found suitable not only for those who are preparing for examinations, but for Landed Proprietors, Estate Agents, Farmers, and Law Students.

The previous education of the Student, the time he has at his disposal, and the object for which he studies, will determine how many classes it is desirable for him to attend, and whether the Course of Study should extend over one or two Sessions.

Students are requested to consult with the Professor of Agriculture as to the plan and arrangement of their work. They will have the option of attending all or any of the following Classes, at the hours named in the Syllabus:—

Agricultural Chemistry, 50 Lectures, . . . 3 GUINEAS.

By **J. FALCONER KING, F.C.S., F.I.C., etc.,**
Analyst to the City of Edinburgh.

Students of this Class have the privilege of attending the Systematic Course of 100 Lectures in Minto House on General Chemistry without payment of further Fees.

Veterinary, 50 Lectures, }
Specially adapted for the Student of Agriculture. } 3 GUINEAS.

By **WM. WILLIAMS, F.R.C.V.S., etc.,**
Principal of the New Veterinary College, Edinburgh.

The Clinical Instruction given daily at the New Veterinary College is Free to Students in this Class.

By payment of other 2 guineas a Student may attend 100 Lectures on Horse and Cattle Pathology in Professor Williams's Veterinary Course.

Botany bearing upon Agriculture, 50 Lectures, }
Also Demonstrations in the Laboratory, including }
Microscopic Examinations of Plants, and the Iden- } 2 GUINEAS.
tification of Seeds, }

By **A. N. M'ALPINE, B.Sc., etc.,**

Botanist to the Highland and Agricultural Society, and Lecturer on Botany in the New Veterinary College, and in the School of Medicine, Minto House.

The practical working of Farm Accounts and Bookkeeping will be under the direction of Mr A. T. NIVEN, C.A., Edinburgh.

Information as to the Classes of Geology, Natural History, Natural Philosophy, and Land Measuring and Surveying will be given at a later date.

A Medal will be given to the best Student in each Subject, which will be decided by the results of Three Examinations conducted during the Session.

In connexion with the Agriculture Class there are the Steven Scholarship of £80 and the Vans Dunlop Scholarship of £100. Particulars may be found in the *Edinburgh University Calendar*. The Highland and Agricultural Society of Scotland gives Ten Bursaries of £20 each and Five Bursaries of £10 each. The examinations for these take place before the classes open. For particulars refer to the *Journal of the Highland Society*.

Arrangements may be made for a limited number of Students being directly under the care of the Professor of Agriculture at his residence on the farm of Corstorphine Bank, where they will have every opportunity of seeing practical work, and be within easy reach of the University.

If Students desire they will be assisted to find farms where they may board after the close of the Session.

The prominent benefits of this Course as arranged are as follows :—

(1.) Advantage is taken, at merely nominal fees, of the existing Classes conducted by the best teachers, besides additional Lectures giving the subjects a more direct bearing upon Agriculture.

(2.) The Classes are so planned that in two Sessions of five months each (beginning early in November) the average Student can qualify himself for the highest Examinations in Agriculture in the kingdom.

(3.) In view of the fact that no scientific agricultural teaching can be thorough without intimate knowledge of practical work, the classes are conducted during the five winter months, when there is little agricultural work of importance to be seen, and when a farmer can most conveniently be absent, leaving seven months of the busy season to be devoted to Practical Agriculture.

(4.) The interest and connexion with Practical Agriculture is kept up by periodical visits to farms in one of the best agricultural districts in Scotland.

(5.) The inexpensive character of this Course places the best Scientific Education within the reach of all those interested in Agriculture.

PRINTED BY OLIVER AND BOYD, EDINBURGH



