

if this practice, was adopted among us, and if each proprietor was authorised to employ a mark which could not be counterfeited without incurring a legal penalty; it would be a preventive against fraud and roguery.

Of Sheep-houses.

In *Daubenton's* treatise, no mention is made of houses for sheep; he thought them unnecessary: he has merely given the plan of a shelter intended to protect sheep from rain and violent heat. He has since discovered that, when the winter was severe, his shepherd put his flock, which was at Montbart, in stables, where they were guarded from the cold. His opinion however, so great is the influence of a man of merit, was the occasion of sheep-houses being neglected when the establishment of Rambouillet was formed: but the flock had scarcely arrived from Spain before the fault was perceived. It was found necessary, at the entreaty of the Spanish shepherds themselves who had conducted the flock, to put the animals in barns or other places of shelter. Houses have within two years been erected.

They are of no use for sheep that migrate, which, living always in a temperate climate, seldom suffer from cold, and in summer are prevented from feeling the heats of that season by the elevation of the mountains on which they feed. The case is different with those which remain in one place the whole year round, and are consequently exposed to the vicissitudes of cold, rain and heat. These require some places of shelter, that is to say, sheep-houses. So that the question which, through the influence of *Daubenton's* opinion, remained some time undecided, appears to me to be no longer dubious.— This however has been ascertained with certainty, that low, narrow houses, almost hermetically closed, of which so many are to be found, are injurious to the health of sheep; and that in this, as in every thing else, extremes should be avoided.

It is immaterial whether the walls of a sheep-house be made of stone, of mud, of reeds or of wood; every one may employ such materials as can be most conveniently procured, or which are least costly or most durable. In some parts of the country, it is usual to make the roofs too low, the air passes over the building without going through it: houses of this construction are not wholesome.

A sheep-house, to be good, must be situated upon a dry soil, secure against rain and snow, sufficiently extensive and high to permit the air within to be frequently changed, and provided with means of rendering it temperate.

It is not always easy to find a dry soil; but it may be rendered so by taking the clay or mould from the surface, and putting, in its stead, gravel, sand or iron dross.

The extent of a house must be accommodated to the number and kind of sheep which are to be placed there: the one designed for ewes that are mothers must be larger, on account of their lambs, than that for large-horned rams; and this latter, larger than the one for wethers which have only small horns, and ewes that bear no lambs. A still smaller space is sufficient, if only young lambs are to be housed: what is most essential is, that all the sheep be able to rest there, eat all at one time, and move about with ease.

The dimensions of a sheep-house should be so calculated as to allow 10 square feet for an ewe and her lamb; 8 feet for a ram or a wether, or an ewe that has no lamb, and 6 feet for a lamb; the mean of which three measures is 8 square feet.

The height must not be below 12 feet, provided much dung be not suffered to accumulate, otherwise the height should be 16 feet to the ceiling.

Ceilings in a sheep-house are convenient for holding fodder and grain for the sheep. The fodder is put into the racks through holes made at intervals above; and the grain, through hoppers; so that the trouble and loss of frequent transportation are avoided.

Houses which have only walls and a roof, and those which are made of ill-joined boards, have no need of windows; in one case, the doors, and in the other, the interstices between the boards, are sufficient to admit a draught of air. But those which are ceiled must absolutely have windows; which should be made on every side, if the house stands detached from other buildings; so that they may be opened or shut on different sides, according to the weather and the season. Some people advise small apertures to be made in the lower part of the walls, to serve as ventilators. This precaution cannot but be useful: it clears away from the bottom of the stables those noxious vapours which would injure the health of the sheep. The windows may be made of any size; if they be made small, their number must be increased. The manner of stopping them, when necessary, is very simple: a bunch of straw is sufficient. In winter, the north and the east windows must be closed, and in summer those towards the west and the south, during the day; but all should be left open during the night, if the flock be housed.

If, through economy, it be wished to employ a house already built but which is low, vents should be made in it ; and they cost but little, if made of pine boards or other cheap materials ; of which long trunks are to be constructed, so as to open, at one end, through the ceiling, and, at the other, through the roof of the loft above. By giving an inclination to these trunks, they may be prevented from reaching the top of the roof, and made to come out only 8 or 10 feet above the eaves.

A general rule is, that upon entering a sheep-house, one should perceive neither cold, nor heat, nor a strong smell of ammoniac.

It would be better to have separate buildings for the different sheep than to admit them all under one roof, as is the case in many countries, where they think it sufficient to divide the building into compartments by means of wicker-work. The quantity of air spoiled by the respiration of a great number of animals is less easily renewed. The neighbourhood of the males and females disturbs the tranquillity of all ; the rams become heated by smelling or hearing the ewes ; the young lambs, before they are completely weaned, call for their mothers a long time : these are disadvantages. At least, it is expedient to have one or two infirmaries, in which to put the sick sheep.

It is a good precaution to furnish with bars of iron and with grates the stable windows that look from the farm ; in this way, wolves are hindered from getting in, roguish shepherds from secretly selling and handing out lambs, and ill-disposed persons from throwing in burning coals, or drugs injurious to the animals. The doors of the houses should be 5 feet wide, two-leaved, and cut transversely nearer the top than bottom : this breadth is not too great, because sheep always crowd one another when they enter, especially when they know that they are to be foddered. The shepherd shuts the two leaves when he wishes to count his flock. By means of the doors being divided, air may be supplied, by leaving the upper part open. The leaves should be so placed as to open outwards ; otherwise the sheep, which always press towards them in the morning, would prevent them from being opened. Lastly, care should be taken to round off all the side-posts, and to leave no angle jutting out which may cause abortions.

It is usual in many farms, to place the food for the flocks upon the ground : an evident inconvenience results from this practice ; a part of the food falls upon the litter, and is trodden

under foot by the animals. In many others may be seen racks, which is the first step towards improvement. Within a few years, mangers have been employed, at first separate from the racks, afterwards joined to them, the two forming one body, of which the manger is the base: by this arrangement, the blossoms, the seeds and the small leaves, instead of being lost, are picked up by the sheep, and help to nourish them. The trouble of carrying troughs in and out is also avoided, and the stable is not incumbered by them.

The racks are made of wooden bars, the upper ends of which are held by a cross-piece, and the lower ends let into the manger. If the bars be placed too far apart from one another, the sheep are apt to get their heads so fast between them as not to be able to disengage themselves; I have seen them strangled in this way. The most proper interval between the bars is 6 inches; it ought not to be less. The racks are made inclining, in order to bring the fodder within reach of the animals; but if too much inclination be given to them, the dust and loose matters among the fodder would fall upon the fleeces and spoil them; they should be nearly perpendicular. Sometimes the manger consists of two pieces sometimes it is one solid piece hollowed out; this latter kind is preferable, because it can bear the rubbing and butting of the rams.

In narrow stables, racks are placed only along the sides of the building; in those which are wide, a double one is also placed in the middle, which makes four that run lengthwise, besides those at the extremities. The ends of the racks should be closed, to prevent sheep from getting in; and the corners rounded off, to avoid accidents.

One thing, which should not be neglected, is to enable the shepherd to watch his flock during the night. For this purpose, he should have a room communicating with the stable, or one made of boards, like a loft, within the stable itself; a common ladder will be stairs sufficient. One disadvantage sometimes results from this; the shepherd, to guard himself from the cold, shuts all the windows: the master must adopt measures to prevent it.

During the season of yeaning, it is indispensably necessary to keep a light in the stable, by means of a glass lantern, grated to prevent fire.

The sheep-houses must be cleansed from time to time, but not so often as some have directed, because the manure would

not be formed ; the smell and the heat will be sufficient indications of the proper time. Fresh litter must often be put in.

Sheep-houses may now be seen in France, constructed upon very good plans, according to the taste and fortune of proprietors of merino flocks. Some are even unnecessarily sumptuous. When any one visits these stables, to learn the proper manner of housing sheep, he should copy only their dimensions, the disposition of their mangers and racks, and their good order, and neglect every thing which does not concern the health of the animals. Rambouillet, Malmaison, and some private establishments, may be imitated in every thing ; among the latter, I would choose that of Mr. *Morel de Vindé*, where I have seen well constructed racks and mangers, of which I shall give a description.

In the first place, they unite all the properties necessary to racks in general, however constructed.

1. They are sufficiently erect to prevent the fodder from falling upon the head and neck of the animals, and sufficiently inclined to bring it within their reach.

2. The manger is in form of a prism, to prevent the lambs from jumping into it, remaining there and dirtying it.

3. The lambs cannot get under, so as to be caught there, and be suffocated in the dung, as happens too often with racks that have vacant spaces beneath them.

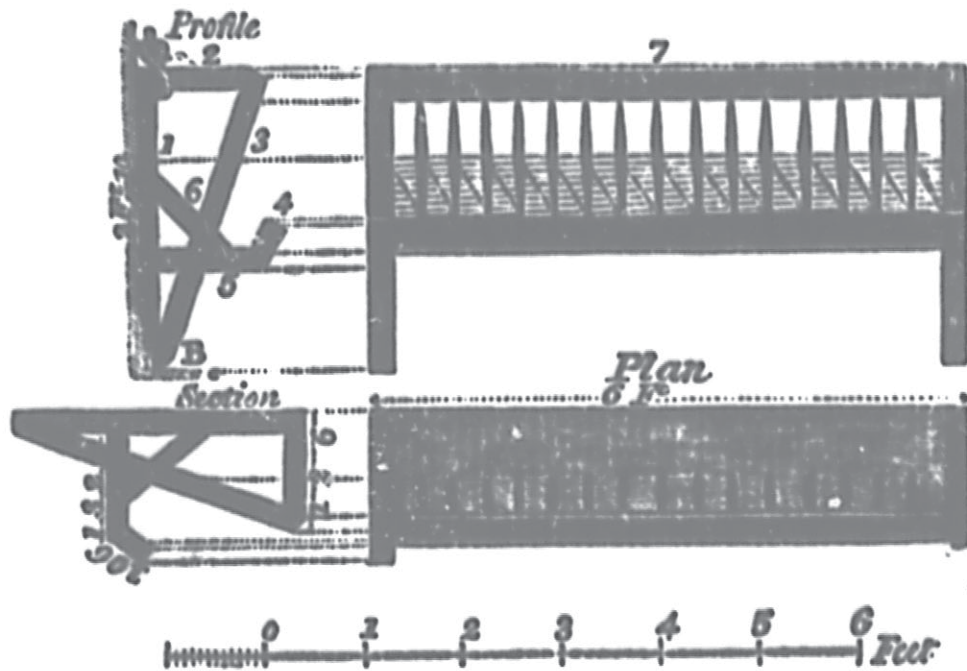
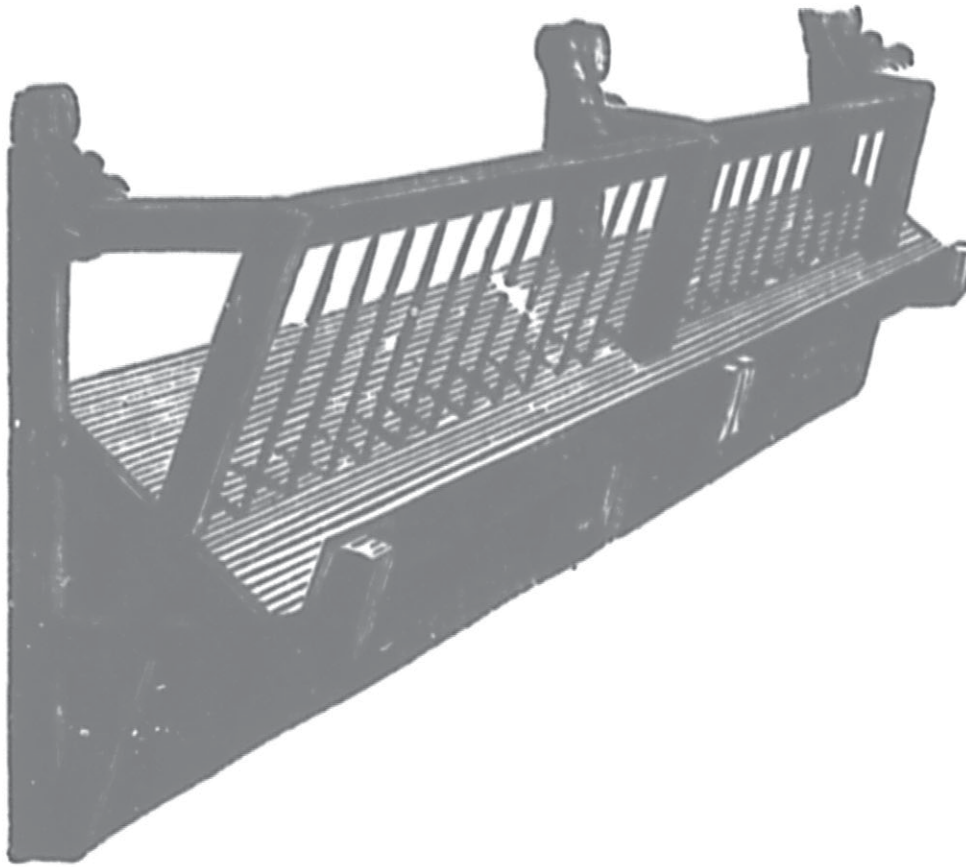
To these general advantages, may be added the following.

1. They are moveable, and may be transported at pleasure, without the aid of a workman ; they may be fixed and unfixed as need requires ; and this is very advantageous, both to farmers who only hire their farms, and to proprietors who may wish to change, for a time, the use of their buildings.

2. They may, at pleasure, be converted into double racks.

All that is necessary, for this purpose, is to plant posts four feet high and six feet apart, and to suspend the racks from them back to back ; they are joined at the hind part of the large board of the manger, and rest perfectly well one against another

In order to do still better, the intervals between these posts should be filled with deal boards, or bricks, or with lath and plaster, or with mortar



They afford room for the sheep to lie down; because, being suspended from above and tapering off towards the wall where they end in an angle, they leave all the space free to the foot of the walls; an advantage which cannot be had with racks whose mangers rest upon masonry or timber.

4. They are very solid, as may be seen in the plate, by inspecting the different pieces of which they are made.

5. Lastly, they are not costly, if they be made with a view to economy in countries where wood is cheap, as they require neither timber-work nor masonry.

Explanation of Plate 1.

The rack is composed of two similar frames of oak, one at each extremity; a single cross-bar of oak unites them in front at the top.

The pieces numbered 1,2,3,4,5,6, are of oak, 2 inches square, planed, and mortised together.

The three boards which compose the manger are of pine or white wood, the rails of the rack are fixed below in the large board which forms the hind part of the manger, and above in the cross-bar of oak. These rails, being a little swelled in the middle, hold very firmly.

From the plan in perspective of two of these racks, placed together end to end, it may be seen how they are suspended from wooden pegs fixed in the walls.

Of Foddering.

Sheep which migrate are always in the air and live entirely upon what nature affords them. Being continually led to parts where they find fresh grass, art has nothing to do in procuring them subsistence, at any time of the year: it however sometimes happens that unfavourable seasons deprive them of their necessary food. During these calamities, they suffer much from hunger; and great numbers of them die.

Where the migration is not constant, that is, where the flocks returning from their summer pastures have a winter asylum in the domain of their owner, fodder is prepared, sufficient to support them until spring.

The length of time they are foddered depends upon the climate of the country : it is longer in the north than in the south. As soon as the colds of autumn begin to diminish the abundance or the goodness of the pastures, a little fodder is at first given to the sheep in the house, and the quantity gradually increased as the winter approaches, because they find abroad less and less to live upon. When no more pasture is to be found, they must for some time depend entirely upon their fodder, and their allowance is diminished by degrees until the spring produces grass.

Many kinds of food are suitable for sheep; and may be divided into roots, stalks, leaves and grains.

The roots are potatoes, Jerusalem-artichokes, carrots, parsnips, turnips, among which the swedish turnip has the property of resisting the frost. All these roots are cultivated with little expence in ploughed grounds. I make no mention of the salsifis,* nor of the skirret, nor even of the beet, although sheep eat them very freely, and they are not despicable vegetables; but they require too much labour to be cultivated on an extensive scale, and they are not very nutritious.

The stalks are, 1. those of all the herbs in natural meadows, consisting, for the most part, of grasses; they are called hay, when dry; 2. those of the herbs in artificial meadows, which are sain-foin, luzerne, clover, pimpernel, ray-grass, fromental, coquile, wild succory, &c. 3. those of the different corns, as rye, barley, oats, indian-corn, millet, &c. 4. those of leguminous plants, viz of pease, vetches, lentils, little chiches, bitter vetches, lupines, fenugreek. The tops of flowers, the ears, the pods, &c. are to be comprehended.

With most of the stalks of the four classes of plants just mentioned, are found the leaves which accompany them at the time of their being dried and which remain with them. None should therefore be strictly considered as leaves, except those of some species of cabbage, which, as they do not perish in winter, may be given green to the sheep; those of the vine that are kept; and those of trees and shrubs, such as the alder, the willow, the birch, the yoke-elm, the beech, the elm, the ash, the poplar, the lote-tree, the medlar-tree, the maple, the oak, the acacia, the sea-rush, the broom, &c.

The grains are, hay-seed, wheat, rye, indian-corn, barley, oats, pease, vetches, lentils, bitter vetches, little chiches, fenu-

* Generally known in English by the name of *oyster-plant*,

greek, lupines. Bran belongs to this class of food. We may also add the masses that remain after oils have been expressed from some kind of seed, such as the seeds of colza (a sort of wild cabbage), of rape, of poppies, of hemp, of flax, olives, nuts, &c. I shall not here propose horse-chesnuts, nor acorns, because horse-chesnuts are not sufficiently abundant, and acorns are given to animals of another kind. The small bean must be reserved for horses, and the larger beans for the use of man.

It has been said that sheep will eat the bark of poplars, of fir, and of several other kinds of trees, and the skins of flax-seed after it has been bruised; but those who have no other resources than these would do well not to rear sheep.

Some persons have also pretended that the cuttings from the fruit-trees of the gardens and orchards should be given to them: they would doubtless eat of all the leaves; but there would be danger of their swallowing at the same time eggs of insects or insects themselves. Others, in short, deem the leaves of green trees capable of affording nourishment. Nothing but extreme necessity should compel the use of them, except the leaves of olive-trees, which are given, in moderate quantities, to sheep, in the south of France.

I shall make some observations upon several of these substances.

Potatoes and other roots must be cleansed from the dirt that adheres to them, and cut into pieces, before they are put into the mangers. To effect this, they are washed in tubs filled with water, which have a double bottom; the upper one is pierced with holes through which the dirt passes, and is let out through a cock. They are cut by means of a hand-mill. The description and drawing of a mill of this kind, constructed under the direction of *Mr. Bourgeois*, at Rambouillet, shall be given at the end of this article.

Of all these kinds of food, the turnip is the most watery; of which, the species called in French *rutabaga* is a little less so than the others; the potatoes contain many viscous particles; the carrot and parsnip are savoury; and the Jerusalem-artichoke, which is easily cultivated, may be preserved without difficulty. This plant is one of the richest presents which America has made to Europe, and its application to the feeding of cattle is one of the happiest thoughts; it is due to *Mr. Ibart*, pro-

essor of agriculture at the Imperial Veterenary School of Alfort. Mr. *Bagot* has made this plant well known.*

The best hay from natural meadows is that which is made on elevated spots, where the grass is fine and tender; the sweet smell which it exhales when gathered in is an evidence of its goodness.

It is necessary to avoid curing the hay from artificial meadows longer than is sufficient to prevent it from fermenting in the loft; when too much dried, some of the leaves are lost, and those that remain turn to dust. The hay which is cut in hot weather is subject to this disadvantage.

The best time, as is well known, is when the herbs begin to flower.

The stalks of the corns and of the leguminous plants afford little nourishment; they are really of service only when some ears or pods remain that still hold a few grains. Oat straw however should be excepted, which is tender because the oats are mowed before they are perfectly ripe. Barley-straw should not be used, on account of its long and harsh beard, which irritates the throat, spoils the fleeces, and occasions itchings violent enough to raise pimples.

Instead of thrashing out the grain, it may be put into the racks, while in the ear or pod, together with the stalks: it is easy to know how much grain is thus given in the ear, by previously thrashing some out and examining the quantity.— This is a practice of the province formerly called Beauce, where flocks were formerly fed in winter on nothing but bunches of wheat, oats, pease, vetches, &c.

The manner of preserving vine leaves is to put them into casks and sprinkle them with a little salt; or to dry them by themselves; or to mix them with alternate layers of straw, which imbibes their taste. Leaves of trees and shrubs may be treated in the same manner; the boughs are commonly gathered before the second sap (*deuxième sève*) and placed in the shade to dry, in such a manner as not to become mouldy. The sea-rush, before it is given to sheep, must be beaten, chopped or pounded. Bran would be of no use if deprived entirely of meal, because it is the meal alone that nourishes. The masses or cakes that remain after the making of oil are rendered fit for use

* See the *Annales de l'Agriculture Française*, t. XXVII, p. 5 et 272, t. XXVIII, p. 129 et 272.

by mixing them with water and giving the mixture to the sheep to drink.

Although I have mentioned many substances proper for the feeding of sheep, yet I may probably have omitted some ; but I have mentioned the greater number. There are few countries which do not cultivate some of them in such quantities as to afford an adequate supply. Good economy requires, in general, that each year that kind of fodder be employed which can be procured at the cheapest rate. For instance, if wheat be more abundant and cheaper than oats or pease, wheat must be given to the sheep ; where little grain is raised, but abundance of grass or roots, their food must consist chiefly of hay or roots.

When several kinds of food can be procured, it is right to give them alternately to the sheep at different meals in the course of the same day ; the qualities of one kind aid or compensate those of another. At certain hours of the day, dry fodder should be given, and at others, roots or grain. If there be any danger that the roots may decay, the winter should be begun with them, mixing however some dry food with them. for alone they would not be sufficiently nutritious.

It is difficult to determine accurately the proper quantity of food which should be given to a sheep ; it would be necessary, in order to form any certain rule, to know how much it eats in the open fields. *Daubenton* supposes the quantity so eaten to be eight pounds of grass, which, according to him, are reduced to two when dried ; but it seems improbable that an animal which bites off at once but a small portion of very short grass, although it feed during a great part of the day, can supply its stomach with so great a quantity. *Daubenton's* estimate does not appear to me to be exact. Besides, the diminution of weight which the grass suffers when converted into hay depends upon the degree of its dryness ; the grass that grows on a moist soil loses more than that of an elevated spot : attention should likewise be given to the quality of dry fodder, which varies as it contains more or fewer nutritious particles. A wether, and even a ram, does not require so much food as an ewe that is with lamb or that gives suck ; the full-grown animals consume more than the young ones : nothing then can be fixed without taking some one country and one race by which to form a standard. Let us suppose a farm at 50 or 60 leagues to the south of Paris, which is about the centre of France : in such a situation, at the season when there is no more pasture, a merino ewe that is with lamb or nursing may very well be nourished within doors upon 2 pounds of hay,

together with one pound of a mixture of grain and fine bran, or two pounds of Jerusalem-artichokes or other roots; for a portion of dried fodder and grain is equivalent to a double quantity of roots. A lamb should have but half this allowance.

One pound of leaves should be reckoned no more than a half-pound of hay.

Care should be taken to place in the stable shallow tubs of water, for the sheep to drink in. If the season is very wet, and the sheep go every day to the fields, they should have no drink in the stable; they get more than is necessary in the grass upon which they feed: when the weather is frosty or dry, they should drink in the stable, especially if they have dry food. The water which remains over night should be changed every morning. Any water seems to answer for sheep, that from ponds as well as that from rivers, or springs, or wells: the last is preferable to that of a pond in which are putrescent matters.

In many countries, it is deemed necessary to give salt to sheep. It is certain that these animals, as well as many others, are fond of it: if we may judge by this natural appetite, it seems proper not to deprive them of it. *Gilbert* directs half an ounce per day for each individual to be given in a little oats or bran, without saying whether it should be given at all times and in every place: a greater quantity might purge them,* and even this is a large dose. They may be made to take it in various ways: it may be given without any preparation; it may be mixed with the feed; or it may be tied in a linen cloth and suspended for the sheep to lick; it is often dissolved in water and sprinkled upon the fodder; a good practice, particularly if the fodder be not very relishing. Many proprietors give no salt to their flocks,† which notwithstanding, have no diseases. It may be indispensably necessary in very wet countries.

If *Daubenton* may be believed, dry fodder, a long time continued, occasions sheep to waste away. Although this assertion may be doubted, it seems proper to mix, as much as possible, watery aliments with those which are dry, and to turn the sheep out to pasture as soon as the grass shoots.

* Sheep have been known to be attacked by long and troublesome lameness in consequence of having taken too much salt; which has induced the belief that sea-water is poisonous to them, while in fact it is injurious only when taken in too great quantity.

† I may instance my own, which have always been healthy, though I have never given them any salt.

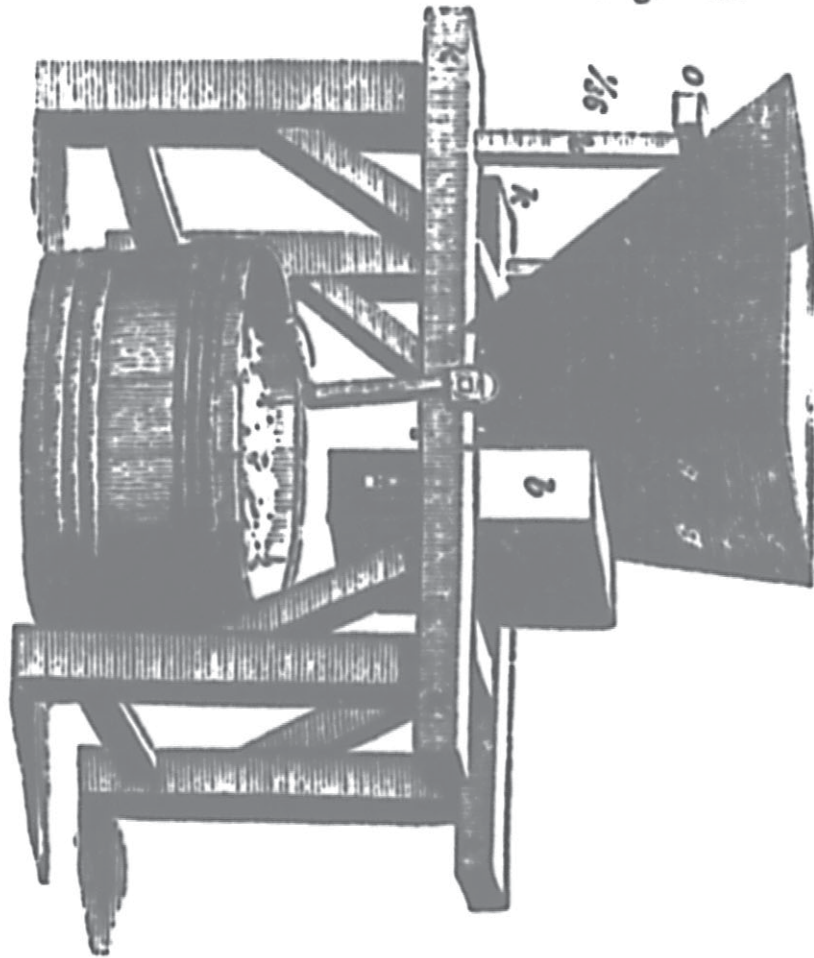


Fig. 1.



Fig. 3.

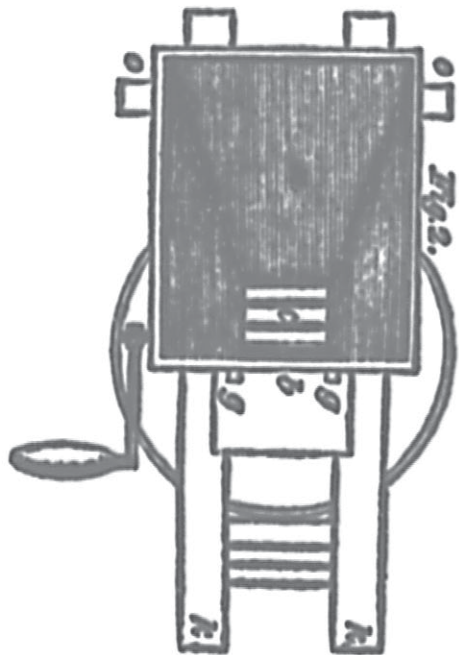


Fig. 2.



Fig. 4.

One thing cannot be too much recommended, which is, to place the hay in the racks while the sheep are out of the house ; by this precaution, the dust does not fall upon the fleeces.

When sheep of different ages are housed together, the strongest place themselves first at the racks, and keep the others away, which languish for want of nourishment. It is therefore advisable to have separate stables for the full-grown sheep and for the lambs, or not to feed the latter until the old ones are gone to the fields.

Description of the Machine for cutting roots.

PLATE II.

a a.—The hopper into which the roots are thrown: the upper part of it is 2 feet 6 inches long and 2 feet wide, the lower part within is 6 inches by 7 ; and it is 2 feet high.

The hind part of it rests in a notch made in the cross-piece of wood *o o o*, which is supported by two upright pieces.

On the front part are two rabbets *g g, g g*, which fit two grooves in the moveable piece *b*. *fig. 1, 2, 3.*

Fig. 1, 2, 3.

y,—is a block which may be set farther from or nearer to the nut *c*, *fig. 3*, according to the size of the pieces into which it is intended to cut the roots ; it is fixed by means of the wedge *x*, *fig. 1*, which is driven below the frame *k k k k*, into the hole *z*, *fig. 3*, made in the lower part.

The upper part of this block is 9 inches broad, 6 inches long, and 10 inches high.

It is armed, on the side towards the hopper, with two iron blades *h h*, *fig. 3*, 7 inches long, sharp, and projecting 1 inch 6 lines.

Fig. 2, 3, 4.

c, c, c. is a nut, made of a wooden cylinder, 9 inches long, and furnished at each end, with a circle of iron *v v*, *fig. 3 & 4*; its diameter, at the extremities, is 4 inches without taking in the thickness of the iron circle ; and, in the middle part, 6 inches.

Nearly its whole length is armed with iron blades, ten in number. They are fixed in the wood, which is cut in ridges

in such a way as to strengthen them and to prevent one side of them from projecting beyond the wood more than 6 lines, while the other side, which is concave, has 1 inch 6 lines clear of the wood. Each blade is 7 inches long; they correspond with the blades *h h* of the block.

Through the nut runs an iron axis of one inch square, rounded in the two parts only where it rests upon the frame *k k*, and held at the extremity of these two parts by irons fixed by means of nuts *n, n*, *fig 1 & 3*.—At one extremity is fixed an iron crank the arm of which is 15 inches long. Its handle is of wood, and about a foot long.

The hopper *a*, the movable block *b*, and the nut *c*, are supported by the frame *k k k k* which is 9 feet long and 3 feet high. The two principal pieces of this frame, which are the upper horizontal ones, are 7 inches apart from each other, that the block *b* and the nut *c* may play between them.

A tub or a basket is placed under the frame, to catch the roots as they are cut.

One man, in a few hours, can cut with this machine as much as is requisite for a large flock; it may be rendered still more commodious and simple. In the environs of Paris, it costs but 72 franks.

Of Folds and Folding.

When sheep have passed the severe season in well-aired houses; they may, if it be convenient, (for this transition is not necessary) be placed for some time, during the nights, under sheds that are something between houses and folds: they may there acquire hardiness sufficient to endure the fold.

This name is given to an inclosure intended to contain a flock of sheep in the open air and without covering.

Folds are of two kinds, one domestic and the other of the fields. The former is made in or near a farm-yard, and is an inclosure formed of hurdles or nets, in which the flock is placed every night. Care is taken to cover the ground with litter.—If the weather be too rainy, the sheep are carried again to the sheep-house, and not put in the fold until the sky becomes serene.

A two fold consideration demands that attention should be given to folding in the fields: it not only contributes to the

Health of the flock, but it furnishes the ground with a good manure. Some persons have thought that folds are injurious to sheep; that they suffered much in them, and that the manure from the houses was better than that from the folds. The former of these assertions is true only when sufficient precautions are not taken. Free air is salutary for all sheep, provided they be protected from heavy and long rains, great heats and the severe cold: these things are not always attended to. Much of the discredit which has fallen upon folding is to be attributed to the laziness and negligence of many shepherds who are averse to trouble, and absent themselves at times when their presence is requisite. In order to make the folding of sheep answer a good purpose, it should not be begun before the approach of mild weather. The flock should be kept in the shade during the heat of the day in summer. At the approach of storms it should be put under shelter; and the folding should be discontinued in the autumn soon enough to avoid the rains and cold. In this way, sheep may be preserved from colds, to which they are very subject, from obstinate running at the nose, and from several other disorders which are caused by checked perspiration. One of the great advantages of folding, is its saving the labour of carrying dung to distant grounds; and the manure is just as good as that from the sheep-house.—Folding should not be begun before there is abundance of food in the fields; sheep, when they lie in the open air, have a great appetite.

The folding must be hastened or retarded, according to the nature of the country: one farmer may be able to continue it no more than three months in the year; another, four or five, &c. The consideration of the fodder necessary to be consumed has also some weight in determining how long the sheep should be housed.

Some farmers, through a mistaken idea of saving time, instead of breaking down the clods of new-ploughed fields where they make their fold, leave them whole, by which means the sheep are incommoded and even hurt. Others make it in moist grounds, without taking care to choose the season in which they are least so. All these circumstances contribute to the ill effects which folding sometimes has upon sheep.

Sheep that are folded are in danger from violent winds, from hail and from wolves. The winds are guarded against by securing well the hurdles or nets of the fold. Unless the hail come suddenly in the night, it is avoided by housing the sheep. There are several means of protecting sheep from the

cunning and voraciousness of wolves.* The most usual are the courage and vigilance of dogs ; the shepherds should also go away from the woods at the approach of night, fold their sheep early, and fix the hurdles firmly. They are commonly armed with guns or piltols, and fire them whenever they hear a noise. This precaution is of no great effect, for the wolves often carry off sheep before the shepherds awake. In many countries it is usual to tie bells about the necks of several of the sheep ; this practice has, for the most part, no other tendency than to encourage the indolence of the shepherds, who, thinking it will enable them to find their flocks again, are apt to go away and leave them. It may however be of some use ; when the sheep are disturbed by the approach of a wolf, the noise of the bells gives notice of it. A farmer has thought of a method which promises to be successful : to the end of a long stick is tied a tin lantern, 10 inches high and 6 inches wide, containing a lamp ; the glasses are of different colours, red, blue, yellow, &c. The shepherd can, without opening it, pour oil into the lamp, by means of a little funnel attached to it, and which is provided with a hinged covering ; the upper opening is shut, to prevent the rain from entering. This lantern is also of use, in dark nights, to light the shepherd in changing his fold. It is tied to a hurdle on the side opposite to that near which the hut stands ; the lamp burning all night consumes but little oil.† The wolves are frightened away by the colours. Other means have been proposed, which it is useless to mention, as those which I have already pointed out are sufficient.

They are mistaken who suppose that folding improves the wool : that of sheep which always pass the night in the sheep-houses is equally fine. It contributes to their health, and for that reason increases their fleece, but does not render the wool finer.

Daubenton sees no inconvenience in folding sheep during the winter ; it is however attended with great inconveniences. At that season the sheep find little or no food in the fields ; as soon as they feel the cold, they crowd together in clusters to keep themselves warm ; which proves that they suffer, and that it is better to make them lie in the house during that season. Besides, sheep are not well folded when they do not place themselves at some distance from one another.

* In one year, after rewards offered to those who should destroy wolves, either by snares, or by arms, 5351 were killed.

† In the environs of Paris, this lamp is supposed to consume each night no more than two-pence worth of oil.

Of Pasturing Merinos.

The time during which flocks are to be led out to pasture, depends upon the climate: in some parts, it cannot be more than four or five months at most; for instance, among mountains which remain a long time covered with snow and are exposed to severe cold: in other places, it may be seven or eight months, on account of the shortness of the winter.

The methods of pasturing sheep are not the same every where; in some places they are pastured upon heaths; in others, upon untilled or wild lands; sometimes they are permitted to run upon fallow grounds, upon meadows during the after-grass, and upon fields that have been reaped until the time when they are ploughed; many husbandmen sow grain for their flocks, such as rye, barley, oats, vetches, pease, lupines and other plants, which they suffer them to crop while young.

To these differences in the manner of pasturing sheep we may add two others, viz. in the quality of the grass, which is not equally nutritive, and in the extent of the pasture grounds. In the south, upon mountains and calcareous soils, any weight of vegetables contains more nutritious particles than an equal weight growing in the north in vallies and clayed soils. Some proprietors have many fields, others have but few, and among the latter some of superior intelligence obtain better crops from their tillage.

It is often asked how many sheep may be supported per *arpent*.* From what has been said it may be perceived that this question is not easy to answer. If, to relieve us from this difficulty, we have recourse to the ancient rural laws, it may be seen that an act of the parliament of Burgundy allows for each *arpent* one ewe and her lamb, and that an ordinance of the parliament of Paris restricts the number to one animal; though doubtless it also meant an ewe with her lamb, which is always comprehended. As the lamb consumes but half as much as its mother, the laws may be said to have allowed a sheep and a half to an *arpent*.

It was supposed that a greater proportion than this could not be kept upon a farm; this reasoning was founded upon the then prevailing system of husbandry; it is known that this system was to divide the farm into three portions, one of which was

* The French word *arpent* is retained, because the translator does not know how nearly it answers to the english *acre*, by which it is generally rendered.

left fallow every third year, during which it was not sown, but ploughed three or four times, and in the intervals it rested, and the grass sprung up ; another produced wheat or rye, which was sown in autumn, to be reaped in the following summer ; in the third, grain was sown in the spring, that it might ripen in the summer. Thus it appears that in the territory within the jurisdiction of these two parliaments, the proprietor of three hundred *arpents* had the right to keep a flock of four hundred and fifty wethers, or of three hundred ewes yielding three hundred lambs. The conversion of a part of the fallow grounds into meadows, by making it practicable to support a greater number of sheep, prevents any precise calculation from being made, 1st. because these meadows may be more or less extensive ; 2d. because they vary in their fertility, both in different countries and in different years ; 3d. because they are partially quitted for other pastures, according to the need of the animals.

Farmers, knowing their own resources, must determine for themselves the numbers of sheep which they can keep upon their farms. It may however be observed, that it is better to have a number less than the soil is capable of sustaining, during the spring, summer and autumn, than to have a greater number, unless the proprietor is willing to fodder them longer than usual. Some seasons are so dry, that in the months of June and July, recourse must be had to foddering, to prevent the animals from suffering.

Merinos feed upon all vegetables that suit the common breeds of sheep. I have thought, while following my flock in the fields, that the Spanish sheep ate several sorts of plants which the others rejected, and my observation has been confirmed by the shepherds at Rambouillet.

The flocks should not be let out of the stable while it rains, except in the great heats of summer, when the rain is light and not likely to continue long ; under these circumstances the rain is not injurious to them ; the dew is at that season even serviceable to them, because by moistening and making tender the grass that is too dry, it renders it more palatable to them, quenches their thirst and contributes to nourish them. At every other season, care should be taken not to lead them to wet pastures, before the sun has dispersed the dew. Artificial meadows, luzerne, and particularly clover, are most dangerous. The least imprudence on the part of a shepherd may destroy the sheep, unless they are speedily succoured. See the article, *Sudden swelling of the paunch*.

When the farm on which mérinos are kept has some parts elevated and dry, and others low and cool, the sheep should be pastured on the former during the bad season, especially while the weather is damp; and on the latter, only after a continuance of dry weather, in the middle of the day, and for a few minutes only.

From time immemorial, a great number of shepherds, proprietors of their flocks, have been in the habit of quitting, after the vintage, the Pyrenées and ci-devant Béarn, of traversing Landes and coming to winter among the vineyards about Bourdeaux, on the left bank of the Garonne: these flocks live upon vine leaves and wild herbs. This practice is productive of some inconveniences, for the earth gets heaped up, the vines are rubbed, and the props are thrown down; but this mode of feeding is wholesome, and affords good nourishment to the sheep at a time when they greatly require it.

Proprietors sometimes reserve, as pasture for their sheep, a part of the first growth of their artificial meadows. It would be as dangerous as extravagant to suffer them to remain there long. Prudence requires that they be made to pass through quickly, at different times; or that the extent of ground be marked out each day on which they may browse without injuring themselves. Prudence also demands that in the spring the flocks be suffered to feed but sparingly in rich pastures, at first particularly, and not without previously giving them some food in the stable, so as to moderate their fatal greediness.

If rains and dews be attended with ill consequences, so also on the other hand, are drought and heat. The soft and loose texture of a sheep's body renders the animal liable to disease produced by moisture imbibed; which proves that it should always be guarded from whatever gives too much humidity to the blood. It would seem, according to this principle, that dryness and heat are always favourable to sheep. Yet, when extreme, they are very injurious and often fatal to them. The sun shining directly upon their heads, which are constantly held down towards the ground, expands the humours within the skull, and occasions apoplexies, which are more common in open countries than in others: it is of course necessary to place flocks under trees, or in the shade of walls or in houses, during the heat of the day.

I will here repeat a remark which I made with regard to feeding in the house, the lambs should be led out to pasture with their mothers, until they have acquired strength; they

would run the risque of finding little to eat, or only coarse grass, because their mothers, being more active and eager, would always go before them and consume the best and tenderest grass.

Inattentive or slothful shepherds, when they are at a distance from water in summer, often neglect to water their flocks; the sheep, in consequence, suffer much, and digest imperfectly their dry food, which is also often covered with dust. If they be conducted to the margin of a river, stream or pool, without hurrying them, those which are thirsty drink no more than is necessary for them. It is only in wet weather that care need be taken to prevent them for drinking too much.

Of the precautions necessary when sheep travel.

Sheep that migrate, when they go to the mountains which afford their summer pastures, make every year long journies; the distance they go each day and their resting places are fixed. Such flocks are not the subject of our present inquiry, but such as are bought in one country and transported to another.

If sheep be observed while at pasture, it will be seen that they are continually in motion, except during great heats. It follows that they may easily be conducted to great distances. Many importations of merinos from Spain have speedily arrived at their places of destination. Those which came to *Mr. Poyferé de Cere* were but fifty four days in travelling from Carravias (near Soma Sierra, in Spain, 18 leagues from Madrid) to Rambouillet, thirty three of which were spent in going from Mont de Marsan to Rambouillet, a distance of 220 leagues: a part of the flock which got separated, arrived in thirty one days at a farm belonging to government, situated three leagues from Trèves, which is distant from Rambouillet 115 leagues, after having travelled more than 300 leagues through very bad weather. These animals are therefore able to perform great journies; yet some precautions are necessary to prevent them from being too much fatigued.

If the flock is numerous, one man is not sufficient to conduct it on a journey; two, and sometimes more, are necessary: one walks in the front, and the others in the rear; the first, by means of a little bread, makes some of the sheep follow him.— A dog might serve instead of a part of the men, and would be useful in passing through cultivated lands and plants in growth: the dog should be active, but not disposed to bite or worry the

sheep. The shepherds of the south of France carry only a stick ; they throw stones at the sheep, and in this way sometimes hurt them, they also whistle to them ; they commonly teach a wether to obey their voice, and it becomes the leader of the flock. I believe this method, except in some cases, preferable to the use of dogs, which favour the indolence and carelessness of the shepherd, and do much hurt, by crippling the sheep and causing abortions.

It is difficult to make a small number of sheep travel, two or three for instance : being accustomed to go in flocks, they run among any which they perceive as they go along. It is better to transport them in a cart ; they should there be kept on their feet, by placing before them a little fodder : when carried in this manner, they can bear a long journey. They have been carried in stage-coaches, and even in a sort of cages, care being taken to prevent them from struggling and bruising themselves ; and have arrived in very good order at their places of destination.

When they travel on foot, they should not be made to go more than five leagues a day. It is advisable, if they are to go far, to begin with three or four leagues, in order to accustom them by degrees to the journey ; after a few days, they increase their pace of their own accord ; in bad weather, or when they are fatigued, they should be made to stop and rest for a while in convenient places. On their way, they feed along the roads in which grass grows, or in the fields that are not sown ; and the consequent delay is beneficial to them, for they should never be hurried. Care should be taken to let them drink when they travel in dry weather, if they meet with brooks or a river or a watering-place of which the water appears to be good.

Every morning, before setting out, the conductor should review all his flock, and count it, to see if none of the sheep are missing : he should examine the feet of such as appear lame, and take out the stones or hardened mud, which often occasion them to limp ; he is to view the condition of each animal, to dress such as have any eruption or other disorder, and then to proceed on his journey.

By following the high roads, there is less danger of getting lost ; but as one is there liable to meet carriages which may hurt the sheep, or other flocks which may communicate to them a contagious disorder, it is safer to take by-roads, if good guides can be procured.

In the spring and autumn, which are the most favourable seasons, sheep may travel at any time of the day : in summer, they should move only early in the morning and in the evening ; the extreme heat of the sun is thus avoided, by permitting the flock to rest in the shade in the middle of the day ; it is also right to shelter it during violent rains. When the road is paved or stony, the sheep should be made to go along the sides ; for unless the ground there be soft and adhesive, their feet will suffer less than if they went in the middle where it is hard.

On arriving at the place of rest for the night, it is better to place the flock in horse-stables or in empty barns than in sheep-houses, for fear of contagious disorders. If the weather permitted, it would be better to leave the flock in a yard ; but there is danger of thefts, exchanges or accidents, which it is prudent to guard against. A nightly guard would be the safest, but it would be very fatiguing for the conductors, unless they were numerous.

It often happens that flocks have nothing, or too little, to eat upon the roads ; sometimes they find no water ; in the evening, these wants must be compensated by provender, fodder and water : a rack may soon be made of ladders a little inclined ; if it be necessary to lay the fodder on the ground, the place should first be cleaned.

In a flock composed of rams and of sheep, if the number of rams be considerable, two companies must be formed, and made to go separately : the rams precede, because if they followed the ewes, they would be too much fatigued. It has been remarked that in long journies, more rams perish than ewes. If the number of rams be too small to form a separate flock, and if on account of the season it be wished to prevent the males from covering the females, a piece of linen reaching to the ground is tied to the rams, placed so as to prevent copulation.

The great price of merinos renders both the purchasers and the venders attentive, the former, to have the animals delivered to them in good condition, the latter, to prevent the conductors from changing or parting with them on the road, and then pretending that they died. These frauds may be prevented by employing the most honest and vigilant men that can be procured ; by requiring of them not to arrive at the place of destination before a certain day ; by marking the sheep when they set out ; by requiring the skins of those that die, and certificates of their deaths from constituted authorities, and moreover receipts from the purchasers.

The age at which sheep travel best, is between two and six years: when younger, they are less able to bear the fatigues of the journey; when older, they require to be treated with more tenderness. The most favourable season for travelling is the autumn, because the temperature of the air is then mild, there is grass along the roads, and the females, if pregnant, are not so far advanced as to be hurt by travelling. The flock which went from Carravias to Trèves stopped only twelve days upon the road; seven at Mont-de-Marsan, and five at Rambouillet. In the south of France it was exposed to great heats and much dust; and in the north, to heavy rains. Many ewes, it is true, miscarried; of four hundred, only two died. An ewe, whose foot was broken at Tours, went on with the rest to the neighbourhood of Paris; in this condition she travelled 50 leagues without any ill consequences; when the creature arrived at her place of destination, her foot was dressed, and she recovered.— I mention these facts to show with how much facility merinos may be transported to great distances when prudently conducted.

It would perhaps be better not to suffer ewes to take the ram when they are going on a journey. In general, lambs that are dropped when their dams are fatigued, are weakly and do not thrive so well; but the profits resulting from those which survive are too great to atone of such a privation: besides, though the feeble are lost, good nourishment is given to the others, and something is gained the first year.

Prudence requires that, when a flock comes from a distance, it be made to feed as nearly as possible in the same manner that it did in the country from which it came; and it should be accustomed gradually to a new diet, if such be expedient: every sudden change is injurious. Merinos coming from Spain, where they have lived upon nothing but fresh grass, do not know how to eat dry fodder at a rack. If they have some sheep mixed with them that have been accustomed to it, they soon learn to imitate them; besides, hunger and instinct alone are able instructors.

After sheep have made a long journey, especially in summer, it is proper to wash and rub them one by one. It should be done in fine weather, that they may dry the sooner. This operation frees them from dust, and preserves them from the scab. Care should also be taken not to put them immediately with other sheep, lest they should have caught some contagious disease by the way; six weeks at least should elapse before they are put with others.

Of Shearing.

Shearing is the shepherd's harvest ; it was formerly attended every where with a sort of ceremony ; it has become a matter of still greater importance since the introduction of merinos, because the profits have more than doubled. It is from the yearly fleeces of his flocks that the proprietor is recompensed for the trouble and expense which they occasion him.

Some sheep, especially among the common breeds, lose a part of their fleece before shearing time, in consequence of either sickness or weakness caused by insufficient nourishment.—Merinos are rarely in the latter case, because they are not suffered to want : it sometimes happens, however, that locks of their wool are pulled out, when they are permitted by inattentive shepherds to feed among bushes.

Daubenton was mistaken when he pretended to point out the time at which the young wool displaces the old, and offered this as a sure sign of the necessity of shearing : the fact is not so ; he has been misled by the growth of young wool, which does indeed take place when any part of the old has fallen out, from whatever cause. Sheep do not in this respect resemble horses, which have a winter and a summer coat, and therefore change their hair every year. The wool of a merino, unless the animal be sick or ill-conditioned, constantly grows. It may keep its fleece several years, which will increase in weight and length ; it is the same wool which continues to grow each year : after some time, it becomes so troublesome to the sheep, on account of the dust and insects which it harbours, that they begin to rub themselves, and thus to lose their wool. As a proof that it is the same wool which continues to grow, it may be observed that when a sheep is not shorn while a lamb, its wool, the second year, is not so fine as it would have been if shorn twelve months before.

In general, the time for shearing is when warm weather approaches ; the animals then suffer from the weight of their fleece ; they should therefore be relieved from it. The time of shearing, of course, cannot be the same in all climates ; it may also depend upon other circumstances. When they migrate, it is proper to shear them immediately before they set out for the mountains. A proprietor who wishes to transport a flock from one part of France to another distant part, should use the same precaution, in order to enable it to walk with more ease. If any sheep should have the scab to such a degree as to require the whole body to be dressed, it would be necessary to shear them sooner.

In the south of France, shearing-time comes about the middle of May ; and in the north, at the end of June ; for the rams and ewes, temperate weather is chosen. In countries where the lambs are dropped in December and January, they are shorn the first year. Some proprietors have them shorn before the ewes, that the young wool may have time to grow before they are made to lie out in the fold, which is commonly done three weeks after their mothers. This interval is permitted with the view of letting their wool gain strength, and that they may not be exposed too young to the inclemency of the air.

It is a matter of doubt whether lambs should be shorn the first year of their lives, or whether the shearing should be deferred to their second year. Some agriculturalists have maintained that by leaving their wool on, they would be preserved from the staggers ; others, that the quantity of wool is thus increased. The former assertion is a mistake ; and so also is the second, if confidence is to be placed in experiments made at Rambouillet and in the department of Aveyron.* The animals are not preserved from the staggers by leaving their fleece on them eighteen months, and the quantity of wool is not increased : but, on the other hand, the wool is finer when taken young, and the lambs are freed from lice† and ticks,‡ which, in some countries, are very troublesome to them.

The instruments used for shearing are shears or scissors of various sizes and forms.

Two customs prevail ; one generally, and the other in some of the departments : the former is to shut up the sheep in a close place, one or two days before they are shorn ; the second is to wash them, for the purpose of getting out the coarsest of the filth with which the wool is loaded. The custom of sweating sheep that are to be shorn,§ favours the shearer, renders the operation easier to the animals, and gives to the wool more grease, which is advantageous in washing ; it is also supposed to increase the weight, but this augmentation is trifling. If the proprietor of the sheep stops here, the manufacturer of the wool has no reason to complain§§. This sweating should not be carried to an extreme in sheep that are vigorous and sanguine,

* They are to be found in Vols. VIII, XVI and XXXVIII of the *Annales de l'agriculture française*.

† *Pediculus ovis*.

‡ *Acarus*.

§ This practice prevails in Spain as well as in France.

§§ In Roussillon, after making the sheep sweat, they make them run in the dust, which, falling upon the fleeces, increases the weight of them. This is a dishonest practice of which the manufacturers justly complain.