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SHEEP ON MINNESOTA FARMS

P. A. ANDERSON

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P. A. ANDERSON, Division of Animal Husbandry

Three general plans may be followed in sheep production: (1) Maintaining a flock of from 25 to 100 breeding ewes, purebred or grade, as part of the livestock on the average quarter-section or half-section farm; (2) specializing in sheep production as the major enterprise and maintaining all the sheep the farm will carry; (3) purchasing feeder sheep or lambs from the western range or the large market and fattening them. The first plan appeals to most Minnesota farmers, wherefore this bulletin deals primarily with the management of the small farm flock.

Selection of Breeding Ewes

Three methods of getting started with a farm flock are suggested:

1. Get ewes from flocks near home.

2. Purchase ewes at terminal markets through commission agents.

3. Buy directly or through dealers in the west—Montana or Colorado.

Whatever method is followed, consideration should be given to health, age, soundness, type, fleece, condition, breediness, quality, and uniformity.

Health.—All ewes should be healthy in appearance, as indicated by general thriftiness and vigor. There should be no evidence of colds, coughing, or diarrhea. Fleeces should be bright and oily; the skin pink, not pale or dark blue; the lining of nose and eyelids bright red. Animals should be in fair flesh, in the fall of the year; or, if thin, the cause should be known. They may be thin from lack of feed.

Age.—The best advice to a beginner is to buy ewes that have had lambs, as they lamb easier and give less trouble at lambing time. Ewes two or three years old are best. Four- or five-year-old ewes are good and cost much less than younger ones. Ewes over five years old with solid mouths can be useful for two or three years, but younger ewes should be purchased if enough money is available. A few young ewes are better than a larger number of old ones.

The age of sheep can be told by the front teeth of the lower jaw. A lamb has four pairs of rather narrow temporary teeth; a yearling, a center pair of broad permanent teeth and three pairs that are temporary; a two-year-old, two pairs of broad permanent teeth and two pairs that are temporary; a three-year-old, three pairs of broad permanent teeth and one pair of temporary; a four-year-old, a full mouth of permanent teeth. After the fourth year the age is hard to determine. A "solid" mouth is one in which the teeth are all sound and of uniform shape, representing ewes from five to seven years of age. A sheep with a mouth known as a "good bite" is one whose teeth show considerable wear and have very noticeable spaces between them. Ewes that have lost part or all of their teeth are called "cut-backs," "broken mouths," or "gummies."

Soundness.—This is often understood to include the condition of the teeth, but is more generally accepted as having reference to the

udder. A healthy udder is soft and glandular with both halves equal in size and the teats normal. Animals with teats that have been injured or removed by careless shearers should be avoided, also those with thick teats that have stoppages. Spoiled udders and deformed teats only add to the beginner's troubles at lambing time.

Type.—A ewe of native or western origin should show evidence of good breeding—good width and breadth of body; deep chest; short, straight legs; short, thick neck; straight back; short, wide head; large, clear eyes; strong bones; compact fleece, and marked characteristics of a recognized breed. Markets are often crowded with ewes that are shallow-bodied, long-legged, long-necked, weak-backed, fine-boned, with long and narrow heads, and with open and hairy fleeces. Such ewes make poor foundation flocks.

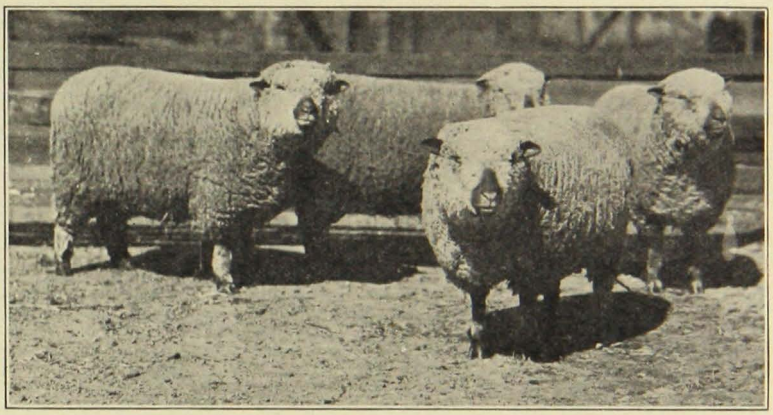

FIG. 1. DESIRABLE BREEDING EWES

Fleece.—The importance of a good fleece can not be overestimated. In buying sheep in large numbers, fleeces can not always be examined carefully, but ewes having hairy, loose, open fleeces should be rejected. A compact, uniform fleece is desirable from the standpoints of profit and health. Fleeces that have black or brown spots or fibers mixed with the white should be rejected. The wool should be fine, long, and have good crimp.

Condition.—Condition refers to the degree of fatness. Ewes coming off good range or good pasture in the fall should be fleshy in appearance. This indicates health and thriftiness. It is not advisable to pay too much for condition, yet the very thin ewe is often unsatisfactory for the beginner. Ewes should weigh 125 to 175 pounds.

Breediness and quality.—Breediness is hard to define, but is recognized as a general refinement of body and head. Femininity in a ewe is an indication of a good breeder or mother. Quality, on the other hand, closely related to breediness, is refinement of bony frame and the manner in which the flesh is laid on—firm and even, not in rolls on the lower ribs or in patches at the tail head. Coarseness is indicated by a

large head; open shoulder blades; prominent hips; heavy, coarse bones; and coarse wool. Ewes of this kind produce lambs of the same general type, which do not fatten or sell well.

Uniformity.—Uniformity is desirable, as the ewes will produce lambs that are uniform and will sell to greater advantage, and the flock will have a pleasing appearance.

Foundation Ewes—Native or Western

The question often arises as to the kind of ewes to purchase, native or western. Natives are ewes raised on the farm, showing evidence of mutton breeding by the use of Shropshire, Hampshire, or Oxford rams. They can often be found in small numbers in farm communities. If many ewes are desired, one should go to the large markets. Range ewes are of two kinds—white-faced and black-faced—and are uniform in type tho there may be some mixture of breeds unless the seller has sorted them. This, however, is seldom the case. Natives are more generally infested with parasites, as they originate on farms in the cornbelt. Among them, also, are many cull ewes that are shy breeders and have bad udders. Ewes of this class carry more weight than westerns, thus adding to the cost per head. As a rule, they are of poor breeding because of the use of poor rams of unknown breeding.

Western ewes coming to market in the fall in great numbers offer the beginner a chance for selection. They are hardier than native ewes and are less likely to be infested with parasites, owing to open-range feeding on fresh pasture. Tho they lack mutton conformation and are smaller they produce good market lambs when mated to mutton rams with wide backs, short legs, and good fleeces. The best ewe lambs can be added to the flock. If only a few ewes are wanted, by careful selection native ewes can be chosen to best advantage. If a carload or more are wanted, western ewes are best.

SELECTING THE BREEDING RAM

Any sheep raiser should look upon the flock ram as a means of continually improving the lambs and thereby increasing the profit from the flock. All of the characteristics already discussed as essential in the ewe are still more essential in the ram. Masculine character is desired. Any sheep raiser, even tho he expects to market all the lambs, should use a purebred ram of a breed suitable to the type of ewes predominating in his flock. One must expect to pay a price in keeping with the quality of the ram selected, but the better, higher-priced rams usually pay the largest profit on the investment.

FALL CARE OF FLOCKS

The ewes should be in good condition for breeding in the fall. After the lambs have been weaned, the ewes should be given good pasture to put them in a gaining condition. This can often be done by turning them into a stubble field or on second growth of timothy and clover or meadow, or into cornfields to eat the lower leaves and broken stalks and make the field cleaner for husking or silage. If the foregoing is not pos-

sible, rape or soybeans should be seeded for pasture. Giving breeding ewes good feed for two or three weeks before the ram is turned with them is known as "flushing." Grain can be used when green feed is not available.

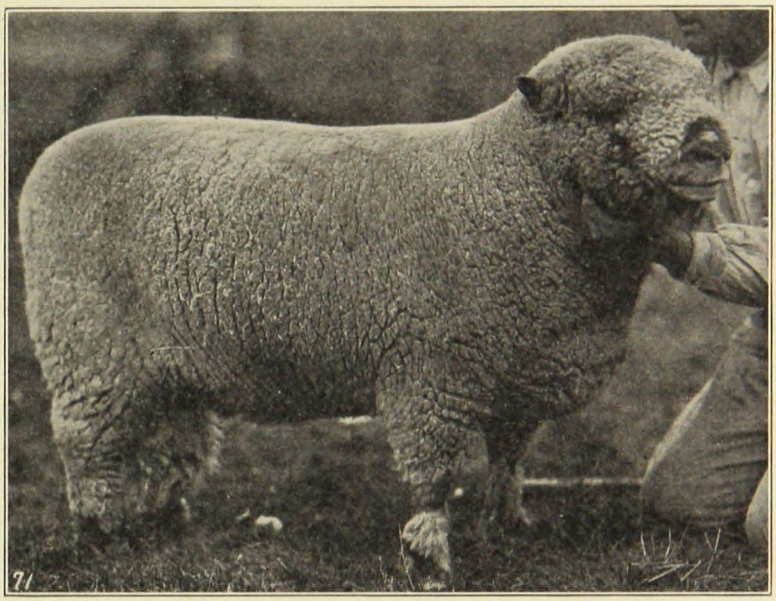

FIG. 2. GOOD TYPE OF BREEDING RAM

The ram should receive extra care at this time in order that he may be in the right condition. A half-pound to a pound of oats a day may be fed along with good pasture. The number of ewes a ram should serve depends upon the system of management. A young or old ram will serve more ewes if hand-coupling is practiced. Many turn the ram in with ewes during the night, taking him out in the morning and feeding him. This insures success. Others with small flocks let the ram follow the ewes at all times. Where more than one ram is used, a good practice is to alternate the rams in the flock. A growthy ram lamb should not serve more than 15 ewes if he is to insure a uniform lamb crop and develop into a strong yearling. A yearling that is strong and well developed may serve 25 to 35, and a good two-year-old or aged ram, 50 to 60 ewes. Much depends upon the ram and the system of breeding. Owners of large flocks use 3 rams to 100 ewes.

It is not good practice to breed ewe lambs, as they are generally not mature enough to withstand the hardships of motherhood and to drop large, strong, lambs. They seldom make good mature ewes, and their lambs nearly always lack in development.

Ewes should all be tagged before the breeding season, and the rear parts should be sheared clean, as summer feeds often cause scours. Likewise, all excess wool should be sheared from the belly of the ram.

Ewes normally come in heat in the fall, and the time when lambs are desired in the spring can be controlled by the time the ram is placed in the flock. The interval between heat periods in ewes varies from 16 to 21 days. The period of gestation is 5 months, varying from 140 to 152 days and averaging 146 days. The breeder should record dates when the ram was let in with ewes and when he was taken out, so that it may be known when the ewes are to lamb. One can also check up on the bred ewes and the breeding power of the ram by using color on the ram. Mix dry orange chrome, red sienna, or lampblack to a pasty consistency with clear motor oil and smear it on the breast between the forelegs. Fresh color should be applied every five days and a new color used every 15 to 20 days. Do not use oil paints, as they can not be removed in the process of scouring the wool.

The time of lambing may be from February to June 1. Early lambs need warmer quarters and more attention than do later ones, but when well cared for they make rapid gains until pasture comes on and finish for market at an early date. Early lambs are also more resistant to stomach worms when turned into infested pastures. March to May 1 is the accepted time for lambing by many, as warmer quarters are not so necessary and farm work is not so pressing as later. Many prefer to have the ewes lamb on grass, as lambs dropped on grass are generally stronger, the ewes having more milk and being less likely to have trouble with infections of any kind than ewes lambing early in sheds. However, lambs born late in the season must compete on the market with the big runs from the west, generally at a lower price than is received for lambs marketed earlier in the year.

WINTER FEEDING

As winter approaches, care should be taken to see that the ewes do not get too thin. By this time of year the fleece will be showing considerable growth, and unless the flock is carefully observed one may

FIG. 3. EXERCISE FOR PREGNANT EWES IS ESSENTIAL

think the ewes are in good condition when they really are not. The principal feed should be a legume—alfalfa, red clover, sweet clover, or soybean hay. The flock may be wintered successfully, however, by using two pounds a head each day of legume hay and supplementing this with prairie hay, oat straw, corn stover, or some cheaper roughage. From two to three pounds of corn silage, or turnips, sugar beets, or mangels a head every day add greatly to the desirability of the ration. Too much silage or roots, however, may result in lambs weak at birth. If the ewes go into winter in thrifty condition, they will not require grain until a few weeks before lambing. Beginning about the first of February, one pound of grain a head every day will make them stronger and better milkers than if they do not receive grain. Grain feeding should be continued until the ewes go on pasture. Any of the following daily rations are satisfactory:

Before Lambing	After Lambing
I. 1 lb. oats 3 lb. alfalfa or clover	I. 1 to 2 lb. oats 2 to 3 lb. silage 2 to 3 lb. hay
II. 1 lb. oats 2 to 3 lb. silage 2 lb. alfalfa or clover	II. 70 parts oats 20 parts corn } 1 lb. 10 parts bran 3 to 4 lb. silage or roots 2 lb. hay
III. ½ lb. oats ½ lb. corn 2 lb. alfalfa or clover hay or 3 lb. prairie hay	III. 60 parts oats 20 parts corn 10 parts bran } 1 lb. 10 parts oilmeal 2 to 3 lb. silage 2 lb. hay

Give the pregnant ewe plenty of exercise by making her travel some distance for her feed. Put hay in racks or on the ground some distance from the barn. Cornfields or bundle corn can be used as roughage during the day. This will provide exercise for the ewe while she gets her feed. She will have less trouble at lambing time and her lambs will be stronger if she has plenty of exercise.

Water Supply Important

It is a common opinion that sheep do not drink much, or require much water in winter. If sheep are offered water only once a day, and that ice-cold and in a dirty trough, they will not drink much and will not do so well as if they have before them all the time fresh, clean water of moderate temperature. One of the most satisfactory and successful

means of watering the flock is an automatic galvanized iron tank of the type that can be kept from freezing by a kerosene lamp placed beneath it. With such a tank a flock of 50 ewes will drink from 30 to 50 gallons of water a day through the coldest winter weather. Goiter in lambs can be prevented by adding potassium iodide to the feed or water from the beginning of the breeding season to lambing time. If added to the water, use 5 grains of potassium iodide for each ewe every week. If added to a grain ration, use one ounce to 100 pounds of grain or one ounce to 100 pounds of salt. Dilute in water and sprinkle uniformly over salt and mix well. Iodized block salt may be used.

EWE AND LAMB AT LAMBING TIME

The ewe should be gaining in weight as lambing time approaches. She should receive a balanced ration of alfalfa or clover, a little silage, and grain according to condition. Silage is valuable as a succulent feed for ewes through lambing time but should be used in small amounts. It stimulates the milk flow and improves or assists digestion.

As the time for lambing approaches, the ewes should be observed closely. The ewe about to lamb refuses to eat, is uneasy, and walks with a drooping head. The udder is enlarged. At this time she should be kept by herself. This gives her a chance to care for her lambs properly. The ewe and lambs should be kept enclosed until the lambs are strong and nursing well. Ewes about to lamb should be watched carefully so assistance can be given if necessary. They should not be disturbed as long as delivery seems to be progressing normally. Mother instinct will take care of the lambs as a rule, but the attendant may assist weak lambs by removing mucous from nose and mouth. Rubbing the diaphragm vigorously with the hand assists in starting respiration. The ewe should be allowed to dry the lamb, as this makes for a closer relationship between mother and lamb. Very weak lambs should be helped to nurse, as the warm milk acts as a stimulant. The ewe should be placed on her side so that the lamb may be assisted.

If a lamb is not able to nurse, it should be held with its mouth open and forced to take some milk. This will usually develop its strength so it will feed normally. When the lamb has nursed enough, it should be placed where the ewe can not step on it. The wool about the udder of the ewe should be trimmed away so that there will be no danger of the lamb's pulling stray locks loose and swallowing them. This often causes death. A strong lamb will be up and nursing soon after birth. The navel cord should be painted with iodine to prevent infection.

Cases of delayed lambing and difficult birth are not uncommon, and should be given the best of care, even if the lambs are still-born. Normal presentation is forelegs and head first, tho often the hind legs are presented first.

After lambing, the ewe should be given a small amount of hay (clover or alfalfa) and a little water. Do not feed heavily for the first few days, as this may stimulate the milk flow so that the lamb can not take it all, thus causing caked udder for the ewe, or too much milk and scouring for the lamb. After the second or the third day, grain may be fed with

some silage, the amounts being gradually increased until the ewe is on full feed. If the ewes have not been getting grain, equal parts of oats and bran may be fed, as both these feeds are especially valuable at this time. Begin with one-quarter to one-half pound daily and increase according to the condition of the ewe.

Lambs that are dropped at night and are chilled when found in the morning should be taken to a warm place and dried. If badly chilled, they may be put in a warm bath, using water heated to a temperature comfortable to the back of the hand. Submerge the lamb and rub it briskly while in the water. A change of water may be necessary to get the lamb thoroly warmed. Badly chilled lambs have often been saved by quick work on the part of the attendant. As soon as the lamb has been revived, dry it well with heated cloths and return it to the mother. Warm milk at this time is a stimulant.

The orphan lamb should be placed with a ewe that has lost her lamb or one that has only one lamb and has a good flow of milk. It is often difficult to do this. If it can not be done, the orphan must be raised on the bottle. Use a small pop bottle with a good-sized nipple and enlarge the opening in the nipple so that the milk will flow freely. Use milk from a cow that has recently freshened, and give the lamb two or three tablespoonfuls every two hours for the first two or three days. The amount given should be increased according to the lamb's progress. Cow's milk is not so rich as ewe's milk and should not be diluted with water. The fat content of ewe's milk is about 7 per cent; of cow's milk, 3.5 per cent. The milk should be about the temperature it is when it is drawn, 100 degrees Fahrenheit. Increase the amount of milk to two ounces at a feeding after the first week, feeding three times a day. Be sure to keep everything clean. Feeding lambs by the use of a shallow pan as soon as they can be taught to drink is advised, as a bottle and nipple require much extra labor. Many sheepmen keep milk goats to nurse orphan lambs or to provide milk for hand feeding.

A disowned lamb can be handled by tying the ewe so that she can not bunt it around when it tries to nurse. Stubborn ewes often demand a lot of patience on the part of the shepherd, and may have to be penned in for several days, but sooner or later they settle down and can then be released. Smearing some of the ewe's milk on the back and hips of the lamb often assists in getting the ewe to own her lamb.

If many ewes are lambing, or if the feeding quarters and shelter for the flock are a little crowded, separate the ewes that have lambed from the others.

FEEDING YOUNG LAMBS

Early lambs should be provided with a creep and given ground grain in a small trough. A small hayrack should also be arranged and kept supplied with the finest and most leafy hay obtainable. The lambs begin to eat and get a good start before the pasture season. If ewes are lambing on grass and the feed is not too abundant, a small creep close to the water supply, where the lambs may receive grain, more than pays for the effort. At first the lambs take only a small amount of grain. Give no more than will be cleaned up, as lambs relish only fresh clean grain.

A small amount of oilmeal (pea size), added to oats and bran, makes a good ration. A small amount of corn may be added.

DOCKING AND CASTRATING LAMBS

All lambs should be docked by the time they are 14 days old. Between the tenth and the fourteenth days is usually the best time for this operation. The long tail is a menace to sheep because it catches filth, may interfere with the health, may prevent mating, gives the sheep an unsightly appearance, and detracts from the selling value. Many methods of docking are used. The method which has proved most satisfactory at the Minnesota Agricultural Experiment Station is to cut the tail off about an inch from the body with a pair of sharp pinchers or docking irons heated to red heat. Very few lambs will be lost by this method, if docked young.

Ram lambs that are not to be kept for breeding should also be castrated at an early age. Many flock managers dock all lambs and castrate the ram lambs at the same time. This may be the most economical method for the large range flock, but it is not recommended for the small flock. Docking is most easily and most satisfactorily done when lambs are under two weeks old; castrating, from ten days to three weeks old. If the two operations are performed at different times, the loss is likely to be less. These simple operations are more often neglected than any other one feature in the care of sheep. If sheep men would realize that lambs with long tails are unattractive in appearance and that ram lambs bring from one to two cents per pound less than those that have been castrated, they would surely take greater care to see that the lambs are docked and castrated.

SUMMER GRAZING FOR THE SMALL FLOCK

Sheep will do well grazing on native prairie grass, brome grass, bluegrass, timothy and clover, or sweet clover. They are especially adapted to annual forage crops, such as rape, Canadian field peas, soybeans, green oats, barley, rye, or wheat. By midsummer, the small flock can usually be grazed in the cornfield for a short time, where they will clean the fence rows and eat the grass and weeds and lower leaves of the corn without breaking the corn down until the other feed is gone. They can graze over grain stubble and will gain a livelihood from the scattered bits of grass and small weeds that usually come on after the grain is cut, also from the second growth on cut-over meadows. They can graze on a potato patch after the vines have begun to dry, and over a beet or cabbage field after the crops have been harvested, and will turn every bit of edible aftermath into mutton and wool. They will eat many weeds that cattle will not. One mistaken idea is sometimes held that sheep can graze brush lands. This is true only when there is plenty of grass growing with the brush, as sheep are not good browsers and will not do well if forced to eat leaves, buds, and small stems of brush on which goats would thrive. Sheep do not like to graze in brush or densely wooded lands. While they can graze on very short grass, the mistake is often made of not giving them sufficient range.

MARKETING LAMBS

Lambs born in March or April, that have been sired by good-sized rams of the mutton breeds and have been fed grain until the pastures are ready and then put on grass, can usually be marketed as fat lambs in August and September at weights from 65 to 80 pounds. They may run with the ewes until marketed or be weaned early in July and fed grain from then until marketed. This plan produces fatter lambs that sell for higher prices than lambs born and marketed later.

Ewes that lamb in May or June may lamb in the pasture and will require very little attention. As a rule, their lambs should be fattened on the farm in much the same way as those brought from the western range. They must be grazed on a corn field or stubble field or put through a fattening period on grain.

GROWING AND MARKETING WOOL

The wool clip is an important source of income in sheep production. If given proper care, the wool should help very materially in paying expenses, leaving the lambs with only a moderate charge against them in addition to their feed. The climate of Minnesota and the feeds grown are conducive to the production of healthy sheep and a strong staple of wool of good length and reasonably fine quality.

Attention to Wool Covering Necessary in Selecting Sheep for the Farm Flock

In purchasing or selecting breeding stock, it is usually necessary for the breeder to note the character of the fleece on the live sheep. He must make allowance for the breed represented and the characteristic type of fleece for the breed, and for the length of time since the last shearing. In general, however, several factors that are very good indications of both the quality and quantity of wool can be noted readily in the fleece as it is growing on the sheep. These are length, density, quality or fineness of fiber, uniformity, purity, and condition.

Length.—A long fleece is desirable in any breed of sheep, altho the length varies widely in the different breeds. Wool that is long enough to be used as combing wool will usually outsell short staple wool. Length also adds to the quantity of wool, or weight of fleece. It seems, however, that extreme length is opposed to fineness of fiber, and nothing would be gained by selecting for extreme length to the neglect of fineness of fiber.

Density.—Density in a fleece means compactness. One can judge the density of a fleece with some degree of accuracy by simply looking at it, but more accurately by grasping a handful of wool on the side of the sheep. If the wool yields readily and the hand can be closed as if there was little or nothing in it, the fleece is loose, open, and light. If one gets a firm handful of solid, unyielding wool that springs right back into place when he lets go of it, the fleece is compact and heavy-shearing. As a rule, the greater the density of the fleece, the finer will be the quality.

Quality.—The term quality applied to wool has a variety of meanings. It is often used to summarize all the characteristics of a fleece, and the user refers to a fleece as of excellent, medium, or poor quality. Again, it is often used to indicate fineness of fiber only, and that meaning is used here. A fleece that is fine in fiber is desirable because it makes the softest and highest priced cloth. Fleeces composed of extremely fine fibers sell at the highest price per pound on the scoured-wool basis, if they are not too short. Extremely fine fleeces are likely to be short and to contain a large amount of yolk, or oil, and to shrink heavily when scoured. In selecting for fineness of fiber one must have in mind the characteristic fleece for the breed. Extreme fineness is likely to be coupled with shortness of fiber and inferior mutton form.

Uniformity.—There is a tendency for wool to vary widely in length, density, and fineness on different parts of the same sheep. Usually the wool on the neck and shoulders is finer than that on the thighs. A fleece will often be desirable on the shoulders and sides but open and coarse on the rump and thighs. Such a fleece will be light in weight and of low grade. The uniformity of a fleece is judged by examining the fleece in at least three places—the shoulder, the side, and the thigh.

Purity.—Purity of fleece means freedom from black, coarse, and hairy fibers. These lower the value because they do not so uniformly take the dyes that are ordinarily used in coloring woolen goods, as do good fibers. Fleeces containing excessive amounts of black fiber are sold as rejects.

Condition.—The condition of a fleece at the time of shearing and marketing even more than the quality and quantity of wool may affect the selling price. To be in proper condition, a fleece must be uniform in strength of fiber and free from foreign matter and excessive matting, and must contain just enough oil to make it soft and bright. A fleece that is seriously at fault in any of these requirements will be discounted. It is, therefore, important to house, care for, and feed sheep in such a way that the fleeces will be in good condition when shearing time comes.

Feeding for Wool Production

The general character of the fleece, as well as the shearing weight and the quality, is determined very largely by the breeding of the sheep and not to any great extent by feeding, yet good liberal feeding on well-balanced rations is essential to the production of a heavy shearing fleece and strong healthy wool fibers. Maintaining a flock on scant pasture in summer and on low-grade non-legume hay in winter is likely to result in a short growth of wool containing weak and dead fibers. Wool is composed largely of protein, and if a good fleece is to be produced the sheep must receive the necessary amount of protein in its ration. Protein is likely to be deficient in the rations commonly fed to sheep. The most satisfactory and cheapest way to insure a sufficient protein supply is by feeding legume hays as roughage—any of the clovers, alfalfa, or soybean hay.

Effect of Dipping

In order to be kept free from external parasites, as ticks, lice, and scab mites, sheep must be dipped in an insecticide solution at least once a year. Dipping in the spring or even in the fall will not injure the fleece, but dipping just before shearing discolors the wool, takes the yolk, or oil, out of it, and reduces the selling price.

There are several standard dip preparations on the market, any one of which is effective if carefully used according to the directions on the package. A small galvanized dipping tank is the most economical, unless there is gravel on the farm and one prefers to construct a concrete tank. Every sheep in the flock, including the young lambs, should be dipped. If the ewe flock has been infested with ticks, the lambs are sure to be badly infested soon after the ewes are shorn. If ticks are found at shearing time, the sheep should be dipped twice, the second dipping 10 to 14 days after the first. Handle sheep carefully while dipping, selecting a bright warm day, so that the sheep may be dry at night. Use soft water or well water softened with soda ash, and be sure the water is not too cold. Use a good brand of dip and see that the job is done well. Ticks found on sheep during the winter can be destroyed only at great cost and then only with partial success. Sodium fluoride has been used by parting the wool at intervals on the entire body and dusting it in with a large salt can.

Shearing

The job of shearing sheep has been greatly simplified by the development of flexible-shaft shearing machines. These machines are made in sizes ranging from a single-unit hand-power machine to a large multiple-unit power-operated machine. The cost of a single-unit hand-power machine is so little that a farmer with only 20 to 30 sheep to shear can afford to buy one. Shearing a sheep is a rather strenuous job even for an experienced person, and may seem almost impossible to the beginner. Patience and experience, however, will soon accomplish results, and any farmer can easily learn to shear sheep successfully if he will carefully follow the instructions supplied by the manufacturer of his shearing machine. May is the most satisfactory month for shearing.

Tying and Packing the Fleece

In shearing, an effort should be made to keep the fleece together. Before rolling it up, all dung locks should be removed. These locks of dirty wool are usually damp and if rolled up with the fleece will cause it to mildew and may reduce the selling price materially. To roll and tie a fleece, place it with the cut surface down, then turn the sides in toward the center and begin rolling from the breech end. Roll the fleece quite tightly and tie it with medium-weight, four-ply, paper wool twine, using just enough twine to hold it together in good shape. Wool twine can usually be obtained from any agency that deals in wool.

Small amounts of wool, such as are usually obtained from the average-sized farm flock, are shipped in large jute sacks that can be purchased from firms that handle wool. Such sacks hold from 200 to 225 pounds

each. When several sacks are to be filled, a wool-sacking device should be provided, as it will simplify the work and make a much neater and smoother job. Before filling, wool sacks should be turned wrong side out and shaken to free them from loose pieces of jute. If wool is stored on the farm for a time before it is sold or shipped, it should be sacked and then put in a clean, dry room.

Feed Racks Protect Wool

A great many sheep breeders lose considerable money because their wool carries too large a percentage of chaff, grain, and weed seeds. Seedy necks and backs are a detriment to a fine fleece. This condition can be remedied in large part by the use of feed racks. Many of the combination grain and hay racks work successfully and are easily constructed. They may be of the wall type or the type from which the sheep feed on both sides. Aside from giving protection from foreign material, these racks are feed-savers, especially of roughage. Sheep that use hay or straw stacks for a feed rack are bound to produce a fleece with a high percentage of chaff and straw. The feed-rack space required depends much upon the size of ewes, but 15 inches will care for the average ewe.

COMMON GROUPING, CLASSIFICATION, AND GRADES OF WOOL FROM VARIOUS BREEDS OF SHEEP

Wool from the leading breeds of sheep in the United States may all be grouped, graded, and classified reasonably accurately as indicated in the following table:

Breed	*Grade*	*Class*
	FINE WOOL	
American and Delaine Merino	Fine	Clothing or combing
Rambouillet	Fine and ½ blood	Clothing or combing
	MEDIUM WOOL	
Southdown	½ and ⅜ blood	Clothing or combing
Shropshire	⅜ and ¼ blood	Combing
Hampshire	⅜ and ¼ blood	Combing
Oxford	¼ and low ¼ blood	
Dorset	⅜ and ¼ blood	Combing
Cheviot	¼ blood and low ¼ blood	Combing
	LONG WOOL	
Breed	*Grade*	*Class*
Lincoln	Low ¼ blood, common or braid	Combing
Leicester	Low ¼ blood, common or braid	Combing
Cotswold	Low ¼ blood, common or braid	Combing

TYPES AND BREEDS OF SHEEP

Sheep raising is distributed throughout the world. Through the influence of climate, feed, care, and selection, sheep change quickly in size, form, and character of wool covering. As a result, many varieties of sheep have gained recognition as pure breeds, and yet the great ma-

jority of the sheep on farms show evidence of the mixing of two or more breeds. Only two types of sheep are generally recognized as of importance in the United States, the fine-wool type and the mutton type. All purebreds of any considerable importance in the United States may be classed as belonging to one or the other of the two general types. Generally sheep of the fine-wool types are grown on large areas of cheap land where feeds available are not suited to the production of high-quality mutton, and wool is depended upon as the primary source of income.

Wherever feeds suitable to the finishing of lambs for market are available, the mutton type of sheep is preferred because the total income per ewe from the fleece and lambs produced is greater than if sheep of the fine-wooled type are raised.

The following table shows the classification of the important breeds of sheep found in Minnesota into mutton and fine-wooled types:

Mutton	Medium wool	Shropshire Hampshire Southdown Oxford Dorset Cheviot
	Long wool	Cotswold Leicester Lincoln
Wool	Fine wool	Merino Rambouillet

Characteristics of Breeds

Shropshire.—The Shropshire is the most popular breed in Minnesota and ranks first in number of registered sheep in the United States. They are often referred to as the farmer's sheep because they fit in very satisfactorily to farm flock conditions.

The rams weigh from 200 to 250 pounds and ewes from 160 to 185 pounds at maturity. Representative ewes shear 8 to 10 pounds of wool of combing length. They are good mothers and fair milkers and frequently give birth to twins. The wool extends well over the head to the nose. The ears, nose, and legs are dark brown to black.

Hampshire.—The Hampshire is a popular breed of mutton type, larger and somewhat more upstanding than the Shropshire. Rams weigh 250 to 300 pounds and ewes 180 to 225 pounds at maturity. Representative ewes shear about 8 pounds of wool. Hampshire ewes are good breeders and excellent milkers, often dropping twins. The lambs develop rapidly. The color markings are darker than those of the Shropshire, being a sooty black. The wool does not extend much below the eyes. The ears are fairly large, drooping, and much wider and thicker than those of the Shropshire. This breed is popular for grading purposes. Hampshire sheep are characterized as good feeders.

Oxford.—The Oxford is the largest medium-wool breed. Rams weigh 275 to 350 pounds and ewes 200 to 250 pounds. The wool is longer and coarser than that of the Hampshire. The fleece weighs about 12 pounds. When size is desired, the Oxford is popular. Color markings are brown to grayish brown, and the best types have a definite hood of wool.

Southdown.—The Southdown is the most highly developed mutton breed, tho small, the rams weighing 175 to 200 and ewes 135 to 160 pounds. The wool averages 6 to 7 pounds and is short and of good quality. The rams are popular for cross-breeding or grading for the production of market lambs.

Dorset.—The Dorset is the only breed that produces lambs twice a year. Both rams and ewes have horns. The breed is average in size and quality of wool. The color markings are white.

Cheviot.—The Cheviot is a small breed with white color markings and has no wool on the head. Sheep of this breed are very trim and alert. The rams cross well for the production of market lambs.

Lincoln.—The Lincoln is the largest breed of sheep in this country, has white color markings, and the wool is long, open, and has good luster. Rams of this breed cross well with grade sheep where size and mutton qualities are desired.

Cotswold.—The Cotswold breed is very similar to the Lincoln, but somewhat coarser-boned. The wool extends over the head and hangs in long ringlets from the entire body.

Leicester.—The Leicester is somewhat smaller than the other long-wooled breeds. It is distinguished by having no wool forward of the line across the ears. Sheep of this breed are wide-backed and thick-muscled but rather shallow in body. The wool is finer than that of other breeds of the long-wooled type and has a very distinct luster.

Merino.—Merino sheep are divided into three breeds: American, Delaine, and Rambouillet. Rambouillet rams are used to some extent in this state for improving the wool of grade ewes. The other types of Merino sheep are of no importance to sheep men in Minnesota.

COMMON AILMENTS OF SHEEP

Sore Eyes

Sore eyes are common among lambs from two to four weeks old. The inflammation is caused by the turning in of either the upper or the lower eyelid, more often the latter, in breeds having a heavy head covering of wool. If this condition is not taken care of, blindness will result. Mild cases may be treated with silver nitrate ointment, or 2 per cent argyrol solution, or ointment obtained from a local druggist. In severe cases a portion of skin below the eyelid may be cut out. Some make a larger opening and draw the parts together with a needle and fine silk thread.

Pinning or Accumulation of Feces

Young lambs are often found with an accumulation of sticky feces adhering to the tail, preventing the voiding of feces. If this condition

is permitted to exist for some time, it causes death. A small stick may be used for the removal of such accumulations.

Constipation, Diarrhea, and Indigestion

Older sheep and lambs occasionally are affected with constipation, diarrhea, or indigestion. In mild cases, a dose of two to four tablespoonfuls of castor oil, according to age and size, will be helpful; for small lambs, one or two teaspoonfuls. In severe cases, irrigate with lukewarm water and castile soap. Epsom salts is also good, using four tablespoonfuls in a pint of water and drenching with a small pop bottle.

Maggots

During the fly season, sheep found squirming, twisting, and endeavoring to bite or rub various parts of the body often are infected with maggots. Lambs on succulent feed or during wet weather should be closely watched. The wet, soiled wool should be removed, and if maggots are found, fairly strong sheep-dip or pine oil should be applied. The best application is ether or chloroform, but this is expensive. Gasoline may be used in the absence of other remedies.

Paralysis in Pregnant Ewes

The immediate cause of this condition is said to be a low calcium content of the ration, also a high condition of the sheep and a lack of exercise. Ewes having this trouble should be removed from the flock, placed on a meager ration, and induced to take exercise. In severe cases, ewes will die. On post-mortem examination, the ewe is generally found to be carrying twins or triplets which are 7 to 10 days premature. The liver is a deep tan color and very soft. More information is necessary concerning this condition, but the feeding of rations high in calcium but moderate in amount, with plenty of exercise, will be of great benefit.

Infections of Udder and Teats

Infections of udder and teats are often caused by bacteria, but more often they are found in heavy-milking ewes whose lambs are unable to take all the milk. Swellings may be reduced by hot applications, tincture of iodine, or camphorated oil. Pads of cotton soaked in Epsom salts dissolved in hot water—as hot as the back of the hand will bear—and applied over the entire udder and covered with a cloth, will reduce severe inflammation. When the udder has become severely infected, a veterinarian will need to be called to open and drain the areas. Sore or enlarged teats are troublesome, but often applications of iodine or other antiseptic will prevent further infection. Ewes that have enlarged teats so that the lambs can not nurse should be disposed of.

Nasal Catarrh, or Snuffles

Sheep that have been exposed to dampness, rain, or snow often have a discharge from the nostrils. At times the eyes also show a discharge. Exposure at any time will cause this condition, especially after shearing,

when there has been a sudden change in the weather. Treatment consists of giving proper housing or shelter.

Grub in the Head

The grub appears in the nostrils, frontal sinus, and other cavities of the head. Grubs set up an irritation that causes a discharge from the nose similar to a "cold in the head." Frequent sneezing and difficult breathing is noticed with decreased appetite in advanced cases. No definite treatment is known. Smearing of the nose of the sheep in the fly season with pine tar, however, acts as a repellent to the fly that causes the grub.

Sore Mouth, or Warty Lip

Sore mouth, or warty lip, is characterized by ulcers on lips and nose. It is found in lambs, tho older sheep are immune. Treatment consists of removal with a small piece of wood or rough cloth and the application of a three or four per cent solution of sheep dip or of a solution of one part nitric acid to seven parts of water. Often blue crystals of copper sulphate rubbed over affected areas will cure the trouble.

Wool Eating

Wool eating is often observed during the winter. It is commonly known as a bad habit, tho it may be caused by the lack of certain essential mineral elements in the feed. Exercise and good feed often show good results. Chronic wool eaters should be disposed of.

Goiter, or Big Neck

Lambs dead at birth or in a weakened condition, upon examination, are found to have a swelling in the throat—an enlargement of the thyroid gland. If such lambs live, they are generally unthrifty. The cause is a lack of iodine.

When the ewe is unable to get enough iodine, the normal development of the fetus is hindered. To prevent losses from goiter, one ounce of potassium iodide dissolved in water and mixed with 100 pounds of salt should be fed to breeding ewes from the beginning of the breeding season until lambing time. Block salt containing iodine may also be obtained.

Rickets, Leg Weakness

Rickets is caused by a lack of lime in the feeds and lack of exercise on the part of the ewe. Lambs may be lame and the legs crooked and fail to support the body. Cod liver oil promotes the deposit of lime and phosphates in the bones, and, in severe cases, one-third of a teaspoonful daily should be given. In other cases, nutritious feeds—alfalfa, clover, oats, and oilmeal—often correct the condition. The condition disappears with plenty of exercise and good pasture.

Navel Infection

Stiffness and swelling of hocks and knees are an effect of navel infection. The animals are dull and show little desire to nurse. Cleanliness of the lambing quarters is a means of prevention. To paint the cord or navel stump with iodine soon after birth is good practice.

Bloating

Treatment for bloating consists of immediate administration of some agent to remove the gas. One pint of newly drawn cow's milk is effective. One tablespoonful of turpentine in a pint of milk is good; likewise, one to two teaspoonfuls of baking soda in a half pint of milk. In severe cases the use of the trocar or pocket knife must be resorted to.

Parasites of Sheep

Sheep are more subject to parasites than any other kind of livestock. The parasites may be divided into two groups—external and internal. The greatest damage cause by parasites in sheep is to the growing lambs. Preventive measures should be uppermost in the minds of sheep owners. Prevention of possible infestation wth parasites means a great deal when profits are figured. Rotation of pastures and the keeping of lambs on newly seeded pasture eliminates many intestinal parasites, tho dogs may be carriers of certain forms of tapeworm.

External Parasites

Lice.—Lice live on the skin and generally in certain locations, causing an irritation, or itching. This itching leads the animal to rub against fence posts or buildings, resulting in the direct loss of wool and of body weight. In the winter little can be done, but as soon as the sheep are shorn they can be dipped in a standard dipping solution at least twice at intervals of 14 to 16 days.

Sheep ticks.—A wingless fly is found in the wool and on the skin of sheep. Sheep with coarse and medium wool are commonly infested with ticks, the fine-wooled breeds less often, probably owing to the denser wool and more oil, or yolk. The sheep tick is known as a bloodsucker, causing an irritation, loss of blood, poor nutrition, and a loss of vitality. Sheep severely infested with ticks also rub large portions of wool off their bodies. In extreme cases most of the wool is removed, and what remains is worthless from a commercial standpoint. Dipping sheep in a standard dip as recommended for lice is advised.

Scab mites.—The scab mite pricks the skin and lives on the blood serum. The area attacked soon becomes inflamed, showing a slight exudation of serum. This serum forms a scab. The prick of the mite causes scratching and rubbing, and the area becomes greatly enlarged. The wool soon shows the presence of the scab mite. If a sheepman is in doubt, a capable veterinarian should be employed, as the scab is highly contagious and must be reported to the State Livestock Sanitary Board. Sheep infected can be dipped in nicotine sulphate and lime-sulphur only, and in the presence of state officials.

Internal Parasites

Stomach worms.—Stomach worms are commonly found in the fourth, or true, stomach of sheep and in the first part of the large intestine. They are from ½ to 1¼ inches long and about the thickness of a fine pin. The presence of stomach worms is probably first manifested by

dullness and lack of thrift. The sheep may have diarrhea and in some cases show a swelling under the lower jaw, called "bottle jaw." Paleness of the skin and the lining of the eyes gives further evidence. The most noted symptom is the lack of growth and development even when properly fed.

Sheep that are found dead in the pasture should be examined for stomach worms as soon as they are found, as the worms are then most readily seen. Examine the fourth stomach and intestine for small red worms wriggling about. Part the small folds of the stomach wall and observe the worms or reddened inflammation of the wall resembling pinpoint punctures.

Copper sulphate or bluestone is the best known remedy. The formula is as follows: Dissolve ¼ pound of clear blue crystals of copper sulphate in a pint of boiling water to dissolve the crystals more readily. Then add enough cold water (soft water if obtainable) to make three gallons. This is the common one per cent solution. Use only porcelain, glass, or earthenware utensils, as the solution corrodes all metals. This solution is sufficient for 100 adult sheep, allowing for 10 per cent waste. The dosage for lambs is one ounce for each lamb under 50 pounds and two ounces for lambs over this weight; for yearling sheep, two to three ounces; mature sheep, three to four ounces, according to size. The solution can best be given with a metal syringe of two- or three-ounce capacity, tho an enamel funnel with a rubber hose attached and a metal nozzle at the end may be used, measuring each dose carefully. Long-necked drenching bottles have also been used. The sheep to be treated should be taken off both feed and water 12 to 15 hours previous to dosing and three to four hours after treatment. They should then be given a light feed and water before being driven to pasture. Do not attempt to increase the strength of the solution or great losses may occur.

It is well to remember that rough, unnecessary handling is to be avoided. The sheep should be closely confined while dosing to make the work easier, one man holding the sheep while the other does the treating. Sheep that struggle should not be dosed as the solution may get into the lungs; likewise, the head should not be elevated higher than normal carriage for the same reason. If many sheep are to be treated, the work may be somewhat simplified by using a corral and forcing the sheep to go through a chute 15 or 18 inches wide attached to a wall or fence, the doser and attendant treating the sheep as they pass through.

Treatments given every three or four weeks will insure a reasonably worm-free flock, tho in wet or rainy weather stomach worms are more prevalent.

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