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**MINNESOTA
FARMS**



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Sheep on Minnesota Farms

P. A. ANDERSON and W. E. MORRIS

SHEEP for many years have been a profitable type of livestock on many Minnesota farms. The sheep population in the state has trebled during the last 20 years and now numbers about a million and a quarter head. Sheep are adaptable to Minnesota because excellent pastures are obtainable, one basis for low-cost production, and because high quality legume roughage can be grown successfully over most of the state, a second basis for low-cost production. It is possible, with sheep, to produce a high quality market product with good hay and pasture plus a small amount of grain. In fact, many Minnesota lambs reach market as top lambs from grass without grain feeding. This can be done with no other class of livestock.

Sheep require relatively little work. They therefore fit well into a farming enterprise where labor is scarce.

Except for fencing, the outlay in equipment is low. Expensive buildings and shelters are inadvisable because of the overhead cost.

Many farmers in the state would find it profitable to add sheep to their livestock enterprises, and many existing flocks could be increased to advantage to use the surplus feed and pasture on the farm.

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 so this bulletin deals primarily with the management of the small farm flock. With plan 2 it is common practice to purchase western breeding ewes, mating these with high quality purebred rams to sire high quality market lambs. All of the lambs are sent to market, none retained for replacement. As the original flock becomes old, it is replaced with a new band from the range. Occasionally there is a tendency, however, to keep back a few ewe lambs; therefore, the type of the ram used both from a carcass and fleece standpoint is important.

Caring for the Sheep

SELECTING THE BREEDING RAM

The flock ram is a means of continually improving the lambs and thereby increasing the profits. The characteristics discussed later as essential in the ewe are still more essential in the ram. Masculine character is desired. Any sheep raiser, even though he expects to market all the lambs, should use a purebred ram of a breed suitable to the type and breeding 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-formed, higher-priced ram usually pays the largest profits on the investment.

Lambs sired by a purebred buck will weigh 10 to 15 pounds more at market age than those sired by a scrub, are easier feeders, will be ready for market at an earlier age, and will dress a higher percentage of carcass.

In selecting a ram to produce market lambs, mutton form is the first consideration. Mutton represents about two thirds and wool about one third the income from sheep. Thick, blocky, fast-maturing lambs, lambs that will reach 90 pounds in weight and at that weight carry a finish or degree of flesh that will satisfy market requirement

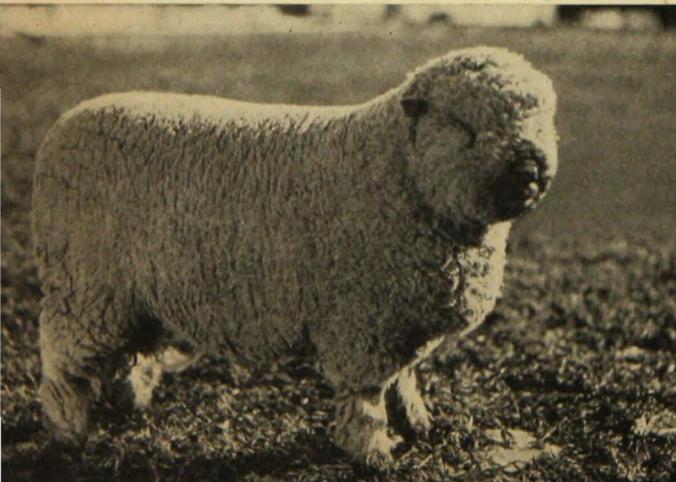
for top lambs are desirable. It must be remembered that wool is a second crop being produced. The ram eventually determines the kind of fleeces to be sold because the ram's daughters are held in the flock for breeding ewes. Therefore, the fleece of the ram should be considered. The aim with mutton breeds should be to produce $\frac{3}{8}$ and $\frac{1}{4}$ blood fleeces. Rams with fleeces that are hairy at the breech and that extend up the thighs and over the rump should not be selected. Fleeces with black fibers and very open thin fleeces should be avoided. Density is desired. Mature fleeces of this grade should be at least $2\frac{1}{2}$ inches in length.

SELECTION OF BREEDING EWES

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

1. Purchasing ewes from flocks near home.
2. Purchasing ewes at terminal markets through commission agents.
3. Buying directly or through dealers in the West—Montana, Colorado, etc.

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



Desirable Breeding Ram

This type of ram will sire good lambs.



Low-down, thick farm ewes—a good kind to select.

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—Buy ewes that have had lambs because 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 you can afford it. A few young ewes are better than a larger number of old ones.

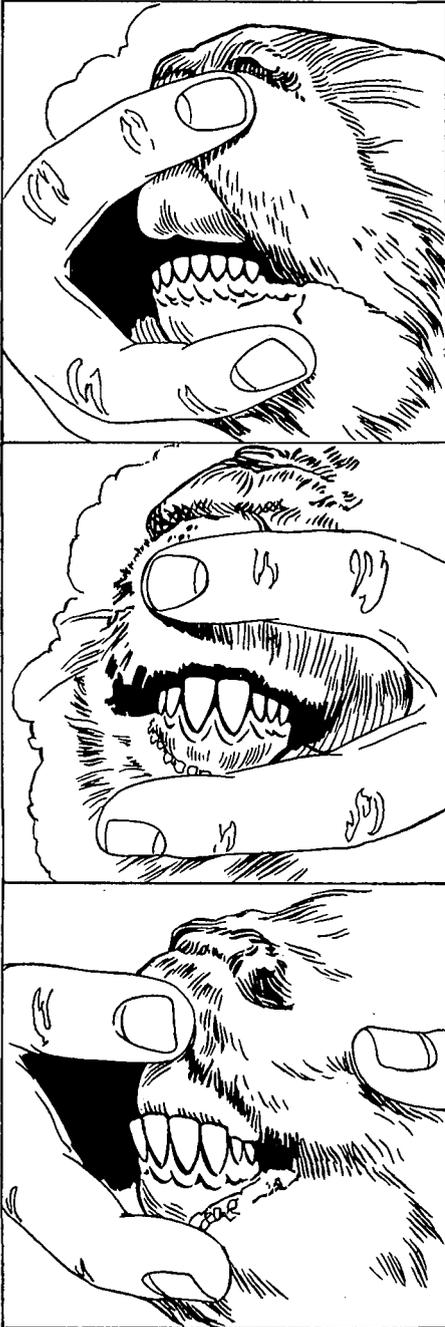
The age of sheep can be told by the front teeth of the lower jaw. A lamb has four pairs of rather narrow temporary teeth; a yearling, a center pair of broad permanent teeth and three pairs that are temporary; a two-year-old, two pairs of broad permanent teeth and two pairs that are temporary; a three-year-old, 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 referring 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 and those with thick teats that have stoppages should be avoided. 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 recognized breed. Markets are often crowded with ewes

A Sheep's Age Can Be



Top: Mouth of lamb—8 small temporary teeth.

Center: Mouth of yearling—1 pair of permanent, 3 pairs of temporary teeth.

Bottom: Mouth of 2-year old—2 pairs of permanent, 2 pairs of temporary teeth.

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.

Fleece—The importance of a good fleece can not be overestimated. In buying sheep in large numbers, fleeces cannot always be examined carefully, but ewes having hairy, loose, open fleeces should be rejected. A compact, uniform fleece is desirable from the standpoint 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. 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 it 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;

Told from Its Mouth

Top: Mouth of a 3-year old—3 pairs of permanent, 1 pair of temporary teeth.

Center: Mouth of 4-year old—4 pairs of permanent teeth.

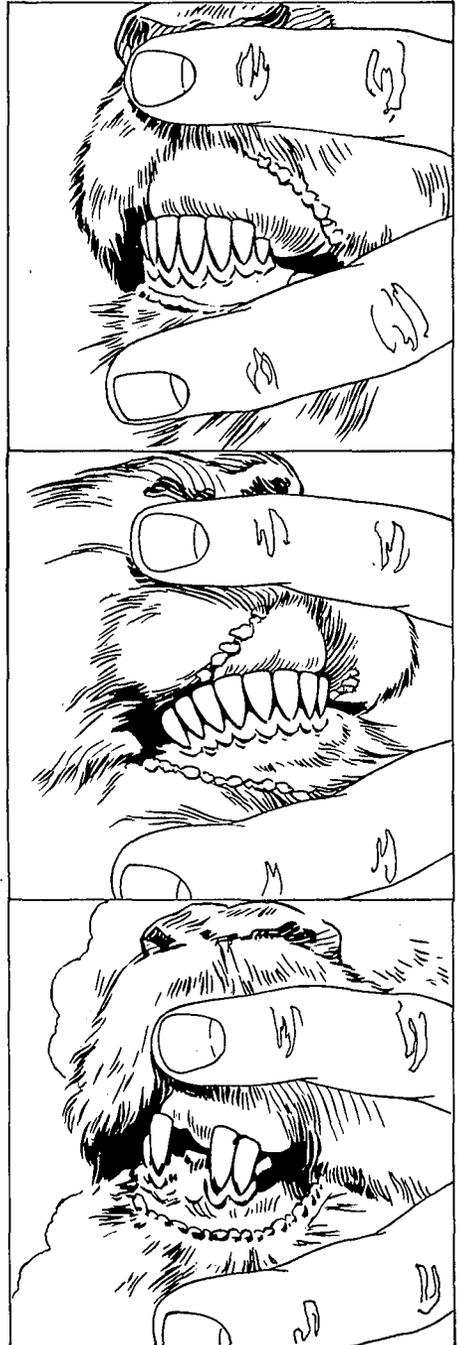
Bottom: A broken mouth.

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 in the ewes to produce lambs that are uniform in type. These will sell to greater advantage, as the flock will have a more pleasing appearance.

Native or Western Ewes

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. A few can often be found 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. Each is distinct in type, though many market lots may contain both kinds. Many prefer only white-faced ewes because of their uniformity, hardiness, and wool character. Others, however, may favor the black-faced ewes because they are larger and have superior mutton form. Natives are more generally infested with parasites because they originate on farms in the cornbelt. Among them, also, are many cull ewes that are shy breeders or have bad udders. Ewes of this class carry more weight than westerns, thus adding to the cost per head. They usually are of poor breeding, sired by poor rams of unknown ancestry.





A profitable farm flock. Good western ewes mated to purebred mutton rams produced these desirable lambs.

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 because of open-range feeding on fresh pasture. Although 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 is wanted, western ewes should be chosen.

FALL CARE OF FLOCKS

The ewes should be in good condition for breeding in the fall. About three weeks before breeding 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 possible, rape or soybeans should be seeded for pasture. Grain at the rate of $\frac{1}{2}$ to 1 pound per day can be used when green feed is

not available. The purpose is to have the ewes improving in thrift. Giving breeding ewes good feed for two or three weeks before the ram is turned with them is known as "flushing." Flushing increases the number of twins.

Ram Should Have Extra Care

The ram should receive extra care at this time to put him in the right condition. A half 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 for extra feed and rest. This insures success. Others with small flocks permit the ram to 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 up 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.

Ewe Lambs Should Not Be Bred

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

All ewes should be tagged before the breeding season, and the rear parts sheared clean because 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 taken out so that he will know 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 5 days and a new color used every 15 to 20 days. Oil paints are unsatisfactory; they cannot be removed in 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 early. Early well-grown lambs are also more resistant to stomach worms when

turned into infested pastures. March to May 1 is the time accepted for lambing by many because warmer quarters are not so necessary and farm work is not so pressing as later. Many prefer to have the ewes lamb on grass because 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 with the big runs from the west, generally at a lower price than is received for lambs marketed earlier.

WINTER FEEDING

As winter approaches, do not let the ewes get too thin. By this time the fleece is quite long, and unless the flock is carefully observed, one may 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 2 pounds of legume hay a head each day supplemented with prairie hay, oat straw, corn stover, or some cheaper roughage. From 2 to 3 pounds of corn silage, or turnips, sugar beets, or mangels a head every day increase the ration's value. Too much silage or roots, however, may result in lambs weak at birth.

If the ewes go into winter in thrifty condition and are fed a legume hay, they will not require grain until a few weeks before lambing. Beginning about one month before lambing, 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:



Exercise in winter is essential for pregnant ewes. In this case the hay is fed some distance from the buildings.

Before Lambing

- I. 1 lb. oats
3 lbs. alfalfa or clover
- II. 1 lb. oats
2 to 3 lbs. silage
2 lbs. alfalfa or clover
- III. ½ lb. oats
½ lb. corn
2 lbs. alfalfa or clover hay
or
3 lbs. prairie hay

After Lambing

- I. 1 to 2 lbs. oats
2 to 3 lbs. silage
2 to 3 lbs. hay
- II. 70 parts oats
20 parts corn
10 parts bran } 1 lb.
2 lbs. hay
3 to 4 lbs. silage or roots
- III. 60 parts oats
20 parts corn
10 parts bran
10 parts oilmeal } 1 lb.
2 to 3 lbs. silage
2 lbs. hay

The pregnant ewe must have exercise. Hay placed in racks or on the ground some distance from the barn will make the ewe walk to her feed. 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 exercise.

Water and Salt Supply Important

It is common opinion that sheep do not drink much or require much water in winter. Naturally if sheep are offered water only once a day, and that

ice-cold and in a dirty trough, they will not drink much. They will not do as well as if they have before them fresh, clean water of moderate temperature all the time. One of the most satisfactory and successful means of watering the flock is an automatic galvanized iron tank 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 salt or water from the beginning of the breeding season to lambing time. If added to the water, use 5 grains of potassium iodide per ewe every week. If added to the salt use one ounce to 100 pounds of salt. Dilute in water and sprinkle uniformly over salt and mix well. Commercial iodized salt may be used in either loose or block form.

WE 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 lambing time approaches, the ewes need close attention. The wool about the ewe's udder 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. The ewe about to lamb refuses to eat, is uneasy, and isolates herself from the other sheep. 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 mucus from nose and mouth. Rubbing the chest vigorously with the hand assists in starting respiration. The ewe should be allowed to dry the lamb because this makes for closer relationship between mother and lamb. Very weak lambs should be helped to nurse since the warm milk acts as a stimulant. The ewe should be placed on her side so that the lamb may be assisted.

Help Weak Lambs Nurse

If a lamb is unable 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 cannot step on it. A strong lamb will be up and nursing soon after birth. The navel cord should be cut about 4 inches from the belly and the remain-

ing stub dipped at once in tincture of iodine to prevent infection.

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

After lambing, the ewe should be given a small amount of hay (clover or alfalfa) and a little water. Heavy feeding should be avoided for the first few days as this may stimulate too heavy a milk flow for the lamb to take. If this happens the ewe's udder may cake, or the lamb may get too much milk and consequently scour. 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 since 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 thoroughly warmed. 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.

Handling Orphan Lambs

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 cannot be done, the orphan must be raised on the bottle. A small pop bottle with a large nipple and enlarged openings is satisfactory. Use milk from a cow that has recently freshened and give the lamb 2 or 3 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 drawn, 100 degrees F. The amount of milk should be increased to 2 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 cannot bunt

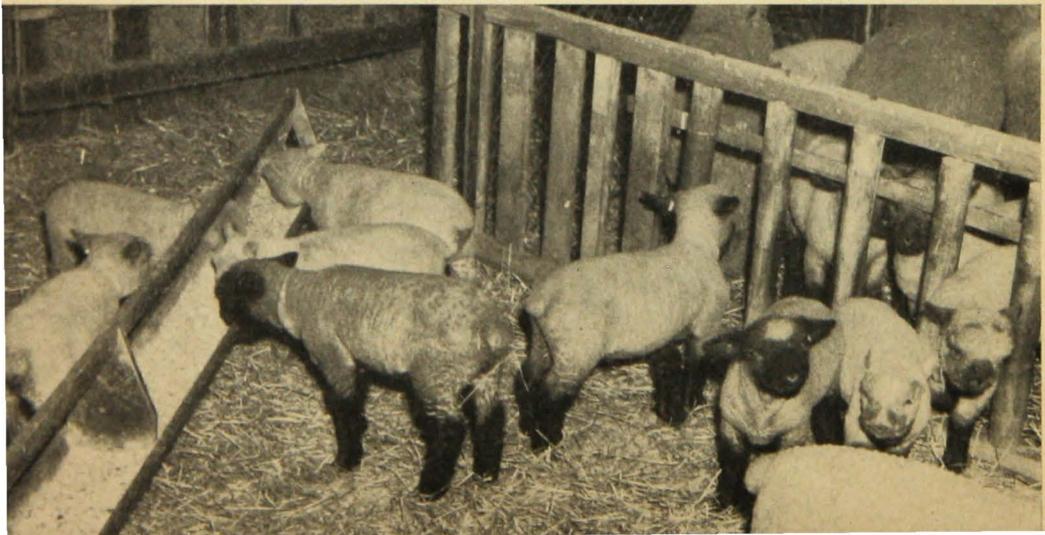
it around when it tries to nurse. Stubborn ewes often demand a lot of patience on the part of the shepherd and may have to be penned in for several days, but sooner or later they settle down and can then be released. Smearing some of the ewe's milk on the back and hips of the lamb often assists in getting 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, the ewes that have lambed may be separated 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. No more than will be cleaned up

A lamb creep provides the extra feed needed for fast growth of lambs.



should be given, 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

All lambs should be docked by the time they are 14 days old. Between the tenth and the fourteenth days is usually best. The long tail 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 pincers or docking irons heated to red heat. Very few lambs will be lost by this method if docked young. Docking with a hot iron is inadvisable in fly time as the burn wound heals slowly and prolongs the danger from maggots.

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 or castrating is most easily and most satisfactorily done when lambs are under two 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 practice 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 perform these operations and not take a discount in price on marketing. See Extension Folder 35.

SUMMER GRAZING

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, wheat, and Sudan grass.

Sufficient pasture for the months of July and August is frequently a serious problem, especially during dry seasons. Most pasture crops have a resting or mature period at this time which results in pastures being short or unpalatable. Supplementary pastures at this period will pay big returns as they can supply an abundance of feed at a time when other feed may be short. A field of rape, Sudan grass, peas, or soybeans available during this dry period will keep the lambs gaining rapidly, while otherwise they may have not gained or even lost weight. Such a supplementary pasture can mean the lambs reach market earlier and at higher weights and condition than if dependent on regular pastures. The other alternative to meet this situation of short dry pastures in midsummer is to feed grain during that period. This, however, increases the cost of production. The supplementary pastures should be an acre to about 20 sheep.

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 can live on the scattered



Supplementary pastures are needed in July and August. Sudan grass may be even more desirable than the rape pictured.

bits of grass and small weeds that usually come on after the grain is cut. Sheep can also thrive on the second growth on cut-over meadows providing they are not bordering on sloughs or stagnant water. 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.

SHADE AND SHELTER

During hot weather while sheep are on pasture, shade should always be pro-

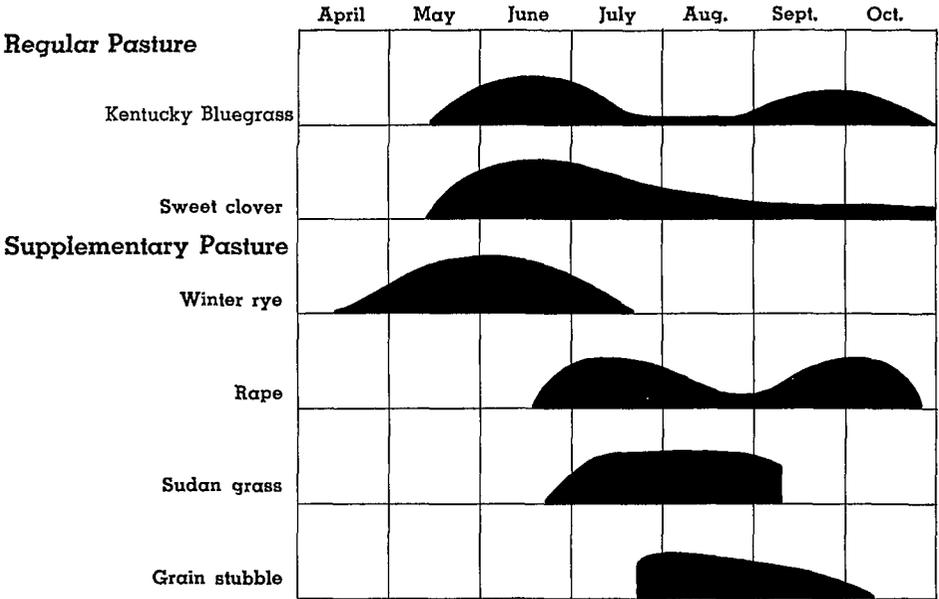
vided. Trees are good for this, but a movable shade is better because it provides a fresh bed ground free from parasites and muddy areas.

It is particularly desirable that shelter is provided against the cold rains of spring and fall, shelter that will provide a dry bed free from cold draughts.

MARKETING LAMBS

Lambs born in March or April, sired by good-sized rams of the mutton breeds and 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 up to 90 pounds. They may run with the ewes until marketed or be weaned early in July and fed grain from then until marketed. Clean abundant pastures should be provided the lambs after weaning. This plan produces fatter lambs that sell for higher prices than lambs born and marketed later. A producer of market lambs should know what degree of finish is required for top prices.

Then he is in a position to sort his



Supplementary pasture to insure seasonal supply. The shaded area for the crop indicated shows the time such pasture will be available and comparative yield.

lamb intelligently, selling those that are ready for market and holding the unfinished ones back for further fattening. This condition can be told by feel only. Age and size have no bearing on it; fatness determines when they will command top prices.

Ewes that lamb in May or June may

lamb on 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. See Extension Folder 37.

Growing and Marketing Wool

The wool clip is an important source of income in sheep production. If given proper care, the wool should help materially in paying expenses, leaving the lambs with only a moderate charge against them in addition to their feed. The climate in 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.

WOOL COVERING IMPORTANT IN SELECTING SHEEP

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, although 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. Combing is a length classification. To be classified as combing, fine wools must be over 2 inches in length, $\frac{1}{2}$ blood; $2\frac{1}{4}$ inches and $\frac{3}{8}$; and $\frac{1}{4}$ blood, $2\frac{1}{2}$ inches long. The shorter wools are classed as clothing. 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 density fairly accurately 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 were 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. Usually greater density of fleece means finer quality.

Quality—The term quality applied to wool has many 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—Wool tends 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, that is, density, uniformity, purity, and firmness, 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 and thereby provide good growth of healthy strong fibers, is by feeding legume hays as roughage—any of the clovers, alfalfa, or soybean hay. If these are not available, grain feeding

throughout the winter is necessary. With nonlegume roughage about one pound of grain like oats is needed per day for satisfactory nutrition.

EFFECT OF DIPPING

In order to control external parasites, such as ticks, lice, and scab mites, sheep must be dipped 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 dipping tank can be easily installed on most farms. These plans are available at University Farm.

Custom dipping service, however, is offered now by portable outfits in many counties at a reasonable cost and great convenience. Every sheep in the flock, including the young lambs, should be dipped. If the ewe flock is infested with ticks, the lambs are sure to become badly infested soon after the ewes are shorn and should be dipped by hand in a barrel if there is no way to dip the entire flock. If ticks are found at shearing

Sheep Dipping

Portable sheep dipping outfits make dipping easy at reasonable cost.



time, the sheep should be dipped twice, the second dipping 10 to 14 days after the first. Sheep should be handled carefully while dipping and a bright warm day selected so that the sheep may be dry by night. Soft water or well water softened with soda ash that is not too cold is preferable. 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

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 electric machine to a large multiple-unit, power-operated



Shear when fleeces are dry on a clean floor or canvas.

machine. The cost of a single-unit electric machine is so small that a farmer with only 50 to 100 sheep to shear can afford to buy one. 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. Shearing should be done on a clean floor or canvas to keep out chaff and other foreign material. Shearing wet sheep or shearing when the weather is likely to turn cool is to be avoided.

TYING AND PACKING

A fleece should not be torn to pieces in shearing. 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. The fleece should be placed with the cut surface down, the sides turned in toward the center, and rolled tightly from the breech end. It should be tied with medium-weight, four-ply, paper wool twine using just enough twine to hold it together. Wool twine can usually be obtained from any agency that deals in wool. **Binder twine must not be used.**

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 before selling or shipping, it should be sacked and then put in a clean, dry room.

FEED RACKS PROTECT WOOL

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 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 on the size of ewes; 15 inches cares for the average ewe.

Wool from the leading breeds of sheep in the United States may all be



Prepare each fleece carefully. Tie with paper wool twine.

grouped, graded, and classified reasonably accurately as indicated in the following table:

Fine Wool		
Breed	Grade	Class
American and Delaine Merino	Fine	Clothing or combing
Rambouillet	Fine and ½ blood	Clothing or combing
Medium Wool (blood)		
Southdown	½ and ¾	Clothing or combing
Shropshire	¾ and ¼	Combing
Hampshire	¾ and ¼	Combing
Oxford	¼ and low ¼	Combing
Dorset	¾ and ¼	Combing

Types and Breeds of Sheep

Many varieties of sheep have gained recognition as pure breeds, and yet most 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-wooled type and the mutton type. All pure-breeds of any importance in the United States belong to one or the other of the two general types. Generally sheep of the fine-wooled 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 important breeds of sheep found in Minnesota may be classified

as mutton and fine-wooled types as follows:

Mutton—Medium wool: Shropshire, Hampshire, Southdown, Oxford, Dorset, Cheviot.

Long wool: Cotswold, Leicester, Lincoln.

Wool—Fine wool: Merino, Rambouillet.

Characteristics of Important Breeds

Shropshire—The Shropshire ranks first in number of registered sheep in the United States. They are often referred to as the farmers' sheep because they are very well fitted 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. The 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, although small, the rams weighing 175 to 200 and the 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.

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 oint-

ment, or 10 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. The cut edges are drawn together with 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 2 to 4 tablespoonfuls of castor oil, according to age and size will be helpful; for small lambs, 1 to 2 teaspoonfuls. In severe cases an enema with lukewarm water and castile soap may be beneficial. Epsom salts are also good. Four tablespoonfuls in a pint of water may be given as a drench.

Maggots

During the fly season, sheep found squirming, twisting, and trying to bite or rub various parts of the body often are infested 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. Ether and chloroform are best, but expensive. Gasoline may be used if there are no other remedies present.

Paralysis in Pregnant Ewes

The immediate cause of this condition is unknown but is apparently due to excretions from certain organs of the body not being properly eliminated. 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 well-balanced rations containing liberal amounts of protein and calcium as found in legume hay, with plenty of exercise, will help greatly as a preventive. Exercise is extremely important.

Infection 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. Swelling may be reduced by the application of hot cloths, or massaging with camphorated oil. An excellent treatment is using pads of cotton soaked in Epsom salts dissolved in hot water—as hot as the back of the hand will bear—and applying over the entire udder and covering with a cloth. This will reduce severe inflammation. When the udder has become severely infested, 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 antiseptics will prevent further infection. Dispose of ewes with teats too large to nurse lambs.

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 grubs are deposited by the fly in the nostrils; from there they crawl to the frontal sinus and other cavities of the head. There they 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.

Sore Mouth or Warty Lip

Sore mouth, or warty lip, is characterized by ulcers on lips and nose. It is found in lambs; older sheep are immune. Treatment consists of removal with a small piece of wood or rough cloth and the application of a 3 or 4 per cent solution of sheep dip or of a solution of one part nitric acid to seven parts of water. Rubbing blue crystals of copper sulphate over affected areas often cures the trouble.

Wool Eating

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

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.

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. Commercial iodized feeding salt is also satisfactory.

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 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. Dipping the stub of the navel cord in iodine soon after birth is a good preventive.

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 caused by parasites in sheep is to the growing lambs. Preventive measures should be uppermost in the minds of sheep owners. Prevention of possible infestation with 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 although dogs may be carriers of certain forms of tape-worm.

External Parasites

In Minnesota lice, ticks, and mange mites are the principal external parasites. Irritation by lice causes loss of wool from rubbing and loss of body weight. The tick is a blood sucker, causing irritation, loss of blood, poor nutrition, reduced vitality, and frequently a material loss of wool due to rubbing. In extreme cases most of the wool might be lost. Dipping at least once a year with a standard dip is necessary for the control of these parasites.

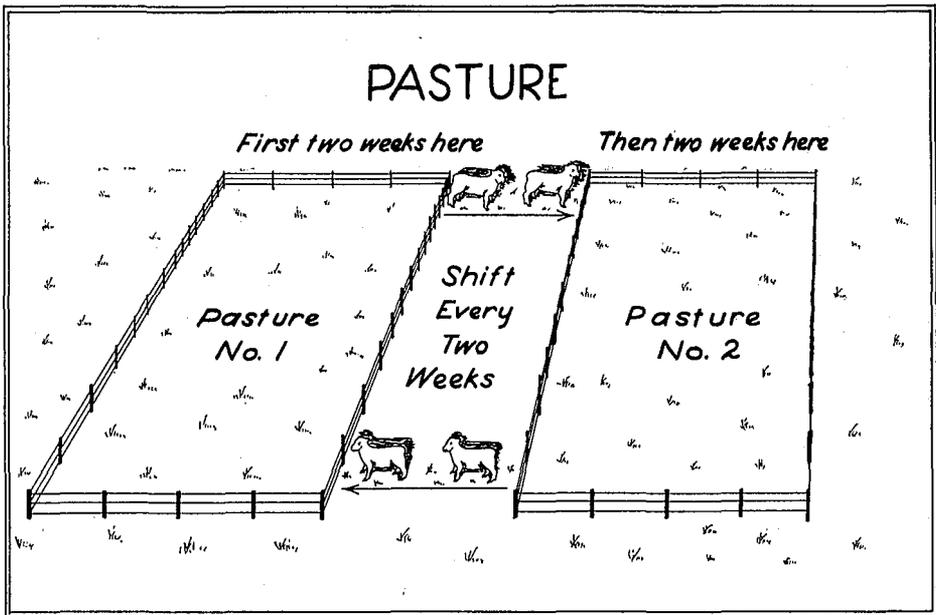
Internal Parasites

The nodular worm causes a material loss to producers as the trouble is frequently not recognized on the farm. Affected lambs make a fair growth but

do not reach a top condition of flesh which results in a low carcass yield. Packers buy lambs on the basis of yield; therefore, the price goes down on lambs that will not dress out satisfactorily. The evidence of parasite infestation is found on slaughter by badly damaged intestines with lumps or nodules sometimes completely covering the intestines. So far pasture rotation is the only control method recommended although there are promises now of certain new chemicals being effective as a treatment.

The presence of stomach worms is probably first manifested by dullness and lack of thrift. The sheep may have continuous 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. These worms are from $\frac{1}{2}$ to $1\frac{1}{4}$ inches long, about the thickness of a fine pin, and are found in the fourth stomach of the sheep.

Copper sulphate or bluestone is the best known remedy. The formula is as follows: Dissolve one-fourth 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 3 gallons. Use only porcelain, glass, or earthenware utensils because 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 2 ounces for lambs over this weight; for yearling sheep, 2 to 3 ounces; mature sheep, 3 to 4 ounces, according to size. The solution can



A recommended pasture rotation.

best be given with a metal syringe of 2- to 4-ounce capacity although an enamel funnel with a rubber hose attached and a metal nozzle at the end may be used. 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.

The addition of one ounce of nicotine sulphate to each gallon of copper sulphate is now recommended as proving more efficient for stomach worms and tapeworms. For further details see Extension folder 42.

ROTATION GRAZING PAYS

1. It reduces the number of worms picked up as many of the newly hatched worms will die on the grass while the field is not being grazed.
2. It will increase the yield of grass, as the grass is given a chance to recover while not being grazed continuously.

In any pasture system wet or boggy land should be avoided. Such pastures harbor lung worms which can be very destructive to a flock. The only control measure for them is to keep sheep away from the source of infection.

UNIVERSITY FARM, ST. PAUL, MINNESOTA

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