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AND APPLIED SCIENCE

MANHATTAN, KANSAS

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## SHEEP PRODUCTION IN KANSAS



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(4)



DORSET FALL LAMBS AND THEIR MOTHERS ON RYE PASTURE

# SHEEP PRODUCTION IN KANSAS<sup>1</sup>

H. E. REED

## 1. INTRODUCTION

During recent years there has been a renewed interest in sheep on the part of Kansas farmers. The increasing demand for lambs has had a great deal to do with the turning of farmers to sheep. The farm flock and the feeding of western lambs are the lines which are being followed.

General and specific information has been requested from the Agricultural Experiment Station to such an extent that it has been deemed advisable to present this information in bulletin form. In compiling and preparing this bulletin, the inquiries received from Kansas farmers have been checked and the subjects and phases herein presented have been stressed to the extent that the inquiries would indicate their importance.

## THE SHEEP SITUATION

The number of sheep in the United States increased steadily and rapidly after the Merino craze in the early part of the nineteenth century. Great expansion took place in the sheep industry in the range states following 1870. The eastern part of the country was paying some attention to the mutton side of the business, but in the West all development was on a wool-production basis. Following 1885 a gradual decrease, broken by a few minor increases, occurred, the low point in numbers of sheep being reached in 1920. During 1924 and 1925 slight increases were reported, due in all probability to the increasing farm flocks throughout the corn belt.

This decrease in numbers has all taken place in the face of a rapidly increasing population. Recent years have also shown a great increase in the demand for lamb. In spite of the decrease in total numbers of sheep in the United States market receipts of sheep and lambs have not shown the same marked decrease. This may be attributed to the fact that the range states and most of the corn-belt states are on a lamb-production basis. Where large bands of yearling, two-year-old, and older wethers were formerly maintained for wool production, bands of ewes are now kept and the percent of turnover is much larger. Approximately 95 percent of the sheep reaching our central markets are lambs. Apparently, then, the number marketed in any one year would depend on the size of the lamb crop and the ability of the

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**Acknowledgment.**—The author is indebted to Mr. Thomas Dean, shepherd of the station flock, for his helpful suggestions in the preparation of Section III of this bulletin.

**Note.**—R. F. Cox succeeded H. E. Reed in charge of sheep production in 1930 and is now in charge of this work.

1. Contribution No. 126 from the Department of Animal Husbandry.

sheep men to carry the lambs to a marketable age and condition.

Wool production has run pretty well hand in hand with the number of sheep, when it is considered that a large number of sheep of mutton type have replaced some of the wool-type sheep in the flocks of the country.

#### KANSAS AS A SHEEP STATE

Back in the eighties Kansas had twice as many breeding sheep as to-day, but sheep production was then on an entirely different basis than at present. At that time Kansas was a pioneer country and lacked transportation facilities. Sheep always gain prominence in new countries, because large numbers can be kept with a minimum of labor and because wool is a staple product which can be transported long distances at a cost small in proportion to its value, or can be stored with little shrinkage or deterioration.

In the eighties wool was the only product of the Kansas flocks for which there was a market. Then came the tariff manipulations which broke the wool market, and the Kansas sheep man was left "high and dry." Lamb was unknown in those days as a marketable commodity and people did not want mutton. So with the market for the only product of their flocks gone, Kansas sheep men did the logical thing and quit the sheep business.

At present an entirely different state of affairs exists. American people still refuse to eat mutton, but they have learned to like lamb.

Kansas is admirably situated in many ways with respect to the sheep industry. Kansas native spring lambs offer great opportunities. The climatic conditions are such that early lambing may be practiced without exorbitant expense for housing. January and February lambs may be marketed in May more easily than March lambs. Kansas farmers have little competition when marketing lambs in May.

The western ranges offer many opportunities for the purchase of breeding ewes and feeder lambs. Nearby markets — Kansas City, Omaha, St. Joseph, and Wichita — afford a good outlet for sheep without an excessive railroad haul. The location of the state between the range country and the river markets permits the "feeding in transit" rule of the railroads to cut freight costs considerably for the Kansas farmer and feeder. This provision allows sheep loaded in the range country, and billed to a terminal market, to be stopped at intermediate points for a six to twelve months' feeding period with but little additional cost.

Sheep fit well into farming operations as practiced in Kansas. The greater part of the work with sheep comes at a time when routine farm work is light, and sheep give the least trouble and require the least care when the farm work is the heaviest.

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### THE SHEEP MAN

Sheep are not in any sense a "get rich quick" proposition. Under present conditions they will, if handled properly, return a profit commensurate with the care and attention given them. Obviously, then, if the success or failure of a sheep proposition is going to hinge on any one factor, that factor would be the man who is handling them.

To get the greatest return from a flock it is necessary to have a knowledge of sheep, and this can be had only from experience with them. Books, bulletins and other printed matter will give the owner many ideas as a basis on which to work, but in no wise can they replace practical experience.

The beginner should not be led by tales of exorbitant profits to stock up beyond his abilities. It is much better to start with a small number and gradually grow into the sheep business. It is likely that at first he will make many mistakes. He will be better off if his mistakes affect only a few sheep rather than a larger flock.

Men who are more familiar with other classes of live stock than they are with sheep think sheep are very peculiar animals requiring peculiar methods of handling. Their peculiarities are in the majority of cases traceable to their habits and nature, which can be learned only through experience with them. When these are known the handling, care and management become simple. Regardless of the class of live stock handled, greatest success comes to those who know more than their live stock know, and sheep are no exception in this respect.

## II. TYPES AND BREEDS OF SHEEP

### TYPES OF SHEEP

**The Why of Type.**--The different types which exist today in breeds of sheep have been largely developed by specialization in the production of mutton or wool. Since they have been developed by specialization, the type which is efficient in the production of one is generally lacking in the characteristics which are essential for high production in the other. This has been brought about by the fact that selection has been made for characteristics necessary to obtain the desired end and at the sacrifice of the characteristics of the other.

**The Value of Type.**--Type is necessary to the studied selection of breeding stock. When a breeder or farmer wishes to obtain stock he knows to what use he intends to put it. Consequently he selects the type best adapted to his purpose. Type should not be confused with breeds, for there are many breeds of sheep of each type.

Two general types are recognized in sheep--the mutton type

and the fine-wool type. The mutton type has been developed to produce the most mutton in the shortest time and on the least feed. The fine-wool type has been developed to produce the most wool of the finest quality. Each type is lacking in the more important characteristics of the other, although some breeds are efficient in the production of both mutton and wool. The popu-



FIG. 1.—Mutton type (medium wool). (Champion crossbred wether, International Live Stock Exposition, Chicago, 1925. Bred and owned by Kansas Agricultural Experiment Station.)

larity and demand for either type will depend on the market offered for the product and the adaptation of either type to certain climates, countries, and conditions.

**The Mutton Type.**--The mutton type calls for the conformation that will allow the most space in which to lay on meat. This is the blocky, broad, low-set, compact type. It stands to reason that an animal of this type will develop more quickly and be thicker in the region of the high-priced cuts, which in the sheep are the back, loin, and hindquarters, than one which is the opposite in conformation.

The ideal mutton sheep has a short, broad head. A wide muzzle with large nostrils is desirable because it is an indication that the respiratory organs are able to function properly, insuring, in a measure, the health of the animal. A large placid eye denotes docility and quietness and such a sheep will fatten more readily than one which is nervous and easily frightened.

A short, thick, full neck, blending smoothly into the shoul-



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ders, is associated with the short, broad head. Mutton sheep have been bred and selected to have large full muscles productive of a large proportion of lean meat fullness in the neck indicates that there are heavy muscles back in the body.

The shoulders of a sheep furnish desirable cuts, so they should be compact on top, and smoothly and evenly covered. A



FIG. 2.—Mutton type (long wool).

depression back of the shoulders is an indication of poor chest capacity, and so the heart girth should be large, the chest wide and full, and the brisket broad, full and prominent, as all these characteristics are indicative of constitution.

The back should be strong, wide and straight, the top and underline of the animal being parallel. The width of the back is determined wholly by the spring of ribs. So to insure plenty of width to allow framework on which to lay valuable meat, the ribs should be widely sprung, and in addition be long, close together and well covered with muscle. A short coupling is necessary to give symmetry and balance to an animal of this type, and with a short loin, width and thickness of loin may be expected.

Length from hips to the dock is very desirable with the hips smooth, well covered and level, any appearance of angularity being avoided. Width of rump may be had if the width is carried from the hips to the pin bones. Drooping rumps, peaked rumps and rumps which are not level are very undesirable.

Both thigh and twist should be broad, deep and full. The legs should come out of the four corners of the body and the animal should stand squarely on them. Width between the forelegs



makes for a wider chest, and width between hind legs insures more room for the proper development of the leg of mutton.

Such a sheep as this puts both flesh and fat on quickly and smoothly. One without this type rarely does. The type herein described is merely accentuated by fattening. Breeds of both medium wool (fig. 1) and long wool (fig. 2) types have this con-



FIG. 3.—Fine-wool type (C type).

formation, varying in size, color markings and minor characteristics with the different breeds.

**The Fine-wool Type.**--In the fine-wool type wool production has been the aim of breeders. Selection has been based on fineness of fiber and heavy shearing fleeces. In conformation the fine-wool type offers quite a contrast to the mutton type. Symmetry of form is lacking in sheep of the fine-wool type, but uniformity of fleece, fineness of fiber, even distribution of yolk, and all that is concerned in desirable wool is there in quantity.

Most fine-wool sheep have heavy folds of skin or wrinkles about the body. This gives a greater growing surface for valuable wool. Some specimens, the A type, have these wrinkles over the entire body from the head to the dock, the heavier folds being about the neck. The B type has folds on the forequarters and hindquarters, and the C type has folds only on the forequarters. (Fig. 3.) Obviously the C type is the most desirable of the wool types for mutton production.

Aside from their wool proclivities, sheep of the fine-wool type are noted for their gregariousness or flocking instinct, hardness and ability to subsist on scanty fare. These qualities are desirable in the range country and without them it is doubtful wheth-

er the sheep industry as now conducted would be possible in the range states.

**Types to Which Breeds Conform.**--The types to which the common breeds of sheep conform are shown in the following chart:

Mutton type.....	Medium wool.....	Southdown--FIG. 4. Shropshire--FIG. 5. Hampshire--FIG. 6. Oxford--FIG. 7. Dorset--FIG. 8. Cheviot--FIG. 9. Suffolk.
	Long wool.....	Lincoln--FIG. 10. Cotswold--FIG. 11. Leicester--FIG. 2.
Fine-wool type .....		Ramlbouillet--FIG. 12. Merino.

### BREEDS OF SHEEP

It is not intended herein to give a history of the breeds of sheep, but merely to give their distinguishing characteristics and, in certain breeds, their adaptability to Kansas conditions.

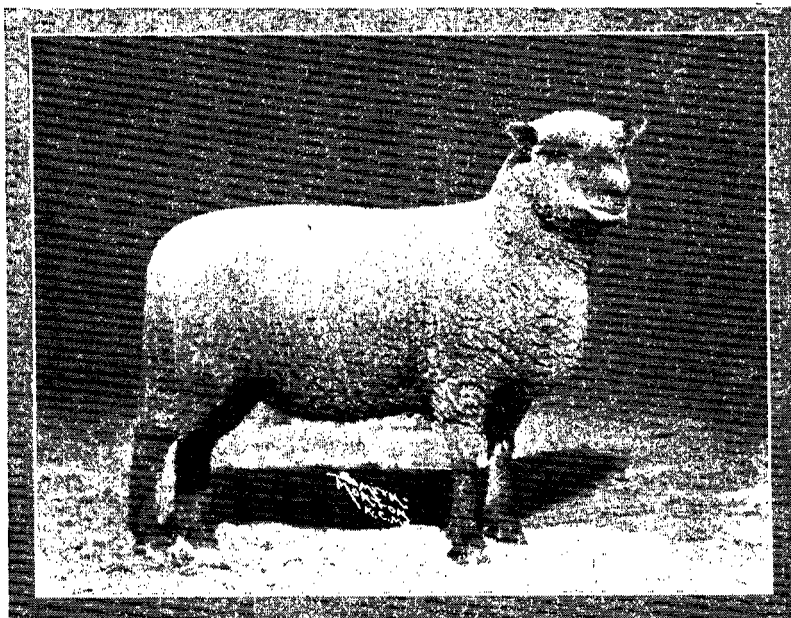


FIG. 4.—Southdown ewe. (Champion, Kansas Free Fair and Kansas State Fair, 1926. Bred and owned by Kan. Agr. Expt. Sta.)

**The Southdown.**--The Southdown breed of sheep enjoys the distinction of conforming more to the ideal mutton type than any other breed. (Fig. 4.) In size they are small, mature rams, in breeding condition seldom exceeding 200 pounds and ewes 125 to 140 pounds. The Southdown fattens more quickly than other breeds and because of the flavor, grain, and firmness of its flesh has no superior as to quality of mutton. Southdown flocks shear an average of 6 to 7 pounds of wool. Uniformity of fleece is excellent in this breed.

The color markings of the face and legs are preferably a light-brown mouse color. Breeders object to extremely light-and-dark-colored points.

In spite of its desirable characteristics the breed is not produced in large numbers. The 1930 census reports about 14,000 head for the United States.

The discrimination in favor of other breeds on the part of sheep men may be attributed to the Southdown's lack of size and light wool production. When crossed on other breeds the Southdown imparts to its offspring much of its own type, thickness of flesh, and feeding ability.

**The Shropshire.**--If a dual-purpose breed of sheep exists to-



FIG. 5.—Shropshire ram. (Champion as a lamb, Kansas Free Fair and Kansas State Fair, 1926. Bred and owned by Kan. Agr. Expt. Sta.)



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FIG. 6.—Hampshire ram. (Champion, Kansas Free Fair and Kansas State Fair, 1925 and 1926. Bred and owned by Kan. Agr. Expt. Sta.)

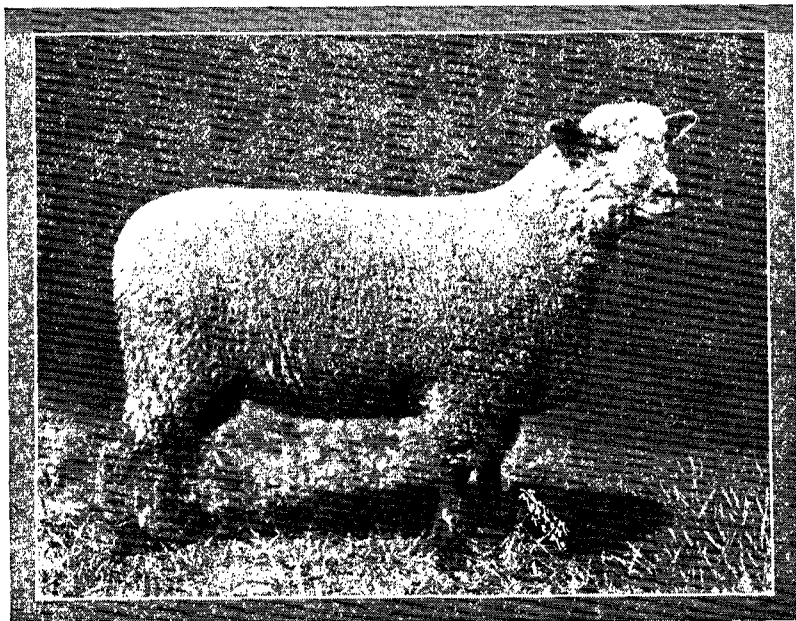


FIG. 7.—Oxford ewe.

day, one that is efficient in the production of both mutton and wool, it is the Shropshire. (Fig. 5.) The ideal Shropshire is much like the Southdown type, but is larger and has longer wool. The Shropshire ranks next to the Southdown in mutton type, and leads all medium-wool breeds, with the exception of the Oxford, in wool production. Shropshire ewes make good mothers and year a large percentage of twins.

The most distinguishing characteristics of this breed are the wool cap which extends down to the muzzle, and wool on the legs which runs down to the pasterns. The color markings of both face and legs are dark brown.

The Shropshire is the most popular breed of sheep in Kansas and one of the most popular in the United States as a whole. In recent years Shropshire men have been paying more attention to vital characteristics such as size, constitution, and vigor, and not so much to wool cap and leg covering.

**The Hampshire.**--The Hampshire of the present time is a large sheep, ranking second among the medium-wool breeds in this respect. This breed presents an attractive appearance, with its black face, ears and legs, and strong wide muzzle. (Fig. 6.)

The Hampshire, becoming in recent years more numerous than the Shropshire, has a very wide distribution and is making very rapid gains in both popularity and numbers. Its hardiness, early maturity, and thick-fleshing qualities, along with its size, make the Hampshire an admirable sheep for crossing on fine-wool ewes from the range country. The use of Hampshire rams in Kansas and the corn belt for siring lambs for the early market is becoming increasingly popular.

**The Oxford.**--The Oxford resembles the Shropshire, but is considerably larger and carries the coarseness which generally accompanies size. (Fig. 7.) The face and leg markings are brown, and it does not have the wool cap and leg covering of the typical Shropshire. The wool on the forehead grows to a sort of topknot.

The Oxford, besides being the largest of all medium-wool breeds, excels all of these breeds in quantity, but not quality production of wool. Twelve-pound fleeces may be expected from Oxford flocks.

**The Dorset.**--The Dorset is the only medium-wool breed in the United States having horns. (Fig. 8.) It is a little larger than the Shropshire in size, but does not conform to ideal mutton type as closely as the Shropshire. The distinguishing characteristics, aside from the horns, are their white faces and legs and pure-white fleeces.

Dorsets do not rank high in wool production. The ewes produce more milk than those of other breeds, and the birth of

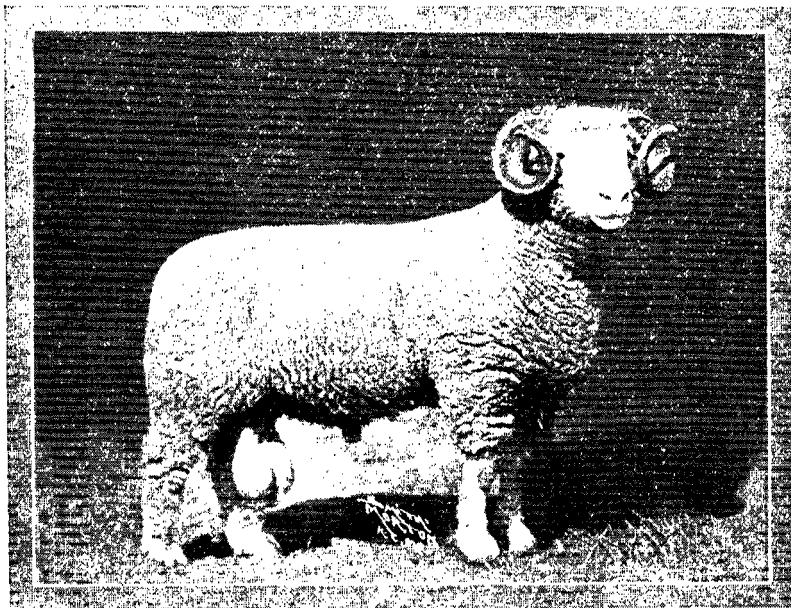


FIG. 8.—Dorset ram. (Champion as a lamb, Kansas Free Fair and Kansas State Fair, 1926. Bred and owned by Kan. Agr. Expt. Sta.)

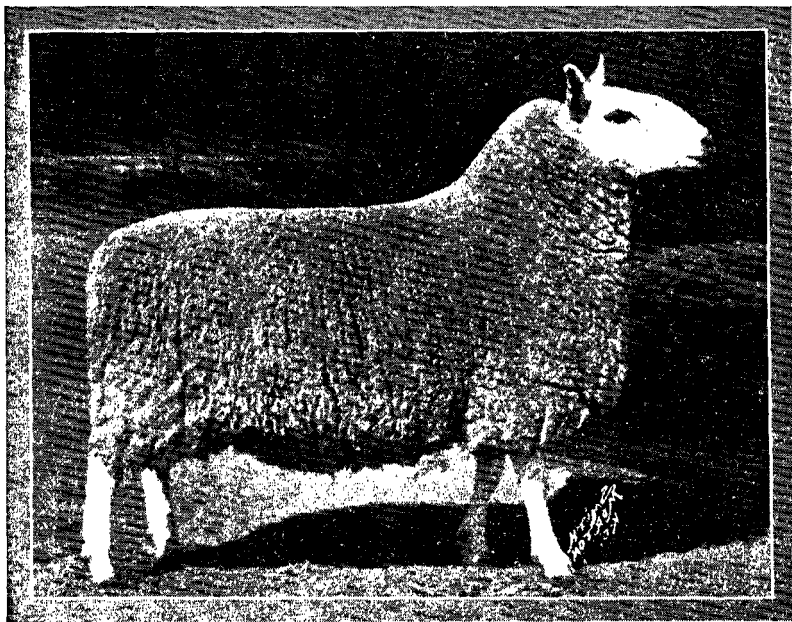


FIG. 9.—Cheviot ewe.

twins and triplets is quite common. Dorset ewes also will breed in the spring of the year to lamb in the fall, which makes them the most popular from the standpoint of producers of "hot house" lambs. They are quite hardy and for lamb production are well adapted to Kansas conditions,

**The Suffolk.**--The Suffolk breed of sheep bears a considerable resemblance to the Hampshire. They are about the same size or possibly weigh slightly less than the Hampshires, but are large of frame and appear somewhat rangy. The head of the Suffolk and the legs below the knees and hocks have no wool on them as do those of the other breeds discussed, but are covered with black hair. This, together with the high carriage of the head, makes the Suffolk a very striking appearing sheep. They shear about the same amount and quality of wool as the Hampshire. Suffolks are noted for their prolificacy, hardiness, and fast-growing characteristics. Suffolk rams crossed on fine-wool range ewes produce meaty, uniform lambs that reach market weight early and usually sell at the top of the market. This and the popularity of Suffolks for crossbreeding in the range states have been the chief factors responsible for the rapid expansion of this breed in the United States. Early lamb producers in Kan-



FIG. 10.—Lincoln ram.



sas could profitably use Suffolk rams to a greater extent than they do at present.

**The Cheviot.**--The Cheviot (fig. 9) is one of the smaller mutton breeds. They are larger of frame than the Southdown but usually weigh no more. With their head and legs covered with white hair instead of wool and their erect head and ear carriage, the Cheviot is perhaps the most beautiful breed of sheep. They are prolific and hardy, and shear a good quality of all-white wool that is in demand by woolen mill buyers. Cheviots are not numerous in the United States, although their number increased over one third between 1920 and 1930.

**The Lincoln, Cotswold and Leicester.**--The long-wool breeds have not been very popular in the United States and especially in Kansas. (Figs. 10, 11 and 2.) They are good sheep and have their place. In countries where heavy carcasses can be marketed to more advantage than American tastes will permit, they have proved profitable. In South America they are found chiefly in Canada. They have been used to some extent on the range.

The meat from long-wool breeds lacks the quality and fine grain of dark-faced medium-wool breeds. They fatten well and make good gains in the feed lot, but the carcasses are often criticized for excess fat. When crossed with fine-wool breeds this objection is removed. All long-wool breeds are noted for their thickly covered, wide, strong backs.

**The Rambouillet.**--The Rambouillet fills an important place in the sheep industry of the United States. (Fig. 12.) It is the most popular breed in the range country and the breed best adapted to range conditions. Fine-wool blood must necessarily be used on the range to maintain the flocking instinct. Besides giving this characteristic to its offspring the Rambouillet also imparts size, early maturity, hardiness, ability to subsist on the scanty fare of the range, and high wool qualities.

The Rambouillet does not compare with the medium wools in mutton qualities. Perhaps the change from a wool-production basis to a lamb-production basis in the range states will bring about great improvement in the mutton qualities of the Rambouillet.

**The Merino.**--The Merino is first and last a fine-wool sheep. Its function is the production of fine wool and it performs this function well. It has little or no claim to mutton qualities.

**The Breed for Kansas.**--As to which of these breeds is best, there is no best breed of sheep. Each breed has certain characteristics and adaptations which limit or favor its production under different conditions. Practically all market sheep are produced from grade flocks. According to the 1930 census reports

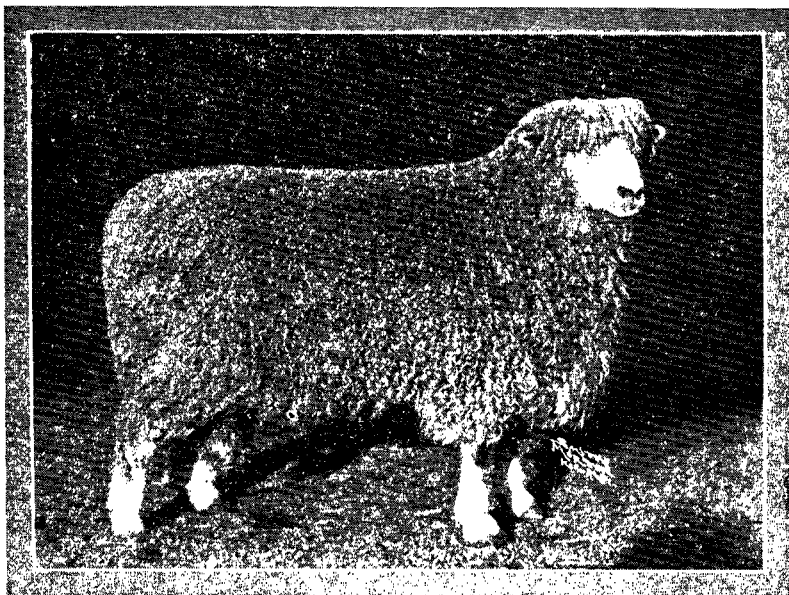


FIG. 11.—Cotswold ram.

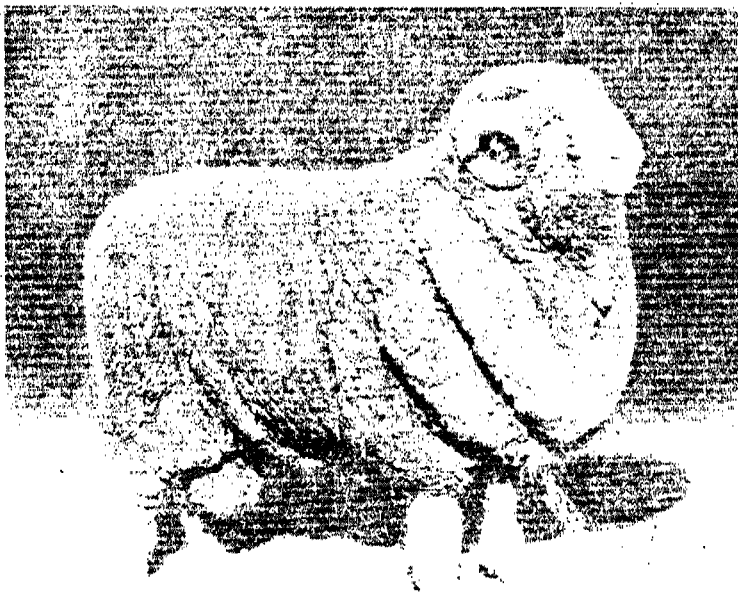


FIG. 12.—Rambouillet ram.

less than 1 percent of the sheep in the United States are pure bred. The price of pure-bred ewes of any breed would, in general, prohibit their use in the production of market lambs. Pure-bred rams should always be used for spring market lambs. Which breed is best for this purpose would depend wholly on conditions. For Kansas conditions it seems that a ram of one of the middle-wool breeds crossed on native or western ewes offers the greatest possibilities.

### III. THE FARM FLOCK

The Kansas farmer starting in the sheep business has opportunities to purchase either native or western ewes. Regardless of the kind of ewes purchased, they should be obtained early enough to permit breeding for early lambs. Lambs born before March 10 are considered as early lambs. Lambs born after that date are late lambs. Early lambing in Kansas has distinct advantages. Late lambing necessitates putting lambs on the market in competition with the great run of range lambs, as well as finishing them under adverse conditions.

#### NATIVE EWES

When good native ewes are obtainable they make a good foundation for a farm flock. In spite of the fact that most of the native ewes in Kansas carry poorer fleeces than the majority of range ewes, they have a more desirable mutton type. The greatest drawback to the purchase of native ewes for market lamb production is that if they are good, thrifty ewes, they cannot be bought so cheap as good western ewes. Quite often, when they can be purchased at a price which is reasonable, they are for sale because they are not making money for their owner. The great majority of natives, especially in the eastern part of the state, are infested with stomach worms.

#### WESTERN EWES

For Kansas conditions western ewes seem to be most advisable. (Fig. 13.) Western ewes can be obtained at a price that will permit them to be handled at a profit. Western ewes come in from the ranges comparatively free from internal parasites. The numbers of such ewes that are offered permit the purchaser to make a selection.

**Types of Western Ewes.**--The buyer will do well to select as blocky types as possible when purchasing western ewes. He need not expect ideal mutton type, for such will not be available. The different ranges have different types of ewes. For instance, the southern ranges run largely to fine-wool blood with considerable variation in size. Many ewes from Utah show a long-wool cross on fine-wool blood, resulting in quite a large

ewe. The northern range, which formerly used a similar cross, now goes in strongly for Hampshire and Suffolk rams, so that ewes from this range may be large, or fair mutton type, and still retain many of the desirable qualities of fine-wool sheep.

Loose, open fleeces on sheep, and especially on range sheep, indicate a lack of quality. Coarse, hairy fleeces are a stronger indication of a lack of breeding and feeding ability. A dense, *heavy fleece is preferable in the breeding ewe.*



FIG. 13.—Western ewes used in farm-flock experiments by Kansas Agricultural Experiment Station.



FIG. 14.—A western ewe of good type and conformation in comparison to a worn-out western ewe.

Aside from the type, quality and fleece, consideration must be given to vigor and health in selecting foundation stock. (Fig. 14.) Femininity and maternal instincts are all-important and should not be overlooked.

**Selecting Ewes.**--In selecting western ewes for a farm flock the udder and teeth will bear close inspection. Spoiled or bad udders are of no value during lambing time. The sound udder will be found soft and pliable. The bad udder will be hard or lumpy. Quite often a ewe is found with teats so large or ill-formed that when she is fresh the lamb cannot get them in its mouth. Such ewes should be avoided. When milk is found in the udder late in the summer it is, of course, a further indication of the fact that the ewe has been a good mother and has done her share toward raising her lamb. An undeveloped udder on a ewe with considerable age indicates doubtful ability to raise a lamb. Such a ewe, if found in good flesh, may be accepted as a nonbreeder. The good mothers are turning their feed into milk for their lambs and not putting fat on their backs.

Teeth should have close inspection, especially when western ewes are purchased on the central markets. A great many western ewes are sent to market because their teeth will no longer permit them to subsist on the fare of the range. (Fig. 15.) When their teeth are worn down short they still have a value as breeders, when put on the feeds of the corn belt. Broken-mouthed ewes, those with their teeth partially gone, are successfully handled by experienced sheep men on corn-belt feeds, but at best such ewes are rarely good for more than a year and must be disposed of after raising one crop of lambs. "Gummers," those with their incisors entirely gone (fig. 15, VI), are so unable to take and masticate their feed that they are useless as breeding ewes.

For the beginner it would be better to purchase a few two-, three-, or four-year-old ewes. Teeth and udders go a long way in determining the price of breeding ewes on the market. Ewes with sound mouths and sound udders will cost more money. In the long run they are the cheapest. When a bunch of breeding ewes are offered, including a number of questionable individuals, it is better to pay a premium to cull these out, buying only the sound ewes. Certainly the questionable ones should never be purchased except by the most experienced sheep men.

**Dipping Precautions.**--When ewes are purchased on the market or on the range they should be dipped before being shipped to their destination. All public yards and most range shipping points are equipped to dip sheep at a reasonable price. Such dipping vats use dips prescribed and approved by the Bureau of Animal Industry, United States Department of Agriculture, and



the dipping is very cheap insurance against ticks, lice and contagious skin diseases.

When a contagious disease develops in a certain section of the United States, the Kansas state live stock sanitary commissioner establishes a quarantine against sheep from that section. They can be admitted to the state only after compliance with the quarantine regulations.

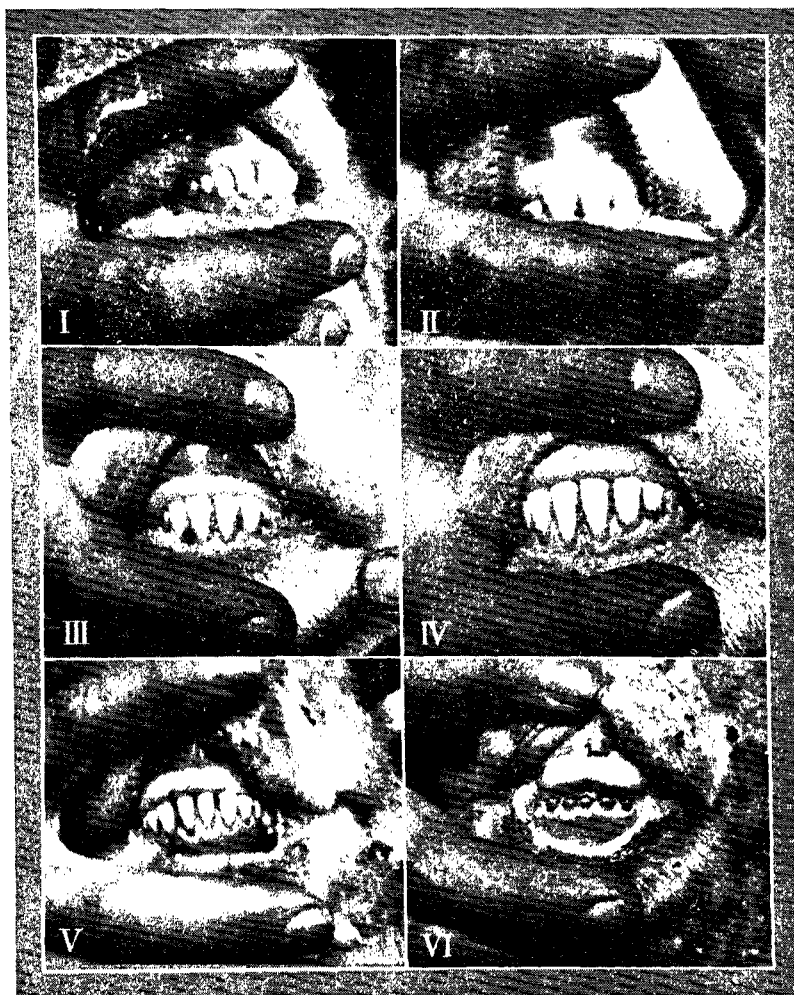


FIG. 15.—Photographs showing teeth of sheep. (I) A lamb's teeth. (II) Teeth of yearling. (III) Teeth of two-year-old. (IV) Teeth of three-year-old. (V) Teeth of four-year-old (full mouth). (VI) An old sheep's badly worn teeth.

### THE RAM

In selecting a ram for use on grade natives and western ewes a pure-bred ram of one of the mutton breeds should be obtained. Too much stress cannot be put on the qualifications of the ram. As a general rule western ewes will not have a very desirable mutton type, nor will they be uniform. Whatever the lamb possesses in the way of mutton type, natural thickness and feeding ability must come largely from its sire. Only a thick, typy, pure-bred mutton ram can be expected to so mark his lambs.

**Good Rams Versus Poor Rams.**--The accompanying pictures (figs. 16, 17 and 18), showing the contrast between good rams and poor rams and their offspring, tell the story and show the advantages of a good sire. The lambs sired by the good rams had the type desired by buyers. They also had the ability to handle their feed so that they went to market at approximately three months of age, weighing 72 pounds. On the other hand, the lambs sired by the poor rams had an undesirable type similar to that of their sires. They required a year's feeding before reaching a marketable finish and a weight of 85 pounds. The mothers of these lambs were from the same band of Utah ewes as the mothers of the good lambs.

**Where and How to Get Good Rams.**--A poor grade of rams can be purchased on the central markets for a few cents a pound. Usually they are for sale because they are sterile, or siring a poor kind of lamb, or at least because some one else does not want them. No matter how little they cost they are the most expensive in the long run.

Good pure-bred rams can be obtained from reputable breeders. They are, as a rule, sold guaranteed as breeders, and a satisfactory settlement is made when they prove otherwise. The man who wishes to buy such a ram should place his order early, because the breeder who produces a desirable kind and guarantees them is generally sold out of serviceable rams long before the breeding season opens. Too often the producer of market lambs waits until the last moment before purchasing, and then has to take whatever is left and whatever he can find.

The objection of most farmers to early purchasing of the ram is that they have no place to put him except with the ewes. Breeders will hold rams until they are needed if the purchaser so desires. If a ram is to be shipped from a different climate or placed under widely different conditions it is a good plan to get him two or three months before the breeding season, so that he may become thoroughly accustomed to the change before the season opens.

**Age of Rams to Use.**--Yearlings are preferable when it is necessary to buy a ram. They are usually more vigorous and can





FIG. 16.—Good rams. (I) Side view, showing mutton type necessary in the sire of market lambs. (II) Front view, showing strong head and prominent forequarters indicative of masculinity and constitution. (III) Rear view, showing wide, thick loins, and deep, full legs, insuring natural thickness in offspring.



FIG. 17.—Poor rams. (I) Side view, showing leggy, shallow bodies. (II) Front view, showing long, narrow faces and pinched chests, indicating a lack of masculinity and vigor. (III) Rear view, showing a decided lack of development in the hind quarters.

be used for a longer time. Tried rams are desirable and can often be purchased at a bargain. As a rule ram lambs should never be used for service. In certain sections of the United States Hampshire ram lambs are used with considerable success. This will not hold true under Kansas conditions. Many



FIG. 18.—(I) Lambs sired by good rams. (II) Lambs sired by poor rams.

breeders refuse to sell ram lambs because they do not feel that they can be guaranteed to do satisfactory service. Excessive service will retard the lamb's growth. His lambs will be small and weak, and it is very likely that many ewes will not settle to the first service.

A ram over one year of age, when handled properly, should be able to serve 50 ewes.

#### CARE OF THE FLOCK

**When to Get Ewes.**--When ewes are purchased it is a good plan to get them as early as possible in August. This will give



the owner plenty of time to get them in shape for the breeding season.

**Insuring Health.**--Where any symptoms of stomach worms are present the ewes should be drenched and rid of these parasites before they are bred, so that their strength may be used in nourishing their lambs. Drenching pregnant ewes is not a safe practice. If ticks or lice are found the ewes should be dipped and sanitary measures taken to prevent a recurrence of them. If an inspection of the udders shows that they still have milk in them the ewes should be dried up as soon as possible. Shortly after a rain, or when the ewes have been running in mud, is a good time to go over them and trim their feet. (Fig. 19.) This will do away with the necessity of too much handling after the ewes become pregnant.



FIG. 19.—Feet showing a condition brought about by neglect.

**Flushing.**--Flushing, or having the ewe gaining in flesh at the time she is bred, is considered an excellent practice by most shepherds. If a ewe is gaining in flesh, her organs, and especially her reproductive organs, are functioning normally, ovulation will be normal, more healthy eggs will be thrown off, and the possibility of the ewe producing twins, or at least thrifty lambs, will be greater. In all probability she will come in heat earlier and be more likely to settle to the first service of the ram. This will result in a more uniform lambing date and more uniform lambs at marketing time.

Flushing may be done by supplying new pasture for the ewes ten days to two weeks prior to breeding. When new pasture is not available flushing may be brought about by increasing the feed, adding good hay or a small amount of grain to the ration.

**Breeding Season.**--In Kansas ewes generally start coming in heat early in September. The first cool nights which usually occur at this time seem to be conducive to heat. Some ewes will come in heat in August, but they are few in number. More uniformity may be had if the rams are not turned with the ewes until September 1. Ewes kept in the hills or on high ground where the nights are cooler will breed earlier than those kept on low places.



FIG. 20.—A ewe properly trimmed for the breeding season.

The duration of pregnancy or gestation period in a ewe ranges from 145 to 155 days, approximately five months. February lambs therefore may be expected from September breeding. A ewe will remain in heat 2 days, and the period between heats varies from 16 to 18 days.

**Trimming Ewes Preparatory to Breeding.**--Before the ram is let to the ewes it is a good plan to shear all wool and tags away from the dock and vaginal opening, so that there will be nothing to prevent the ram from serving the ewe. (Fig. 20.)

**Trimming the Ram.**--The wool should also be trimmed from around the sheath of the ram. Where severe weather does not set in until late in the fall the flock ram may be entirely shorn in early August, even though previously shorn in the spring. He will keep cooler and be more vigorous without his wool. Rams of those breeds which are heavily wooled about the head should have the wool sheared away from their eyes, so that there will be no difficulty about their sight.

**Marking the Ewes.**--In order to know which ewes have been bred and also the date on which they were served the ram may be painted on the brisket. By this means the ewes which have been served can be easily seen. The color of paint can be changed each 18 days and those ewes which come in heat again can be found. Ordinary paint is objectionable on wool because it cannot be easily scoured, and wool paint dries too rapidly to be used for this purpose. Lamp black, Venetian red, or other colored paint powders can be mixed with lubricating oil and satisfactorily used. Marks from these materials will have disappeared from the ewes by shearing time.

**Handling the Ram.**--In warm weather it is advisable to run the ram with the ewes only at night. By doing this the ram will be fresher when turned out and will not have to stand the heat of the day with the flock. When kept away from the flock during the day he can be fed nutritious feeds which would be too expensive for the entire flock. Some breeders find it advisable, especially when the flock is small, to turn the ram out with the ewes for only two or three hours in the cool of the evening.

**Feeding the Ram.**--For a few weeks prior to and during the breeding season the ram should be fed nutritious feeds. Oats is the best single grain for the ram. Where oats is not available, as is the case in many parts of Kansas, a suitable mixture can be made of corn 6 parts, bran 3 parts, and linseed oil meal 1 part, by bulk. The ram should receive from 1 to 2 pounds of this grain ration daily, the amount depending on his size and condition. When the ram is quite thin the proportion of corn in the ration

should be increased. The grain sorghums may be used in place of corn.

In addition to the grain the ram should be allowed about 2 pounds of good hay, preferably alfalfa. Where possible he should have access to pasture.

During other than the breeding season every care should be taken to prevent the flock ram from getting fat. There is nothing that impairs the ram's breeding ability so much as excessive fat.

During the off season, except during the coldest part of winter, the ram can be kept in condition on pasture or forage. During severe spells in winter it is advisable to give him some grain.

**Exercise for the Ram.**--The ram should never be closely confined for long periods. He needs exercise to keep in good condition. It is better to let him run with the ewes throughout the year than to confine him.

#### FEEDING THE EWE FLOCK

**Considerations in Feeding.**--In choosing a method of feeding the ewe flock, one should first stop to consider why the ewe is being fed. The pregnant ewe should be fed for a threefold purpose.

First, she must maintain her own life. It will naturally require some feed to keep her vital organs functioning properly.

Second, she must have feed to permit her to nourish and develop the unborn lamb. Feed in excess of that required to meet her own needs will be utilized in the development of the lamb. If the feeds given the ewe are not the kind she should have to nourish the fetus properly, her own reserve will be drawn on. In such a case she will go into lambing time in a weakened condition and be unable to do a good job of mothering the lamb.

When a lamb is born it consists mostly of muscle and bone and virtually no fat. Muscle and bone are made up largely of protein. So the pregnant ewe requires a relatively large percentage of protein in her feed if her lamb is to be properly developed at birth. When leguminous hays make up the greater part of her roughage she is able to obtain the necessary protein. When she is fed on carbonaceous roughages it is advisable to add linseed oil meal or cottonseed meal to her ration.

Third, the ewe should be fed for wool production. When a ewe is given only enough feed for her own needs and the development of the lamb, she will use part of it in growing a crop of wool. If strong, healthy lambs are had the ewe must have sufficient feed in addition to that required for herself and lamb to grow a crop of wool. Wool also requires protein, as it is of a nitrogenous nature, and a profitable crop of wool cannot be grown without protein. Any feed given the ewe in excess of



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these requirements will be used in laying on a reserve of flesh upon which she can draw later while suckling her lamb.

Many farmers desire to utilize as much coarse feed and roughage as possible in feeding ewes during the winter months. When ewes are fed only on cheap, coarse roughages they may have to eat so much to get the required nutrients that the overloading of their stomachs will have a bad effect on the unborn lamb. In some cases this may even cause abortion.

**Feeding During Pregnancy.**--After a ewe is bred, unless she is very thin,  $\frac{1}{2}$  pound of grain each day will be sufficient. An excellent grain ration for pregnant ewes is half corn and half oats. Any of the grain sorghums may replace the corn.

When alfalfa or other leguminous hays are fed a protein supplement is not necessary. When leguminous hays are not fed the addition of  $\frac{1}{4}$  to  $\frac{1}{3}$  of a pound of linseed oil meal will improve the ration.

Silage is a cheap succulent feed and may be used efficiently in feeding ewes so long as it is not moldy or frozen. It is not advisable to feed a ewe silage in excess of 3 pounds each day. Silage cannot be depended on for the entire roughage part of the ration. Dry roughage is necessary.

**Feeding During Lambing Time.**--Several days before a ewe lambs the feeding of bran will prove beneficial. Bran is a laxative feed and will "cool her out" and help put her system in good condition before lambing. For 16 hours after lambing the ewe does not need feed. Ewes showing evidence of being heavy milkers should have their feed reduced. In some cases it is advisable not to feed grain for a few days after lambing to avoid udder troubles.

**Feeding During the Suckling Period.**--After the lamb is born a ewe should be fed with the idea of furnishing milk for the lamb. She should not be fed large quantities immediately following lambing, as the small lamb cannot handle a great deal of milk. As the lamb grows and increases in size the milk flow should also increase.

The practice of fattening the ewes while they are nursing the lambs, with the idea of selling them as fat ewes immediately after weaning, is a very expensive procedure and seldom pays. A ewe cannot make economical gains if she is suckling a lamb. If she is a good mother and cares for her lamb as she should the greater part of her feed goes to making milk for her lamb. The low price that is paid for fat ewes makes it impossible for suckling ewes to show a profit when fattened. When it is desired to sell ewes after they have weaned their lambs it is better to feed them for milk production and take a loss on the sale price rather than the greater loss which will come from the great quantity of

feed required to make gains on such ewes. Furthermore, fattening rations are not conducive to high milk production.

**Feeding Ewes When Dry.**--After weaning the lamb the ewe may be expected to do well on pasture alone. For a short time scant pasture would be preferable to a rank growth as it will aid in drying up the ewe.

**Exercise.**--The cheap coarse roughages, such as cornstalks, kafir butts, and shredded fodder, have some value for feeding ewes. The value is not due so much to the nutrients contained in them as to their use in making ewes take exercise. Well-fed pregnant ewes are likely to get fat and lazy if they are not made to take exercise. Ewes seem to enjoy picking around, even when sufficient feed is given them. Roughages may be spread over the field, and the ewes will get the right kind of exercise in picking over this feed. Should they get lazy and refuse to pick around, the rest of their feed may be cut down or it, too, may be spread in the field. At the Agricultural Experiment Station kafir butts are spread out for the pregnant ewes. They will strip the stalk of all leaves and foliage.

During heavy snows (fig. 21) paths may be made in the lots and field with a snow plow. The roughages can be spread along the paths and the ewes forced to get their exercise without floundering through the deep snow.

Many sheep men find it advisable to do the greater part of their feeding at a considerable distance from the barn. Such a practice insures exercise and keeps the ewes in good physical condition. One prominent breeder makes his ewes go three-quarters of a mile twice daily for their feed.

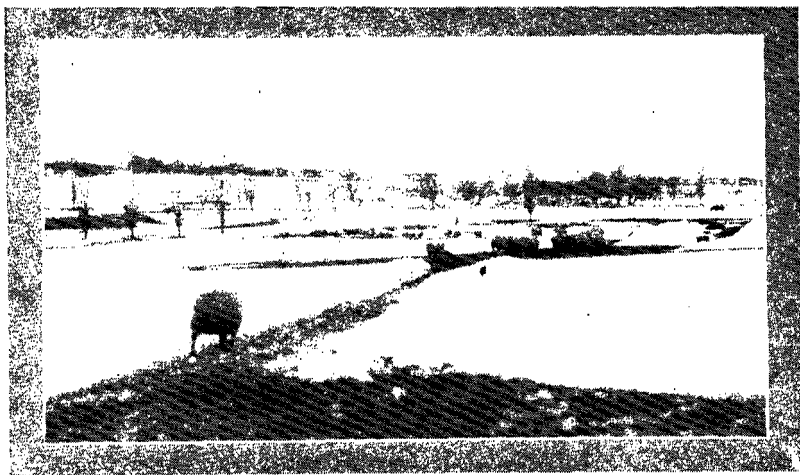


FIG. 21.—Snow paths for feeding roughage and insuring exercise.

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Exercise, even though essential in keeping ewes in condition, should never be violent. Straining of any kind may cause the ewe to lose her lamb. Hence, the ewes should not be made to go through deep snows or mud. Neither should they be permitted to crowd through narrow doors and gates, nor to jump over high door sills while heavy with lamb.

**Water.**--It is desirable to have clean fresh water available at all times. Pregnant ewes nearing lambing time should not be made to drink icy water on account of the danger of chilling the fetus. Ewes are feverish at lambing time and attention to the water supply is important. They should not be permitted to fill up on a large quantity of water before or shortly after lambing. It is better to give them small quantities at frequent intervals. Extremely cold water is detrimental as it will tend to chill both the ewe and lamb.

**Suggested Rations.**--The following rations are suggested for ewes in various conditions as indicated :

### For Pregnant Ewes

1. Alfalfa hay, clover hay, or sweet clover hay. Young healthy ewes will gain and give birth to strong lambs on alfalfa or sweet clover hay alone. The amount fed to them should be governed by the condition of the ewe. Pregnant ewes should not be permitted to get overfat. Old ewes and thin ewes should have grain in addition to the hay.

2. Alfalfa, clover, or sweet clover hay, 2 pounds daily. Pasture or run of cornstalks.

3. Grain,  $\frac{1}{2}$  pound. Alfalfa, clover, or sweet clover hay,  $1\frac{1}{2}$  pounds. Pasture or run of cornstalks.

4. Grain,  $\frac{1}{2}$  pound; alfalfa hay, 1 pound; silage, 3 pounds.

5. Cottonseed meal or linseed oil meal,  $\frac{1}{3}$  pound; alfalfa hay, 1 pound; silage, 3 pounds.

6. Cottonseed meal,  $\frac{1}{3}$  pound; cane hay,  $1\frac{1}{2}$  pounds; silage,  $2\frac{1}{2}$  pounds; ground limestone,  $\frac{1}{2}$  ounce.

Any of the following grain mixtures will suffice: Oats 50 parts, corn 50 parts; or corn 60 parts, bran 30 parts, linseed oil meal 10 parts; or corn 50 parts, linseed oil meal 10 parts.

### For Ewes Suckling Lambs

1. Grain, 1 pound up, depending on the condition of the ewe and lamb she is suckling; hay, 2 pounds; silage, 3 pounds.

2. Grain, 1 pound up, depending on condition of the ewe and lamb she is suckling; hay, 1 pound; and pasture.

When pasture is available the silage may be taken from the ration. When suckling ewes are turned on pasture it is advisable to continue the feeding of hay and grain. When the pasture becomes plentiful enough to furnish sufficient roughage for the

ewes, they, of their own accord, will quit eating the hay. When lambs are to be crowded for market the ewes should have grain as long as they are nursing the lambs.

**For Dry Ewes**

1. Pasture alone. Scant pasture is preferable until the ewes are dry.

**LAMBING TIME**

**Precautions.**--Lambing time is the most critical time in the life of both the ewe and the lamb. Obviously it is a time when negligence will materially decrease profits. It may be possible for the shepherd to be careless in other seasons of the year and still "get by" after a fashion, but lambing time will not permit indifference in any way if a profitable crop of lambs is to be secured.

If the ewes have been cared for properly during their period of pregnancy, if they have been fed with the idea of nourishing the fetus and at the same time permitted to lay on a reserve of flesh to give them strength during labor and upon which to draw while suckling the lamb, if they have had enough of the proper kind of exercise to insure their being in a healthy condition, and if a strong, robust ram has been used, the shepherd may view the approach of lambing time with few misgivings. If these essentials have been overlooked trouble may be expected.

**Symptoms.**--Ewes about to lamb will sink away on each side of the rump and in front of the hips. The vulva will enlarge and take on a swollen appearance. Wax will form on the end of the teats, and milk can be drawn from them. As the time more nearly approaches, uneasiness and nervousness will be evident.

**Assisting the Ewe.**--Ewes in a thrifty condition will require little or no help during lambing. It is best not to assist them unless it is absolutely necessary.

**Cleanliness.**--Before attempting to assist a ewe the shepherd should wash his hands thoroughly and disinfect them in some mild solution. A mineral oil also carrying an antiseptic should be smeared on the hands to make it easier to insert the hand in the ewe. Where the case requires assistance the cause of the trouble should first be ascertained and help rendered on that basis. If the presentation is not normal the lamb should be pushed back into the uterus and its position readjusted.

**Presentations.**--The normal presentation of a lamb is with its forefeet coming together and with the nose resting on or lying between the forelegs. When difficulty is encountered from such a presentation it is usually due to the head or shoulders being too large to pass easily through the pelvic passageway. Help may be given by pulling outward and downward. Smear-

ing oil or grease on the vagina will facilitate the delivery. Every care should be taken not to tear or bruise the ewe.

One should never attempt to pull on a lamb until he is aware of the lamb's position. Both forelegs may be coming apparently normally, but the head may be turned back. The head and one foreleg may be presented with one leg folded back. The head may be presented with both legs back. The lamb may be in such an unusual position in the uterus that delivery is impossible until the lamb has been straightened. Lambs may be delivered without trouble, hindfeet first.

When pressure from labor has been so great that it is difficult to put the lamb back in the uterus for readjustment, the operation may be made easier if the ewe's hind parts are raised higher than her forequarters. When this is done the lamb can be pushed back into the uterus.

Operators with small hands have an advantage over those with large hands. Experience is the most valuable teacher in cases of this kind.

**Removing membranes.**--No one should try to pull the fetal membranes or afterbirth from the ewe after the lamb is born. In doing so they may be broken, or parts of them retained. The ewe should be allowed to throw them off herself.

When the ewe does not clean herself readily or bleeds, or has a bad odor from her uterus, it is advisable to flush her with a mild disinfectant. A salt solution made by dissolving one teaspoonful of salt in a quart of water which has been boiled and then cooled is very good for this purpose. A rubber tubing may be inserted into the uterus and the solution poured in a funnel in the other end of the tubing. When the solution does not go down, slowly raising and lowering the funnel will cause it to do so. When the ewe has been flushed out a few times any of the placenta or membranes which she has retained will usually be discharged.

**Helping the Lamb.**--After the lamb has been delivered any membranes which are about the head and nostrils should be removed. The fingers can be slipped into the lamb's mouth and any mucus found there removed. If the ewe is not completely exhausted from her labor the lamb should be placed at her head. She will lick the lamb dry and it will soon be ready to nurse.

**Lambing Pens.**--Ewes and lambs should, if possible, be placed in lambing pens immediately after lambing. These pens can be easily made with two panels or hurdles. Two panels, 4 feet long, hinged together and placed in a corner make an excellent pen. The pen makes it possible to avoid any disturbance from the rest of the flock and the possibility of the lamb getting away from its mother and being disowned.

**Chilled Lambs.**--In extremely cold weather it may be advisable to help the ewe dry the lamb and start circulation by rubbing the lamb with warm cloths. Chilling may be avoided by wrapping the lamb in a warmed burlap sack before placing it at the ewe's head. A chilled lamb should be taken to a warm room and thoroughly warmed before returning it to the ewe. Lambs should not be kept from the ewe for long periods, as the ewes are apt to disown their lambs. An old blanket thrown over the lambing pen will help keep in warmth when a ewe is going to lamb on a very cold night.

**Nursing the Lamb.**--A strong lamb will nurse without help, but weak lambs may require assistance for the first few times. It is essential that the lamb get the colostrum or first milk of the ewe. This colostrum is laxative and is necessary to clean the lamb of the fecal matter accumulated during its fetal life. When a ewe dies before the lamb can get the colostrum, the lamb must have castor oil if it is to be saved.

**"Pinning."**--The first feces that come from the lamb are quite sticky. They will stick to the lamb and become hard so that it will be impossible for further movement to take place. These may be removed and no more trouble expected from this source.

**Sore Eyes.**--Little lambs are often bothered with sore and



Fig. 22.--A dead lamb's pelt on an orphan lamb.



irritated eyes. A saturated solution of boric acid may be dropped into the eyes twice daily. A 10 percent solution of argyrol is more effective but also more expensive.

Sometimes the eyelid on little lambs is turned under, resulting in irritation. Some authorities recommend sewing the eyelid back. When such cases are found at this station the eyelid is held in place with the fingers and adhesive tape put on so that it will remain in place. In a couple of days the eyelid will stay in place without the tape.

**Crooked Legs.**--Sometimes lambs are so weak in the legs that their pasterns will not be straight. Splints can be bandaged on, using cotton between the splints and legs to prevent stopping the circulation. In a few days the legs will straighten up so that the splints will be unnecessary.

**Navel Troubles.**--Lambs are not so subject to navel infection at birth as other young animals. To avoid infection the navel cord may be painted with iodine.

**Orphan Lambs.**--One of the troubles of shepherds at lambing time is orphan and disowned lambs. Disowned lambs may be expected from ewes which do not have milk for their lambs and from ewes whose lambs get away from them for long periods shortly after birth. *Since ewes recognize their lambs only by*



FIG. 23.—Feeding time for the orphan.



smell, part of this can be overcome by sprinkling some of the mother's milk on the lamb) and some on the ewe's nose.

Persistent and patient effort on the part of the shepherd will enable him to make a ewe which has lost her lamb mother another lamb. When a lamb dies its pelt may be removed and placed on an orphan, twin, or other lamb which it is desired that the ewe adopt, and she will often accept it as her own. (Fig. 22.) The pelt should not be left on the lamb for a long time, due to the danger of infection.

At the Kansas Agricultural Experiment Station a very heavy-milking Dorset ewe and a Southdown ewe each had twins within five minutes. The Southdown was old, thin, and sick, and had no milk for her lambs. Because of her breeding and the breeding of her lambs it was desirable to save them. Consequently the Southdown lambs were rolled and soaked in the afterbirth of the Dorset. The Dorset accepted them as her own and mothered the four lambs for several days until other fresh ewes could be found to care for the Southdowns.

Orphan lambs can be raised on cow's milk successfully. (Fig. 23.) Even though ewe's milk differs in composition from cow's milk, the latter needs no alteration. Cow's milk should be warmed to body temperature and given in small amounts but often. Sometimes it is advisable to add a small amount of lime water to the milk to sweeten the lamb's stomach. The bottles and nipples should be kept clean or digestive troubles will result.

#### FEEDING LAMBS

**Milk.**--Ewe's milk is the best feed that can be provided for lambs. However, lambs cannot be made ready for the early market on milk alone. It will require additional feed.

**Creeps.**--Little lambs will start nibbling at feed by the time they are two or three weeks old. The most satisfactory way to feed them is to provide a creep. A creep can be provided cheaply and easily by nailing some slats, preferably one by fours, on horizontal two by fours. (Fig. 24.) The slats should be spaced so that the lambs may enter the creep but their mothers cannot. The creep should be placed close to where the ewes are fed. Little lambs do not like to get too far away from their mothers. Neither do their mothers like to have them too far away. When the creep is some distance from where the ewes are fed lambs are longer in finding the feed and do not eat it readily.

**Grain.**--Grain for lambs up to eight weeks of age should be ground, after which whole grain will suffice. A mixture of ground corn, ground oats, and bran is a good feed to start little lambs. The corn may be gradually increased and the oats and bran eliminated if the lambs are intended for market. Corn 6 parts, linseed oil meal 1 part, is a very good grain ration for

fattening little lambs. The grain sorghums or ground barley may be used in place of the corn.

**Hay.**--The lambs will eat a great deal of hay, and it should be kept before them in the creep at all times. Leafy leguminous hays are best for this purpose. Fourth and fifth cuttings of alfalfa make excellent hay for little lambs.

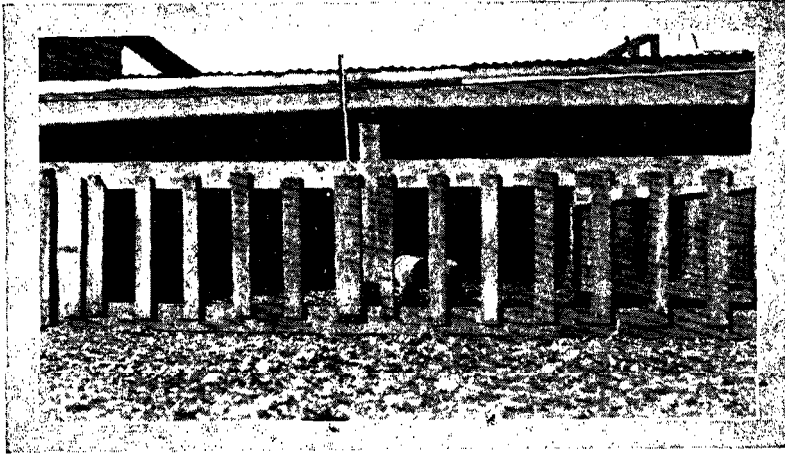


FIG. 24.—A satisfactory lamb creep.

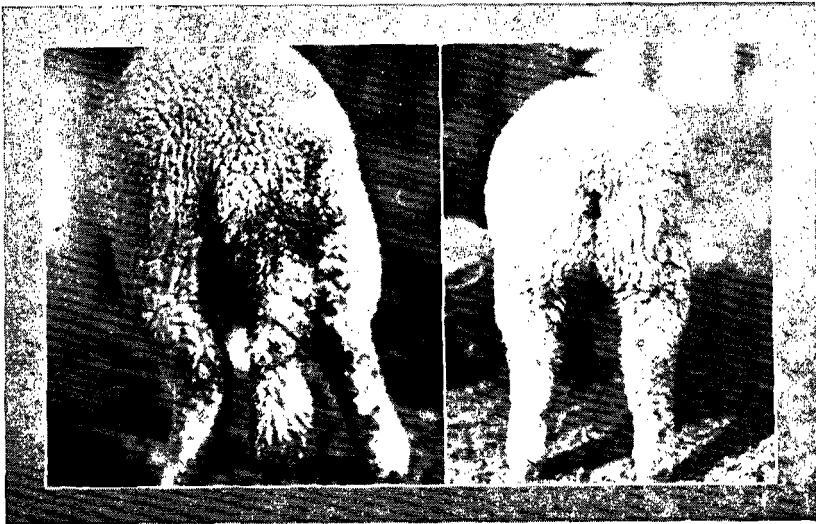


FIG. 25.—Undocked and docked lambs.

### DOCKING AND CASTRATING LAMBS

**Docking.**--Some time between the age of two weeks and one month all the lambs should be docked. The docked lamb does not run the danger of having his tail weighed down or infected from an accumulation of filth. Docked lambs are neater and tidier in appearance than undocked lambs. (Fig. 25.) This fact will appeal to packer buyers who naturally figure the tail as so much waste. The docked lambs bring a higher price than undocked lambs, and the saying "Dock your lambs or the market will" is only too true.

**Docking with a Knife.**--Docking is a simple operation. The tail may be cut off at the desired length with a knife. When this procedure is followed the lambs should be closely watched so that they do not bleed profusely. Many little lambs bleed to death, or at least until they are quite weak, from this method of docking. If the tail is cut off when the lamb has considerable size, it is advisable to tie a string around the tail before cutting to prevent excessive bleeding. The string should be removed as soon as the danger of bleeding is over and the blood is clotted. If the string is left on for any length of time the stub will become sore and inflamed.

**Docking with Pincers.**--One method of docking which appeals to many sheep men and farmers is that of removing the tails with red-hot pincers. (Fig. 26.) The necessary equipment is a pair of large pincers with dull blades, some means of heating the pincers, and a quarter-inch board with an inch or inch and a quarter hole in it. The board should be nailed up solid at a convenient height. Two men are necessary for the job.

One man should grasp the lamb firmly and hold it with its back against his chest, head up. He will probably hold the lamb's hind legs with his right hand and will pull the tail through the board with his left. The lamb's buttocks are then pushed up against the board and the tail pinched off with the red-hot pincers by the other operator. The skin on the tail should be slipped toward the body before docking, so that after the operation the skin will slip back over the dock and heal more quickly. The board prevents the lamb from being burned. Very little blood is lost by this method and there is practically no danger from infection. The tail, however, will be quite sore for a few days. The accompanying pictures show the simplicity of the operation.

**Castration.**--Ram lambs are even more objectionable on the market than long-tailed lambs. Ram lambs over five months old take on a more or less "bucky" appearance and their carcass carries to some extent the buck characteristics of texture and

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FIG. 26.—Docking with pincers. (I) Applying the pincers at red heat. (II) The board prevents burning the lamb. (III) Searing prevents loss of blood.



FIG. 27.—Castration. (I) Disinfecting hands and knife. (II) Disinfecting scrotum. (III) Cutting off lower third of scrotum.



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FIG. 28.—Castration. (I) Grasping testicle with thumb and forefinger. (II) The testicles removed. (III) Disinfecting scrotum and surrounding parts.

color. Ram lambs do not fatten so readily as wether lambs and are a great nuisance in a bunch of lambs being fattened.

When castrating the lamb is held as in docking. The operator should have his hands and knife clean and disinfected. The scrotum is then mashed in a weak solution of one of the coal-tar dips, and the lower third of the scrotum is cut off. The testicles are then removed by pulling them out, bringing with them as much of the cord as possible. The testicles may be pulled out by pinching on the cord between the thumb nail and forefinger. After removing the testicles the scrotum and surrounding parts should again be thoroughly disinfected. (Figs. 27 and 28.)

**Precautions.**--When docking or castrating it is better to do the work on a bright, clear day in order to avoid complications from cold or chilling. It is also well to remember that the lambs should be handled as little as possible during the operation, to avoid exciting them. Increased circulation will result in greater loss of blood. After either operation the lamb should be put down immediately and kept as quiet as possible until all danger of bleeding has passed. When the work is done in the morning one has ample time to see that all bleeding has stopped before night. The younger the lamb the less likely the trouble from bleeding.

In some flocks these operations are performed at the same time. In others a week or more elapses between the operations. The advisability of either will depend on the operator and the prevailing conditions.

#### WEANING LAMBS

In some flocks the lambs are weaned when they are sent to market. In some they are weaned, fed for a while, and then marketed or kept in the flock. Some farmers let the ewes themselves wean their lambs.

Lambs may be weaned by the time they are three and a half months old. When they are taken away from their mothers they should not be permitted to come back and nurse out the udder. When this is permitted the second parting is just as hard on the mother and the lamb as the first one.

Lambs that have been taught to eat at creeps will suffer no hardships from being weaned. The feed of the ewe should be reduced or she should be put on a scanty pasture until the milk flow has ceased.

To avoid udder troubles the ewes should be milked out every two or three days until they are dry. It is not advisable to take all of the milk, but just enough to avoid congestion and caking of the udder.

## SHEEP PRODUCTION IN KANSAS

45

### SHIPPING TO MARKET

**When to Ship.**--The Kansas farmer who is raising spring lambs should by all means get his lambs ready for market before the great run of western spring lambs dominate the market. The man who has good stock, lambs early, and feeds properly will have no trouble in getting his lambs to market by early June.

**Stock Cars.**--The sheep man who has enough lambs to use the railroad in getting them to market is fortunate. A double-deck stock car will easily hold 250 lambs. A single-deck or ordinary stock car will accommodate 125 or more.

**Pooled Shipments.**--Few flocks in Kansas are large enough to utilize a stock car. In some communities where a number of farmers have small flocks, the lamb crop is shipped together. The lambs from each flock are marked in a certain way so they may be identified and sorted at the market. This method of marketing is very satisfactory.

**Trucking.**--Where the distance from the market will not prohibit trucking many flock owners have found it profitable to truck the lambs in as they reach a marketable weight and condition. Double decks may be easily built for hauling lambs in trucks. A one-ton truck, double-decked, will accommodate around 30 lambs.

**Accompanying the Lambs to Market.**--Regardless of the method of shipping a great deal can be learned about market requirements of stock by accompanying them to market. When on the market the owner can see where his stock is lacking, to what the buyer objects, or commends, and compare his own with the market tops. The successful handling of a flock of sheep requires a knowledge of current market demands. It also requires a willingness to cater to these demands, so long as these demands do not interfere with economical production.

### SHEARING

**When to Shear.**--The time to shear sheep in Kansas will depend on prevailing weather conditions and housing facilities. Shearing is usually done between the middle of April and the middle of May. By the middle of April the weather is such in most parts of the state that shearing may be done. When one has ample shelter for his flock it may be advisable to shear slightly earlier in certain sections. As spring comes on, sheep will do better when shorn. There is no advantage in letting sheep go until later in order to have more grease in the wool. The wool graders value wool largely on a shrinkage basis. The more grease the more shrink, and a correspondingly lower price.

Sheep that are not shorn suffer from the heat and cannot be expected to do well in the hot summer months.

If sheep are not shorn by fly time, maggots are quite likely to cause trouble where the wool is fouled. It is not a good plan to shear ewes that are heavy with lamb. At this station all lambs that are to be retained in the flock or exhibited at the fairs in the fall are shorn to their pelts in June.

**Hand Shears or Clippers.**--Clippers are used far more extensively than hand shears. More sheep can be shorn with them in a given time and a smoother job can be accomplished. For those who have objected to clippers because they shear so close that sheep are likely to sunburn, combs have been devised which will leave up to a quarter-inch of wool on the sheep. When shorn with such combs, the job is just as smooth, and shearing may be done earlier, as the sheep are less likely to chill. Combs are also made which cannot cut the skin.

Clippers can be obtained that run by hand power, electric motor, or gasoline engines.

**Care Before Shearing.**--Shearing can be done more easily on a warm day. Heat makes the grease or yolk in the wool run so that it is more evenly distributed throughout the fleece. In cold weather the grease does not run and makes shearing more difficult by clogging the combs. Sheep should be thoroughly dry when shorn. Wet fleeces tend to mold. Sheep should not be fed before being shorn. If their paunches are not full at the time they are shorn the necessary handling is not so hard on them.

Shearing can be made easier by arranging a small pen next to the shearing floor. The sheep which are not shorn can be kept in the pen and may be caught easily and with little excitement.

**The Shearing Floor.**--A clean floor, preferably of boards, should be used for shearing. Shearing on the ground, or in litter, works considerable dirt, chaff and other foreign matter into the wool. This will greatly reduce the value of the wool. The floor should be swept frequently during shearing.

**Learning to Shear.**--It is practically impossible to explain the procedure of shearing in writing, but it is quite easy to show how it is done. The best thing for the beginner to do is to watch some one shear who knows how. Ease in shearing will come only with practice. Even though a man has only a few sheep he should know how to shear them. There are but very few custom shearers in Kansas, and if one does not shear his sheep himself he may have to wait until very late in the season to get this work done.

In shearing, the sheep is set up on its rump, its back resting against or between the knees of the shearer. The sheep should

be tipped backward far enough to keep its hind feet from resting on the floor. This will prevent struggling to a great extent. Different shearers have different systems of taking the wool off. Most of them take the wool from the head first, then the front of the neck, and on down to the brisket and belly. With this much removed the wool on the sides and back is then removed with long, sweeping strokes.

It is desirable to take the fleece off in one piece, and not to pull the fibers apart. This makes it easier to tie the fleece after it is removed. In shearing one should be careful not to cut the sheath on rams or wethers, and the udder and teats on ewes.

**Tying and Sacking the Wool.**--Paper twine or twine made especially for tying fleeces is the only kind to use in tying up the wool. Binder twine should never be used, as the sisal fibers stick in the wool and lower its value.

In tying the wool the fleece should be folded into a bundle with the skin side exposed. The bundle is then wrapped once each way with the special twine and tied. (Fig. 29.)

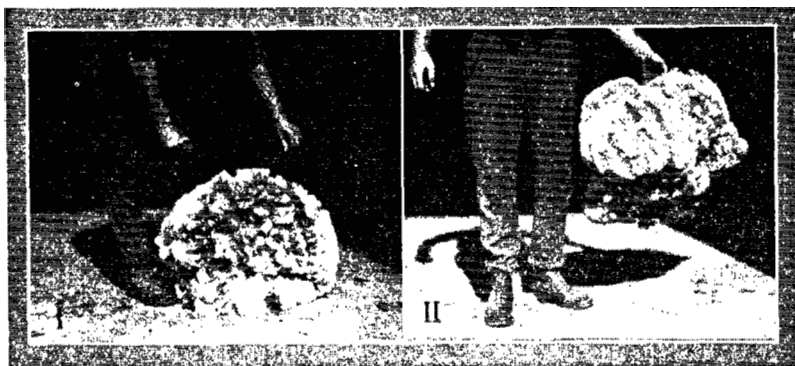


FIG. 29.--(I) Tying the fleece. (II) The bundle ready for sacking.

Wool boxes, used for making tight, compact bundles of the wool, are objected to by graders. Most wool pools recommend the looser bundle. Graders prefer it because the fleece is more easily examined.

For shipment the fleeces are packed tightly into wool sacks. Wool sacks are made of burlap and are 7½ feet long and 40 inches wide. They may be obtained from pools, wool commission firms and stockmen's supply companies. Each sack will hold from 225 pounds of wool up, depending on how tightly it is packed.

Wool of the same grade should be sacked together. Tags, wool from dead sheep, black fleeces, and fleeces of low market



value, due to burrs or other foreign matter, should be sacked separately from the good wool.

**Marketing the Wool.**--Kansas wool is marketed in three different ways. It may be sold to local wool buyers, or representatives of wool commission houses who travel through the country at shearing time. It may be marketed through the county pool. County pools in the main are fostered by the county farm bureaus. The wool may be consigned to wool commission houses, which will grade it, buy it from the grower, or sell it to others as he may direct.

### CULLING THE FLOCK

A poor sheep eats as much and costs as much to keep as a good one. The good ones, and not the poor ones, return a profit. After the flock has been shorn in the spring it is a good plan to go over the ewes and cull out those that are undesirable. With the wool off a much better idea may be had of their conformation.

Old ewes with broken mouths, and thin because they can no longer properly handle their food, should be shipped to market. Old ewes whose strength has been sapped due to too heavy nursing, if the possibility of putting them back in condition is slight, should also be among those to go. Too frequently for the good of the owner this kind turn into boarders or else give birth to weak, sickly lambs. Ewes that have good teeth and are thin because of heavy milk production should be kept.

Thin ewes are not the only ones to cull. Ewes in good condition by reason of the fact that they have not done a good job of nursing are just as undesirable as any of the thin ones. Ewes that are poor mothers for any reason should be marketed. Those with bad udders, caked udders, and teats so ill-formed that a lamb cannot nurse had better be sold.

Every flock owner has a different problem. Many are trying to build up a high-grade flock, using pure-bred sires and retaining the best ewe lambs. Such men have an ideal or standard by which they select. Conformity to this standard should not be the only requirement to give the ewe a place in the flock. If she is not a producer, and has not the marks of a producer, she should go with the rest of the culls.

Men who handle western ewes on the farm-flock plan and who may think of saving back ewe lambs might do well to consider that a ewe lamb will bring just as much money on the early spring market as a wether lamb. The money derived from her sale will usually buy a serviceable ewe of breeding age in the fall. Even though some men breed their growthy ewe lambs, it is not a good practice, as their growth is unquestionably retarded and they are not so good mothers as older ewes.

At culling time the rams should not be overlooked. If they

are not of the desirable type and their lambs are not thrifty, early-maturing and thick-fleshed, the owner will be ahead financially by getting rid of them.

Sheep are a too profitable class of live stock to be handled in a haphazard way, and the narrow spread between the price of the good ones and the price of the poor ones is too small for a man to attempt to handle any but the best.

#### IV. PASTURES FOR SHEEP

##### PASTURES ESSENTIAL FOR SHEEP

Pastures are essential to the economic production of sheep. The use of pastures materially decreases the cost of maintaining a flock. Due to the nature of sheep they are able to secure the greater part, and in many instances all of their feed, from pasture crops. Sheep are looked on by some farmers as scavengers and are allowed no pasture except what may be obtained after other classes of live stock have grazed, and what they may pick up from lanes, fence rows and stubble fields. Profitable returns may be had from a flock with the use of but very little grain, if pastures are provided for the sheep. (Fig. 30.)

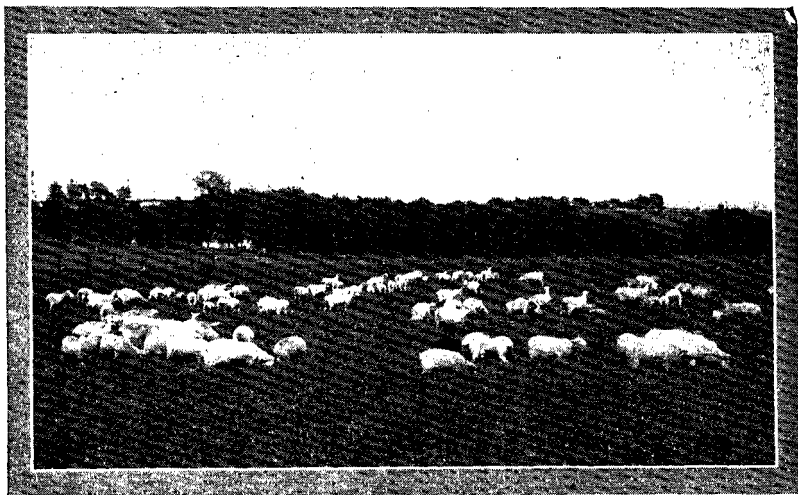


FIG. 30.—The station flock on sweet clover pasture.

##### USES OF SHEEP PASTURES

Good fresh pastures in August and September will suffice for flushing the ewes in preparation for the breeding season. Good pasture will go a long way in reducing feed costs on pregnant ewes, besides providing an excellent means of giving the ewes

the right kind of exercise. In the spring, after lambing time, ewes turned on good pasture will be able to produce more milk for their lambs. Lambs can also obtain a great deal of nutrients from pastures. Dry ewes should receive nothing but pasture. Even the thin ewes will recuperate from their suckling on good pasture.

The flock rams can be kept in a healthier condition when given access to pasture than when kept on dry feeds. Aside from the tonic effect of pasture crops the green feeds are more or less cooling. Any feed which tends to cool out an animal's system in the hot summer months is of great benefit.

#### PASTURE CONSIDERATIONS

In planning pastures for sheep several factors should be given consideration.

**Bloating.**--Sheep bloat easily. The pasture crop should be one which will not readily cause bloat. The tendency to cause bloat can be lessened by care on the part of the flock owner. Sheep will bloat on any pasture that grows if they are turned on when hungry or when a heavy dew is on the grass. If they are filled on dry feed or kept off until the dew has dried, little danger will be had from bloating.

**Hardiness of the Pasture Crop.**--Another factor to be considered is the hardiness of the pasture crop. Sheep graze closer than any other farm animal. This is possible by reason of their thin lips, small teeth, and the fact that they can move either side of their lips independently of the other side. Their sharp little feet will prove severe on annual pastures where the stand is scant. Sheep should not be permitted to graze a crop to the ground if it is the intention to pasture it again. They should be removed and the pasture allowed to grow again.

**Soil Fertility.**--third factor worthy of the consideration of the flock owner is that of selecting a pasture crop that will add to rather than take from the plant food in the soil. Legumes that are adapted to sheep grazing will take care of this situation very well. Fertility of the soil is also increased by the fact that the droppings of the sheep will be scattered more evenly over the fields than is possible by other stock.

**Small Fields.**--In planning sheep pastures it is better that the field be small rather than large, so that fresh pasture will be available more often. Rotating pastures can be done more easily if the fields are small.

#### ANNUAL OR PERMANENT PASTURES

Annual pastures are preferable to permanent pastures for sheep. Fresh pastures can be had more often from annual pas-

ture crops. One of the greatest possibilities annual pastures offer is the means they afford of combating stomach worms. Permanent pastures grazed year after year by sheep become infested with stomach worms. The most satisfactory means of ridding the field of them is by plowing.

**Stomach Worms.**--Stomach worms have caused serious losses among Kansas flocks. The best means of handling them is prevention. The best means of preventing them is by rotating pastures. When sheep are given a new pasture every three weeks there is little likelihood of infestation from worms.

Sheep which are infested with stomach worms show pale whitish skins. The white of the eye will be bluish or colorless. The animal may have a depraved appetite and scouring and coughing may be present. The adult worm is less than an inch long, hardly as large as a pin, and pink in color. Stomach worms are found in the fourth stomach of the sheep. In this stomach the adult worm lays thousands of eggs daily. The eggs pass from the sheep in the droppings, and hatch in a very short time under favorable conditions. The larva then crawls on blades of grass where it encysts and is taken in by the lambs or sheep in grazing. It reaches maturity in the fourth stomach, completing the life cycle. The larvae after hatching are less active during dry weather. Damp weather is favorable to them. They are quite hardy in the cyst stage and can withstand long periods of drought or freezing, becoming active when conditions are favorable. The stomach worm is a sucking parasite. The adult will



FIG. 31.—Drenching sheep. (I) Drenching with bottle. (II) Drenching with rubber hose and funnel.

be found attached to the wall of the fourth stomach. The constant sucking of blood at this vital point by thousands of stomach worms keeps the sheep in a weakened condition and in some instances causes death.

Drenching with appropriate remedies is the best means of ridding the sheep of this parasite. Care should be exercised in drenching. The sheep should be securely held, and the dose should not be administered while the sheep is struggling. The sheep should be made to stand on all four legs, and the nostrils should not be raised higher than the level of the eyes. The dose may be given from a drenching bottle, or by means of a rubber hose and funnel. (Fig. 31.)

A 1 percent solution of copper sulphate will prove effective in killing worms. This may be obtained from any druggist or made at home. If made at home, 1 ounce of blue copper sulphate crystals is dissolved in 5 pints of water. White crystals should not be used. The dose of this solution is 2 ounces for a lamb and 3½ ounces for an adult sheep. Animals that are to be dosed should be withheld from feed and water 16 to 20 hours before and 8 hours after drenching.

Nicotine sulphate is also a good remedy for stomach worms. One-half ounce of a 40 percent solution may be diluted with 1 quart of water. The sheep should be deprived of feed and water before and after drenching the same as for the copper sulphate treatment. The dose of this diluted solution is 2 ounces. Lambs may stagger from this treatment unless a great deal of care is used in drenching.

Two or more drenchings with either of these solutions at intervals of 10 days may be required to rid the flock of worms.

#### SUGGESTED PASTURE CROPS

Work with pasture crops for sheep at the Agricultural Experiment Station has shown that for general Kansas conditions, sweet clover, Sudan grass, rape, and rye pastures are more dependable and efficient than other pasture crops.

**Sweet Clover.**--Sweet clover, being a legume, puts more into the soil than it takes from it in the way of plant food. Where proper precautions are exercised in pasturing sweet clover trouble from bloating is absent. It is a hardy plant and proves very efficient as a sheep pasture. For early pasture sweet clover should be sown in late March and early April. For later pasture it can be sown with oats and pastured after the oats is cut. Sweet clover should be drilled or broadcast at the rate of 12 to 18 pounds of scarified seed to the acre. The white variety is preferable for pasture. A firm seed bed is essential for sweet clover.



The secret in pasturing sweet clover seems to be in not permitting the growth to get too rank and in not allowing it to be grazed too close. Sheep should be turned on when the clover is about 8 inches high. The branches of the sweet clover plant do not come from the crown. Height is necessary that the plant may have branches for foliage. If sheep graze the plant down to the root, and they will do so if starved to it, the plant dies. Sheep should be removed before sweet-clover pasture gets short.

Sweet clover is a biennial. The second year's crop goes to seed about midsummer and is not as readily eaten. Sweet-clover pastures have in many instances reseeded themselves satisfactorily for 5 or 6 years. Should this be allowed to continue for any time the same objection that is had for permanent pastures would hold for sweet-clover pastures.

**Sudan Grass.**--Sudan grass is a crop adapted to all sections of Kansas and will furnish a great deal of pasture. Like sweet clover it should be pastured so that a rank growth will not develop. The only objection to Sudan grass as a pasture for sheep is that where chinch bugs are prevalent they attack the crop. Since Sudan is a rapid-growing crop it may be pastured and rested many times during the growing season. Sudan should be drilled in late May at the rate of 20 to 25 pounds to the acre.

**Rye.**--Rye is another crop which will do well in all parts of Kansas. As a fall and winter pasture crop for sheep it has no superior. Rye for pasture is preferably drilled as near the middle of August as possible at the rate of 1½ to 2 bushels to the acre.

To get the best results as a sheep pasture rye must be grazed close enough that the plants are not allowed to joint. If rank growth is permitted sheep will neglect that part of the field for portions that are grazed more closely.

**Rape.**--Rape makes an excellent sheep pasture on productive land in northeastern Kansas. In other sections of the state it is usually too hot or too dry for best results with this crop. Under Kansas conditions rape must be sown in the early spring. It is usually drilled or sown broadcast at the rate of 4 to 6 pounds to the acre, but for sheep pasture at this station better results have been secured from seeding as heavy as 15 to 20 pounds. Where rape cannot be relied upon the necessary expense for seed and preparation of the ground makes it an expensive crop.

Rape may be pastured, rested, and pastured again, when growing conditions are favorable. Rape has been pastured as late as October 15 at this station.

**Alfalfa.**--Although alfalfa fills other requirements it is dangerous as a sheep pasture due to the great tendency to cause bloat. Its place as a sheep pasture can be filled more safely by

sweet clover. While it is true that sheep are pastured on alfalfa with success in more arid sections they are just as apt to bloat in the afternoon when the crop is dry as they are when the dew is on in the morning. Alfalfa is a good crop for soiling, however, and after wilting does not cause bloating.

**Cowpeas and Soybeans.**--Cowpeas and soybeans in sections where they are dependable crops make good sheep pasture. Their principal use as a pasture crop seems to be sowing them in cornfields where it is the intention to "lamb down" the corn. These crops are likely to become woody-stemmed when sown alone for pasturing.

**Wheat.**--Wheat pasture makes good grazing for sheep, but in those sections where the soil is given to blowing it must not be grazed too close.

**Oats.**--Oats yields too little forage as pasture to be used. The cost of seed and preparation of the ground prohibit its use as a sheep pasture in most parts of Kansas.

**Blue Grass, Bluestem and Buffalo Grass.**--The blue grass, bluestem, buffalo and other native grasses all furnish good sheep pasture. The objection to them is, as stated before, that permanent pastures are quite likely to harbor stomach worms.

## V. SHELTER AND EQUIPMENT FOR SHEEP

### SHELTER REQUIREMENTS

Shelter requirements for sheep are simple. The shelter should provide a dry place for the sheep to lie with freedom from drafts but with adequate ventilation. Expensive barns are not needed.

Few barns in Kansas have been built especially for sheep. The usual procedure, when shelter for sheep is needed, is to change and alter barns that have been built for other classes of live stock. Such barns serve their purpose well and can be fixed for sheep with little or no expense.

### THE SITE

When a barn or shed is to be built for sheep the first consideration should be to locate it on high, well-drained ground. Shelter which is damp is unhealthful and unfit for sheep. The building should also be located so that it will be handy to pastures.

### CONSTRUCTION

**Barns or Sheds.**--Frame work is the cheapest and most logical construction for sheep barns. The type of building may satisfy the builder's preference. (Fig. 32.) The simpler the construction the more efficient it is. One of the most satisfactory

types of sheep barns in Kansas is a shed, 32 feet wide and 420 feet long. (Fig. 33.) The shed extends east and west and is open to the south. It has a gable roof, the ridge pole being 15 feet from the ground. The walls are 5 feet high, with burlap curtains on the open side. From 1,200 to 2,000 ewes are lambed in this shed each spring.

Sheds of this type are satisfactory for any kind of sheep, provided they are deep enough. Depth to the shed is desirable because narrow sheds afford little protection from driving rains

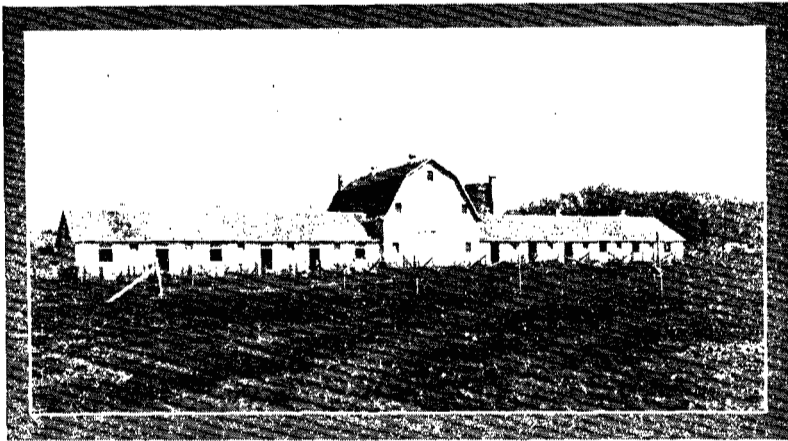


FIG. 32.—The sheep barn of the Agricultural Experiment Station.

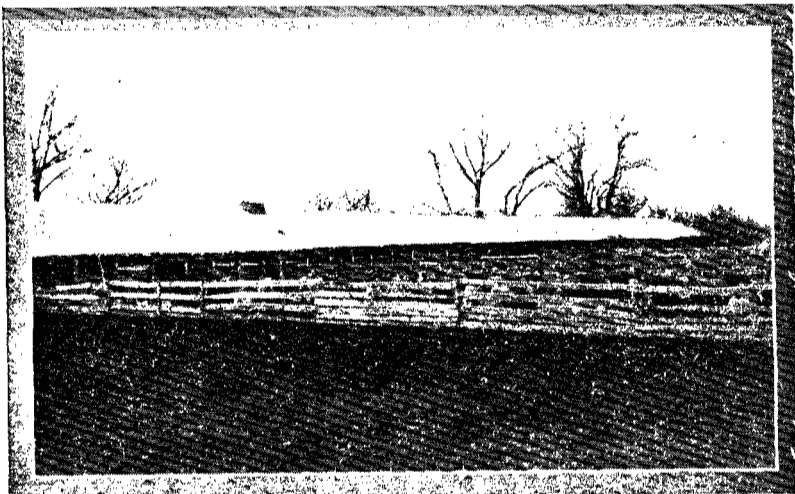


FIG. 33.—A simple and adequate lambing shed.

and drifting snows. Gable roofs give more protection than shed roofs.

Open sheds are preferable for fattening lambs. Warmth is not necessary or desirable in a sheep barn except that at lambing time ewes and little lambs should be housed so that there will be no danger of chilling. One thickness of boards will suffice for walls. In Kansas, where practical, a loft is desirable because it helps break the extreme heat in summer. Heat is more of a problem in Kansas than cold. If the barn is so constructed that the sheep can keep cool in it during summer it will prove adequate protection in winter.

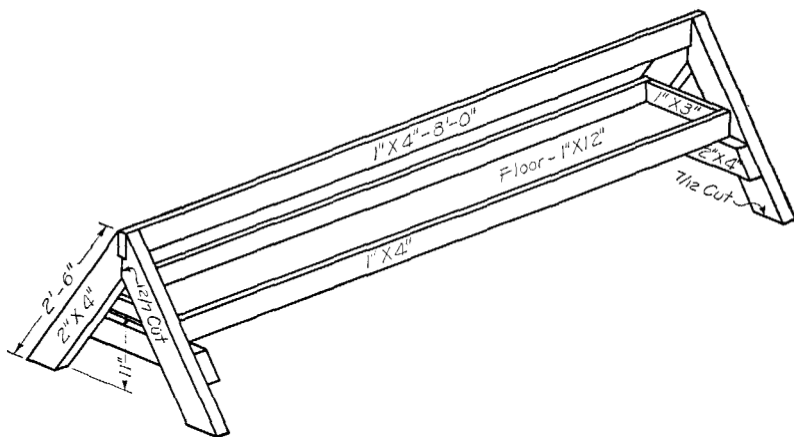
**Wide Doors and Low Sills.**--One of the advantages of the deep open shed for sheep is that there are no doorways in which they may be crowded. When a barn is used for sheep the doorways should be wide, otherwise the sheep are likely to develop injuries in crowding through them. High sills are objectionable because the sheep have to jump over them. Narrow doorways and high sills are especially dangerous to pregnant ewes.

**Windows and Light.**--The open shed gives ample light and ideal ventilation for sheep. Barns for sheep should have plenty of windows for the same purpose. A dark, poorly ventilated barn will become damp.

**Floors.**--Dirt, preferably tightly packed clay, makes the best floor for sheep barns.

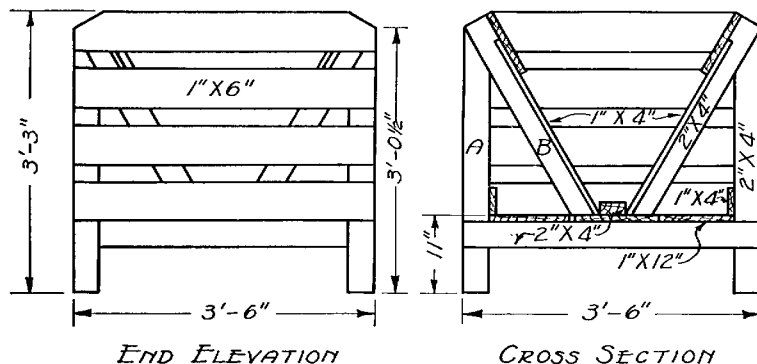
#### EQUIPMENT

Equipment should be planned to facilitate the handling of the sheep. Much time, labor and expense may be saved with



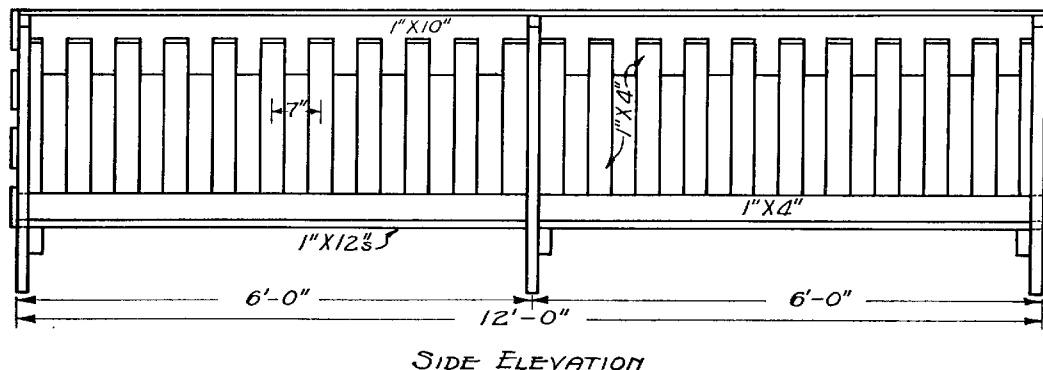
Cooperation Department of Agricultural Engineering.  
FIG. 34.—A grain bunk.<sup>2</sup>

2. Plan No. 77-528. Sheep-feeding bunk, 8' 0" long. A frame, rectangular trough 12" wide. One sheet, bill of material, 10 cents. Address, Engineering Experiment Station, K. S. C., Manhattan, Kan.



*BILL OF MATERIAL*

No.	Req.	Size	Length	Grade	Remarks
9		1" x 4"	14'-0"	NYYP	Hopper Slats
2		1" x 4"	12'-0"	NYYP	Box Sides
3		1" x 12"	12'-0"	NYYP	Floor
2		1" x 10"	12'-0"	NYYP	Hopper
2		1" x 6"	14'-0"	NYYP	Ends
5		2" x 4"	12'-0"	NYYP	Framing
2		6d		Cor.	Nails
1#		8d		Cor.	Nails
2#		16d		Cor.	Nails



*SIDE ELEVATION*

Cooperation Department of Agricultural Engineering.

FIG. 35.—A combination feeding rack.<sup>3</sup>

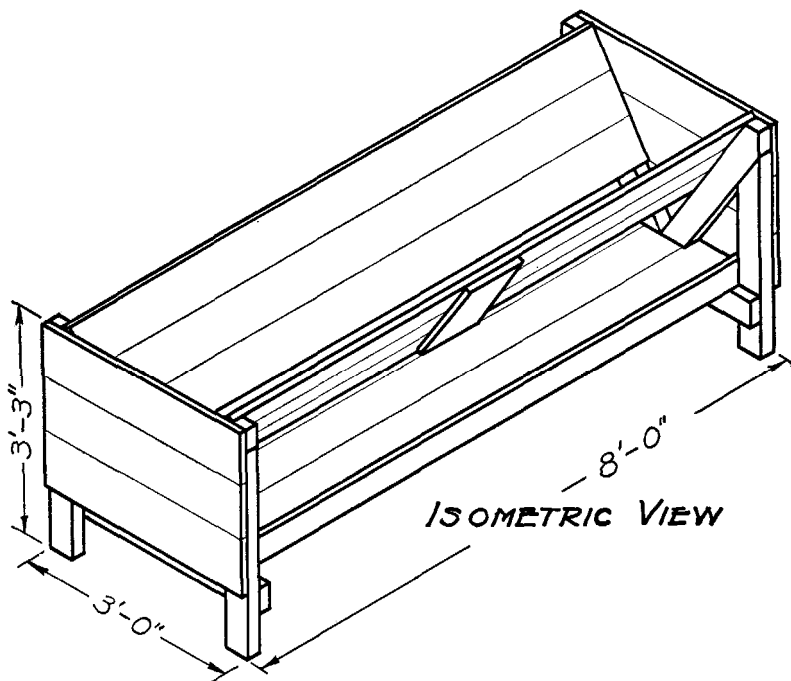
3. Plan No. 77-522. Sheep-feeding rack. 3' 6" wide, 12' 0" long. Hopper-style rack. One sheet, bill of material, 10 cents. Address, Engineering Experiment Station, K. S. C., Manhattan, Kan.



proper equipment, which, like the shelter, should be quite simple yet efficient.

**Feed Bunks.**--Bunks should be provided for the feeding of grain, else considerable of it will be wasted. A long trough 4 to 6 inches deep serves this purpose well. (Fig. 34.)

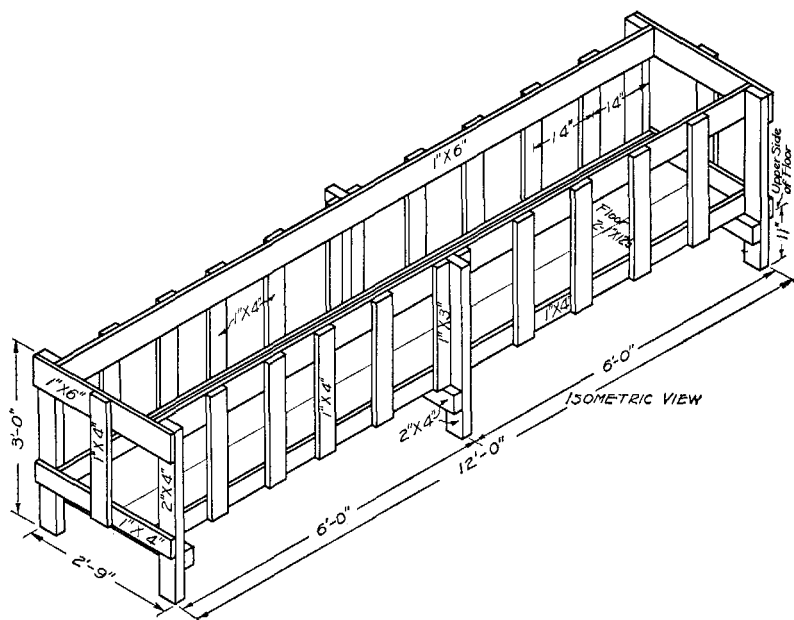
**Combination Racks.**--A combination rack can be made for the feeding of both roughage and grain. (Fig. 35.) The box part of such a rack should be not less than 4 inches deep. If space between slats is wider than  $3\frac{1}{2}$  inches, small sheep and lambs are



Cooperation Department of Agricultural Engineering.  
FIG. 36.—A rack which protects the wool from seed, chaff and leaves.<sup>4</sup>

likely to get their heads fast between the slats. Figure 36 shows a type of combination rack which is very effective in keeping chaff, leaves and seed out of the wool. Figure 37 shows another rack which may be used for feeding either grain or roughage. Sheep do not waste feed from this type as they do from some of the others. Such a rack requires more space for each lamb than the other types. One foot of bunk space should be provided for lambs and yearlings. Pregnant ewes should be allowed at least 2 feet of space.

**Posts and Boards.**--Fence posts and boards provide a very good means of feeding dry roughage. The posts can be set around a haystack or around the outer edge of the feed lot. An 8-inch board is nailed horizontally along the posts 3 inches from the ground. Another board is nailed above the first one leaving a gap of 8 to 10 inches, through which the sheep may put their heads. The feed is pushed up against the boards so that the sheep may eat. There is little or no waste by this method of feeding roughage.



*Cooperation Department of Agricultural Engineering.*

FIG. 37.—A type of combination feeding rack.<sup>5</sup>

4. Plan No. 77-524. Sheep-feeding rack, 3' 0" wide, 8' 0" long. Rack-hopper type. One sheet, bill of material, 10 cents. Address, Engineering Experiment Station, K. S. C., Manhattan, Kan.

5. Plan No. 77-526. Sheep-feeding rack, 2' 9" wide, 12' 0" long. Combination rack and bunk. One sheet, bill of material, 10 cents. Address, Engineering Experiment Station, K. S. C., Manhattan, Kan.

**Water Trough.**--An excellent water trough for sheep may be made by sawing a barrel in two halves.

**Hurdles.**--Hurdles may be used in many ways about the sheep barn. In dividing pens, holding sheep in corners, closing lanes and alleys, and making temporary pens, they are a great convenience. Small hurdles are used for making individual pens for ewes at lambing time. Hurdles should be light so that they may be handled with ease and strong enough to hold the sheep. Good hurdles may be made from 1-by 4-inch boards.

**Cutting Chute.**--If large numbers of sheep are handled it is advisable to construct a chute so the work may be done easier and in as short a time as possible. The chute should be built so that it will conveniently open from a place where the sheep can be penned. It should be only wide enough for one sheep to pass through at a time. The sheep will go through more readily if the chute is boarded solid so they cannot see out through the sides. It need be only high enough that the sheep cannot see over. At the end of the chute where the cutting and sorting is to be done a gate should be hinged so that it will permit the sheep to go into one or the other of two lots. A handle should be put on the gate so that one man may handle the sheep with one hand and open or close the gate with the other. When one sheep starts through the chute the rest will follow. Such a chute will be a great aid in sorting feeding lambs.

**Dipping Vat.**--When the flock is a permanent project on the farm a dipping vat will make it possible to prevent lice, ticks and skin troubles. A galvanized-iron tank of a size to suit the flock may be purchased. The vat should be set in the ground. A wooden runway can be built to the deep end of the vat. At the other end a small pen should be built to hold the sheep until the dipping solution drips from them. This pen should be so constructed that the drip will drain back into the vat. The sheep carry a great deal of the solution from the vat in their wool. If it is not allowed to drain back in, it is necessary to replenish the solution frequently. Standard dips are obtainable at all drug stores with full directions for using them. Nicotine sulphate dip is used at this station.

**Fences.**--The fencing problem has kept many farmers out of the sheep business in Kansas. If sheep are to be limited to any given area it will be necessary to provide fence. The cheapest fence that will prove satisfactory for sheep may be made from 26-inch woven wire, with three strands of barbed wire placed above. A 32-inch woven wire would be still better. The 32-inch wire with one strand of barbed wire below and three strands above will make an excellent fence. The smaller the mesh in the woven wire the better it is for sheep. A large open mesh may permit them to get fast in the fence. When sheep are the only animals that come in contact with the fence the posts may be spaced farther apart than is customary when fencing for other classes of live stock.

## VI. FEEDING WESTERN LAMB FOR MARKET

### FACTORS AFFECTING LAMB FEEDING

The feeding of western lambs is more of a speculative proposition than the handling of a farm flock. The feeder has little or no control over many of the factors which have an influence in determining the profitableness of such an undertaking. It would be logical for the beginner to consider these factors before attempting to feed western lambs. The fact that feeders are making a profit in fattening western lambs is not reason enough in *itself* to warrant the *beginner's* entrance to the business.



FIG. 38.—A lot of uniform feeding lambs.

**Experience.**--Experience is necessary if success is to be attained in feeding western lambs. The beginner should start with a very few lambs. Not only is feed-lot experience necessary, but a knowledge of market demands, market conditions, supply of feeders, demand for finished lambs, and the value of various feeds is essential. Men who handle western lambs year after year study these things and gauge their operations accordingly. In lean years they handle very few lambs.

**Why Western Lambs Are Preferable.**--Western lambs are more desirable for fall or winter feeding. They may be secured to the best advantage after crops are harvested and the farmer is ready to begin his feeding. Western lambs are available in such numbers that a feeder may secure a uniform lot. (Fig. 38.) Western lambs, by virtue of both their breeding and care, are of light enough weight that a good gain may be put on them and still not have them in the heavy-weight lamb class.

Western lambs come in from the ranges apparently healthy

and free from parasites. Native lambs should be ready for market long before fall.

Western feeder lambs can be bought from the central or western markets, direct from the ranges, or from men who make it a business to contract lambs for delivery to feeders.

**Types and Weights of Feeder Lambs**--Weight and type are important factors in the selection of feeder lambs. (Fig. 39.) Available markets will not handle mutton and heavy lamb unless they buy them cheap. By the time heavy feeders have attained a desirable finish they have also acquired so much weight that they will fall in the heavy-weight lamb class, and consequently command a lower selling price.

Lighter feeding lambs will make economical gains on cheap feeds for a time before they are finished on concentrates. Heavy feeders will have to be fed concentrates from the time of arrival at the feed lots in order to get the necessary finish before they get to an unpopular weight. (Fig. 39, I.)

The tidier type of lambs, with good backs, deep middles (fig. 39, II), square ends, and tight fleeces (fig. 39, III) make better feeders than the growthy, rangy sort. The former are generally thicker and more heavily muscled and put fat on more rapidly and evenly than the larger ones. In a feeding test conducted at the Agricultural Experiment Station such lambs, weighing between 55 and 60 pounds when going into the feed lots, returned a greater profit than rangy 70-pound feeders. It was possible to put a greater gain on the lighter lambs, which resulted in a more desirable finish. They also stayed within a more marketable weight.

**Location**--The location of the farm will have an influence on the feeding of lambs. The cost of shipping the feeder lambs from their source or the finished lambs to market may be prohibitive and make profits impossible. If the feed lots are some distance from the unloading point, feeder lambs can be driven in easy stages, but it is not practical nor advisable to drive fat lambs great distances. Hauling may increase the handling cost beyond reason.

#### METHODS OF HANDLING

No one or two plans of management will cover the activity of Kansas farmers in their lamb-feeding operations. Plans may differ with sections of the state and with different feeders within the same section. Many of the plans are worthy of mention.

Throughout the state are feeders who purchase lambs, put them in the feed lot immediately, finish them as quickly as possible, and send them on to market. These men are using lambs as a means of marketing their crops. They realize the inadvisability of putting high-priced feeder lambs on poor feeds. At all times they keep the feed better than the lambs.



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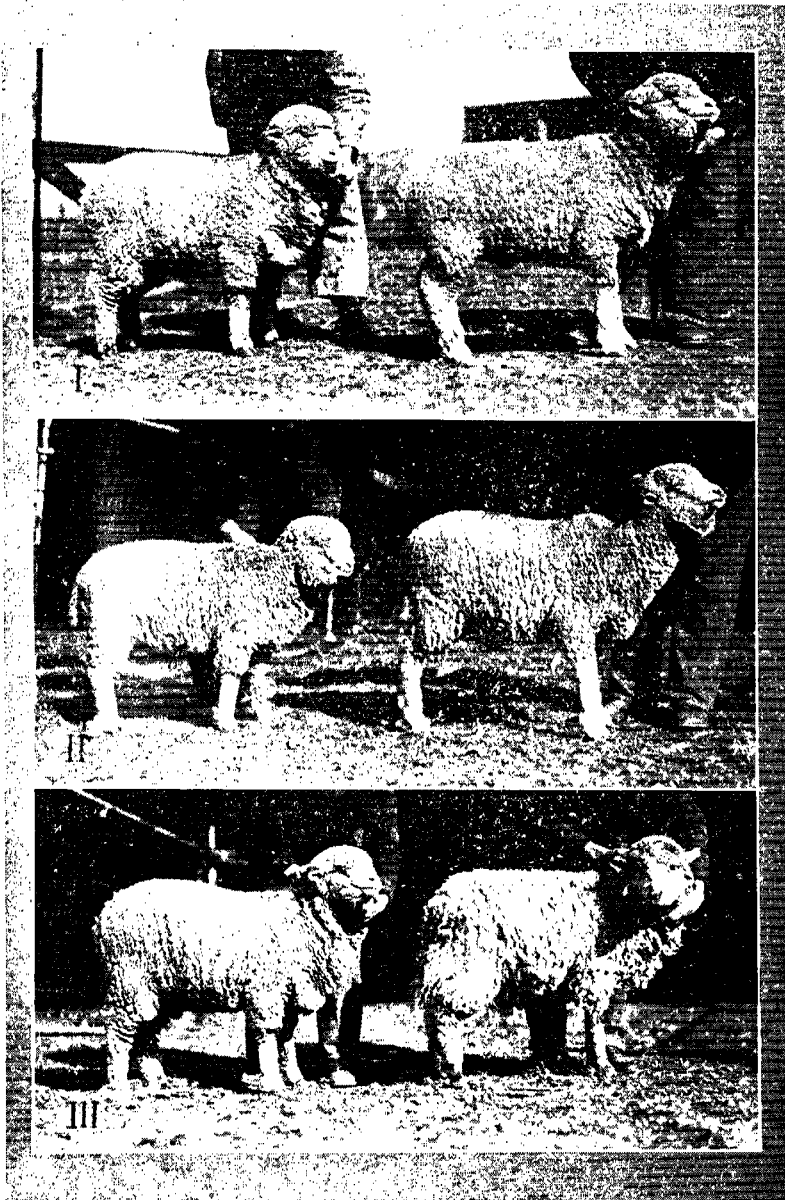


FIG. 39.—Types of feeding lambs. (I) Light lamb in contrast to heavy lamb. (II) Tidy lamb of good type in contrast to rangy lamb of poorer type. (III) Quality lamb in contrast to a lamb of undesirable quality.

The practice of buying light lambs early in the fall, running them on wheat pasture, stubble fields, and stalks, and then finishing them in the dry lot is also state wide. Light lambs are essential to the success of this plan on account of the greater length of the feeding period. This method sometimes courts disaster, as farmers will leave the lambs in the field too long, even when it is no longer possible for them to gain on the available feed. Consequently the lambs lose rather than gain in both weight and flesh.

Many farmers find it profitable to "lamb down" their cornfields and save the expense of harvesting. Such a practice is dependent more or less on weather conditions, as sheep have an aversion to mud. Lambs will not do well if forced to hunt their feed through muddy fields. Fattening lambs do not require exercise and if it is necessary to take too much exercise in finding their feed they may lose more than they gain.

In the eastern part of the state where cowpeas and soybeans are a dependable crop feeders find it advisable to sow either of these crops in their cornfields and let the lambs harvest them. If they obtain sufficient growth it is possible to do this without harm to the corn crop, provided the lambs are taken out when the legumes are gone. Some let the lambs harvest the corn also, which usually gives them a suitable finish, while others finish them in the dry lot after they have cleaned up the beans or peas.

In the extreme western part of the state many men maintain their own ewe flocks, carry their lambs through the summer as cheaply as possible and feed them out in the fall if they have a feed crop, and if not ship them to market as feeders. Such a plan, while it works in western Kansas, would not be advisable in central or eastern Kansas on account of the ravages of stomach worms and the greater possibilities of earlier lambs for the spring market.

Adjacent to the central markets are many feeders who study the markets and take to their lots fat, half-fat, and thin lambs, with the idea of "playing the market." Generally they buy on a low market, feed a short or a long time as the case may be, and get the lambs back on when the market is good. Proximity to the market is essential to the success of such a plan, and the short haul is quite a factor.

#### GETTING LAMBS ON FEED

Getting and keeping lambs on feed sometimes presents a problem. Western lambs usually come to the feed lots without having ever tasted grain. It is very easy to give them too much at first and "stick" them.

On arrival at feed lots, if the lambs are to be hand fed, they should be given a fill with some bulky dry roughage. Prairie hay is excellent for this purpose. Good-quality alfalfa may bloat

them at first if it is fed alone. The lambs may be fed for a few times in this way and the roughage gradually changed to that which is to be used during the feeding period. Lambs will take more roughage early in the period than later, when the concentrates are increased.

After the lambs have been filled on dry hay a small amount of grain may be offered them. One-eighth of a pound per lamb per day is enough to start lambs which have not had grain. This may be increased at the rate of  $\frac{1}{8}$  of a pound a day for two or three days. It is advisable to wait a day or two between increases after the lambs are getting over  $\frac{3}{8}$  of a pound per day.

When lambs refuse their feed the amount should be reduced, and increased only after the lambs show an inclination to take it. It may be advisable to let them miss a feed entirely. Some feeders prefer to keep lambs just a little hungry. Others like to keep them full. One of the most successful lamb feeders in Kansas has adopted the practice of giving small quantities of feed to his lambs eight or ten times daily. He has found that by this method he can get them to take more feed. The more feed he can get them to take the more gains they will make and rapid gains are usually the cheapest gains. Experience alone will give the best information as to how to keep lambs on feed.

In large commercial feeding plants and where self-feeders are used the lambs are put on feed much quicker than is possible with hand feeding. The self-feeders are filled with oat hulls or a mixture of oat hulls and chaffy wheat screenings. The lambs are also given prairie or some other bulky hay. After the lambs have cleaned up the hulls the feeders are filled with pea-sized oil meal with about 10 percent shelled corn or corn chop. Allowing free access to such a feed would seemingly "stick" the lambs at the outset, but it does not. The percentage of corn is increased each day, and in a week's time the lambs are on a full feed of corn 6 parts, linseed oil meal 1 part. For short feeding periods the amount of oil meal may be reduced.

In such a feeding practice the amount of hay consumed is small. Some feeders grind the hay and add bulk to the grain ration by mixing the hay with the grain.

When self-fed lambs ease up on their feed a change in the form of the grain may make them eat more readily. If shelled corn is being fed it may be given as chop, and *vice versa*.

#### HAND FEEDING VERSUS SELF-FEEDING

Whether hand feeding or self-feeding is to be followed will depend on conditions. Where so many lambs are fed that the expense of labor will run into large amounts self-feeding is desirable. Where the number is small, under 800 head, the additional labor required for hand feeding will not be such an item and in such a case hand feeding is preferable to self-feeding.

When self-feeding is the method followed it is necessary to mix the grain and the supplement, as lambs will not balance their feed properly if allowed free access to grain and supplement in separate self-feeders. They will eat excessive amounts of the supplement and tend to grow rather than fatten.

Costs of gains are higher on self-fed lambs than on hand-fed lambs. The question of using one or the other of these methods should be determined by the labor requirements and costs.

### FEEDS FOR FATTENING LAMBS

The information offered here regarding feeds for fattening lambs is taken from results of lamb-feeding investigations conducted by the Agricultural Experiment Station. These investigations have been prompted by inquiries and requests for information from Kansas farmers and sheep feeders. The aim of the investigators has been to determine the relative value of Kansas-grown feed crops, the relative value of nitrogenous concentrates, the substitute value of the latter, and to secure information as to the best method of preparing the feed and the method of feeding. The results are given in more detail in circular form than are shown here.<sup>6</sup>

#### Concentrates

**Corn.**--Corn has no superior as a grain for fattening lambs. The physical properties of corn are excellent, and it is probably more palatable to lambs than any other single grain. Corn is high in fattening nutrients. It is not a balanced feed in itself on account of a lack of protein. When fed with a leguminous feed a well-balanced ration results. Such a combination is the standard ration in the majority of feeding trials. When leguminous hays are not fed the addition of a nitrogenous concentrate is necessary to secure the best results.

Feeding trials conducted at this station show that where corn is the only concentrate used 300 to 400 pounds are required for 100 pounds gain, varying with the quality and feeding ability of the lambs, and to a greater extent with the kind and amount of roughage fed.

Shelled corn is usually taken as the basis of a ration. No advantage is to be had in grinding corn for lambs. A lamb which cannot grind its own feed is not worth feeding.

**Barley.**--Corn does not make a dependable crop in all parts of Kansas. Where corn will not grow well a suitable substitute must be found for those who desire to feed.

In a test to determine the value of barley as a substitute for corn two lots of lambs were fed corn alone and whole barley

6. Such of these feeding circulars as are available and further information on sheep and lamb feeding may be secured by addressing a request to Agricultural Experiment Station, K. S. C., Manhattan, Kan.

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alone, respectively, along with alfalfa hay and silage. The corn lot made an average daily gain of 0.47 pound as against 0.43 pound average daily gain made by the barley lot. For 100 pounds of gain 268.38 pounds of corn were required and 292.35 pounds of barley. Thus only 8 percent more barley than corn was required to make 100 pounds of gain. The difference in gain, finish and feed required was slight. When barley can be bought for 10 percent less per pound than shelled corn it should prove as satisfactory and economical as shelled corn.

**Kafir.**--Kafir is a crop well adapted to most sections of Kansas. The possibilities of substituting kafir in different forms for shelled corn in the ration of fattening lambs have been tried out at the Kansas station.

Corn has been fed in comparison with threshed kafir, ground kafir and kafir heads. In one trial corn-fed lambs made slightly greater gains than those fed either whole or ground kafir. The difference in favor of ground kafir over threshed kafir would not pay the cost of grinding the grain. The trials show kafir to be practically the equal of corn for putting lambs in a marketable condition.

In another trial corn was fed in comparison with kafir and ground kafir heads, and similar results were had. The lambs fed ground kafir heads did not make as large a daily gain as the other two lots, but they sold for almost as much per pound, indicating practically as satisfactory a finish.

In a more recent trial three lots of lambs were fed shelled corn and alfalfa hay, threshed kafir and alfalfa hay, and kafir heads and alfalfa hay, respectively. Each lot was fed the same amount of hay and grain each day throughout the test, the kafir heads being figured on the amount of grain in the heads. Each lot made the same daily gain and required practically the same amount of grain per 100 pounds gain. The corn and threshed kafir lots also required practically the same amount of alfalfa per 100 pounds gain. The kafir head lot required slightly less alfalfa than the other two lots, due probably to the additional roughage they received in the kafir heads. Figuring alfalfa hay at \$15 a ton these lambs gave a return for the grain fed them of \$2.82 a bushel for corn, \$2.52 a bushel for threshed kafir, and \$2.75 a bushel for the grain in kafir heads.

Assuming corn to be 100 percent efficient as a concentrate for fattening lambs this trial showed kafir heads to be 96 percent efficient and threshed kafir to be 90 percent efficient. This would indicate that where kafir is a more satisfactory crop than corn it may be substituted for corn in the ration of fattening lambs and that the most desirable form in which to feed it is in the head. Where kafir grains are considered so small and hard that they must be ground to insure best results from feeding them



to other classes of live stock, it must be remembered that sheep chew their food so thoroughly that it is unlikely that any of the grains will escape mastication,

**Oats.**--Oats is a good feed for the breeding flock, but is usually too expensive to be used in the fattening ration. Besides oats is not high in fattening nutrients. For fattening lambs its best use is for mixing with corn in the earlier part of the feeding period, when getting the lambs on feed.

### Protein Supplements

In a trial to determine the value of a protein supplement three different lots of lambs were fed corn alone, corn and linseed oil meal, and corn and cottonseed meal, respectively. All lots were fed alfalfa hay and silage. The lots fed the protein supplement made considerably cheaper gains, more rapid gains, and commanded a higher selling price by virtue of the fact that they were carrying a higher degree of finish.

As to which of these two supplements, linseed oil meal or cottonseed meal, is best the results of several trials indicate that there is but little difference in their feeding value for fattening lambs. Lambs fed linseed oil meal generally show more bloom and finish at the close of a feeding period than lambs that have been fed cottonseed meal.

### Roughages

A roughage, to be efficient in a fattening lamb ration, should, aside from being nutritious, be palatable and one which will be relished by the lambs. If it does not have these characteristics it must be properly balanced by the concentrate part of the ration so that a good, healthy appetite will be maintained throughout the feeding period.

**Legumes.**--Leguminous roughages, those having a relatively high protein content, are palatable, and where such hays make up the entire roughage part of a fattening-lamb ration, it is not necessary to resort to the use of nitrogenous concentrates to insure palatability. Leafy hays are preferable to the more stemmy sort for lambs. Lambs will not eat coarse, woody stems unless forced to do so. Of course, grinding the hay, as is sometimes done by those who use self-feeders, will permit the use of a stemmier hay than could otherwise be utilized.

However, the additional food nutrients made available to the lambs by grinding hays are not sufficient to pay for the expense which is necessarily incurred. Grinding hay for lambs is only advisable when it is necessary to mix it with grain in a self-feeder for the purpose of making the ration lighter, more bulky, and avoiding impaction and the digestive disorders which might result from the overfeeding of grain.

**Alfalfa Hay.**--Feeding trials at this and other agricultural experiment stations indicate that alfalfa hay stands supreme among Kansas-grown roughages for fattening lambs. This fact in itself offers certain problems in different sections of the state. In parts of Kansas where alfalfa hay is a good crop and the supply is abundant the problem is one of utilizing the crop. Lambs have been fattened on alfalfa hay alone.

In this connection it may be of interest to alfalfa growers to know that western lambs costing \$13.10 per hundredweight, fed shelled corn and alfalfa hay for 45 days, gave a return of \$80.40 per ton for the alfalfa hay fed them, when corn was figured at 70 cents per bushel.

The fact that alfalfa is not successfully grown in all parts of the state, along with the decreasing acreage of alfalfa, offers the opposite problem--how to get along without it or at least with the smallest possible quantity. A feeding trial was conducted by this station with an idea of determining the minimum efficient utilization of alfalfa hay when corn was fed according to the appetite of the lambs. The results were so interesting that they merit reporting here.

One lot of 52 lambs was fed  $\frac{1}{2}$  pound of alfalfa hay per lamb per day, a similar lot was fed 1 pound, and a third lot  $1\frac{1}{2}$  pounds. In addition to the hay the lambs were given all the shelled corn they would clean up. The lots were fed for 60 days.

There was little difference in the gains made by the three lots during the 60-day period. In all lots the daily gains increased as the feeding progressed, unusually large gains being made in the last 20 days of the trial. For the first 20 days the gains increased with the amount of hay fed, but for the last two 20-day periods the gains increased with the amount of corn fed. For the entire 60 days the gains were greatest where the smallest amount of alfalfa hay was fed.

Increasing the corn and decreasing the hay lowered the cost of gain in this trial when corn was figured at 70 cents per bushel and alfalfa hay at \$15 per ton.

From the standpoint of finish there was little difference in the  $\frac{1}{2}$ -pound and 1-pound hay lots, but the  $1\frac{1}{2}$ -pound hay lot was notably deficient in finish and bloom, so much so that it was seriously objected to by packer buyers.

Cheaper gains, more rapid gains, and a more desirable finish may be had when the ration consists of comparatively small amounts of alfalfa hay and large amounts of shelled corn. While this is figured on the basis of 70 cents for corn and \$15 for alfalfa, the same will hold true as long as the cost of a pound of corn does not exceed four times the cost of a pound of alfalfa hay.

The gains made at different periods by these lots show that it would be advisable to feed a larger amount of hay at the beginning of a feeding period than at the close.

The results indicate further that it is not advisable to feed so much as  $1\frac{1}{2}$  pounds of hay to fattening lambs. When such a large amount is fed they will not eat enough corn to put on a suitable finish.

**Sweet Clover.**--Sweet clover hay, when cut before it becomes too coarse and when cured properly, is quite similar in content

and physical properties to alfalfa hay. In a number of feeding trials at this station it has given practically the same results, as regards daily gain, cost of gain, and feed required for 100 pounds of gain. It is worthy of note that in all trials alfalfa-fed lambs carried slightly more finish and bloom at the close of the several feeding periods than did those lambs fed sweet-clover hay.

In a trial comparing the nutritive value of these two feeds, lambs paid a return of \$80.40 per ton for the alfalfa they ate and \$76.20 per ton for the sweet clover they ate, when corn was figured at 70 cents per bushel. On this basis, figuring alfalfa as 100 percent efficient as a roughage for fattening lambs, sweet clover was figured as 95 percent efficient.

**Cowpea Hay.**--Cowpea hay, cut when the pods were almost ripe, was fed to lambs in comparison with alfalfa hay at this station. The lambs relished the leaves and pods, but refused to eat the greater part of the coarse, woody stems. The lambs fed the cowpea hay along with shelled corn made about the same daily gain and had practically the same feed requirement for 100 pounds gain as lambs fed the alfalfa hay and shelled corn. They did not, however, carry so high a degree of finish and bloom as the alfalfa-fed lambs, consequently they did not command so high a selling price. The lambs paid \$69.60 per ton for the cowpea hay fed them, when corn was figured at 70 cents per bushel, and the cowpea hay was figured to be 87 percent as efficient as alfalfa for fattening lambs.

**Sudan Hay.**--Sudan hay, a forage crop available in all parts of Kansas, was fed to lambs along with shelled corn in comparison with alfalfa hay and shelled corn. For the first 15 days of the feeding period the lambs receiving Sudan hay relished their feed and cleaned it up readily. After this time they lost appetite and did not do well, indicating a lack of balance in the ration. Had a nitrogenous concentrate been added this difficulty would no doubt have been overcome, and greater returns would have been had from the Sudan hay. As it was the alfalfa-fed lambs made an average daily gain of 0.32 pound as compared with 0.25 pound for the Sudan-fed lambs. The alfalfa lot required considerably less feed for 100 pounds of gain, carried more finish and returned a larger profit, Sudan hay in this case was figured to be 56 percent as efficient as alfalfa when fed with shelled corn alone for fattening lambs.

**Silage.**--Silage is probably the cheapest roughage that can be grown in Kansas. Silage can be satisfactorily made from corn, cane, or any of the grain sorghums. Choice of these crops for silage should depend on the yield tonnage per acre in any given locality. At this station Orange cane seems to yield the most, and practically all of the silage for experimental feeding

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is made from it. In feeding silage to fattening lambs, or to any other class of sheep for that matter, care must be exercised in avoiding moldy or frozen silage. Either will cause digestive disorders.

In a test conducted at the Kansas station two lots of lambs were fed shelled corn, cottonseed meal and alfalfa hay; and shelled corn, cottonseed meal, alfalfa hay and silage, respectively. The results showed little difference in the rate of gain, finish, or selling price.

In a more extensive trial to determine just how far one might go in feeding silage, six lots of lambs were fed for 60 days. All lots were fed both shelled corn and cottonseed meal. The same amount of shelled corn was fed each lot. The amount of cottonseed meal was determined by the amount of alfalfa hay fed, those receiving more hay receiving less of the meal.

In addition to the corn and cottonseed meal, one lot was fed alfalfa alone as the roughage for the entire period. Another received silage alone as the roughage for the entire period. A third lot was fed both alfalfa and silage throughout the 60 days. A fourth lot received silage alone for 20 days and then both silage and alfalfa for 40 days. The fifth lot had silage alone as the roughage for 30 days and alfalfa and silage for the remaining 30 days. The sixth lot had silage for 40 days and alfalfa and silage for the last 20 days.

Very interesting results were secured. They showed that more rapid gains were to be had, and also a higher finish, when silage was not excessively used.

They also showed that silage can be judiciously added to alfalfa as the roughage portion of the ration and materially cheapen the cost of gains. The lambs receiving silage alone as the roughage were lacking in appetite, made slower and more expensive gains, and had the lowest degree of finish. This would indicate that silage cannot be depended upon as the sole roughage. The results also brought out the fact that where it is necessary to use silage alone as the roughage for a part of the feeding period it is better to do so in the early part of the period rather than at the later, and that the time to add alfalfa to the ration is before the lambs lose appetite, rather than afterward.

### Salt

Salt will help the appetite of the fattening lamb. The method of giving salt and the kind to use sometimes presents a problem. Western lambs unaccustomed to free access to salt may eat too much at first and have considerable trouble from digestive disorders. If it is desired to allow free access to salt the amount should be limited until the lambs get accustomed to it. Such a situation can also be handled by mixing an adequate amount of salt in the grain.

Records at this station show that feeding lambs have eaten an average of 0.01 pound of salt per head per day. They have been given barrel stock salt and allowed free access to the salt after becoming accustomed to it.

When block salt is put before the lambs it is advisable to break up the block at first and distribute small lumps over the lot. Otherwise the stronger lambs will get more than is good for them and the smaller lambs will not get their share.

#### **Water**

Fattening lambs should have fresh water available at all times. Where water troughs freeze it may be advisable to use tank heaters. In the feed lots at this station it has been quite noticeable that lambs make better gains during periods when the water troughs do not freeze.

