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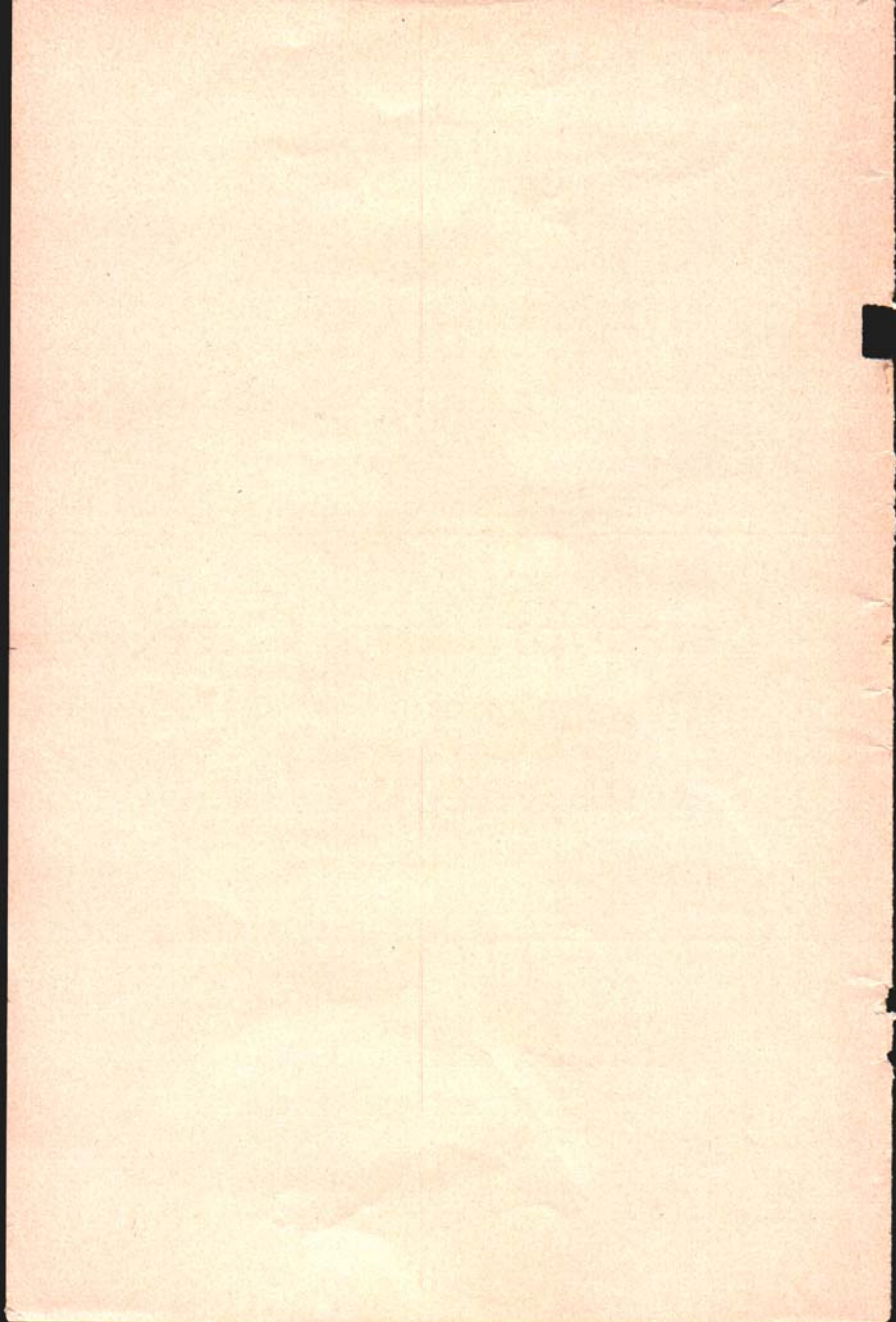
EXTENSION BULLETIN 242



Selection and Care
of the
Farm Sheep Flock

By GEORGE BROWN

MICHIGAN STATE COLLEGE
COOPERATIVE EXTENSION SERVICE
EAST LANSING



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SELECTION AND CARE OF THE FARM SHEEP FLOCK

By GEORGE A. BROWN¹

Agricultural problems of recent years have been due in a large part to surplus supplies of crops sold directly for human consumption. Increased yields per acre, wider use of mechanical power, thus enabling one man to till a larger acreage, and the substitution of motor power for horsepower have all contributed to the increased supply of surplus products. Development of livestock enterprises, utilizing more land for pasture, and providing a home market for all roughages and a larger proportion of our cereal grains, will aid materially in solving the problem.

SHEEP ON MICHIGAN FARMS

Sheep will play a prominent part in the development of such a program. They produce two "crops" per year (wool and lamb), and require less labor than other classes of livestock and only a small amount of grain.

Physical equipment required for sheep is comparatively small. The buildings necessary are inexpensive and easily constructed. While flocks must have constant observation and some attention, the time involved in handling a flock of sheep is not great, and the labor—except during the lambing season—is not arduous.

No class of livestock can be so successfully carried over the winter months on roughages only as the breeding ewe flock. In fact, when the flock is not bred to lamb until after the grazing season starts, the ration often consists entirely of roughage. When good pasture is available and the flock is kept healthy, fat lambs may be sold off grass. Sheep husbandry requires a rather large acreage of pasture land as compared with the acreage necessary to produce winter feed. As a result, they are well adapted to a new section where only small areas are available for cultivation or to the farm where it is not possible or desirable to cultivate a large acreage.

The production of both wool and lamb, affording two sources of income at different seasons of the year, reduces very materially the element of risk which is a part of all livestock enterprises. While all

¹Professor Emeritus and former head of Animal Husbandry. The author wishes to acknowledge the valuable assistance in the preparation of this manuscript given him by L. H. Blakeslee and Harold Henneman of the Animal Husbandry department.

sheep produce both wool and lamb, there is a wide range in the adaptability of the different breeds in the performance of these functions. Accessibility to market, availability of feed, and the relative price of wool and lamb will determine which will receive the major emphasis. In no case should either function of the sheep be neglected. Local conditions should determine the stress that each receives. There is a constant demand for wool which will always be a staple article of clothing. While the per capita consumption of lamb is low, the possibilities for increase are comparatively unlimited. An increase of one pound in the present per capita consumption of 6½ pounds would permit considerable expansion in sheep raising.

BREEDS OF SHEEP

There are more than 40 breeds of sheep, most of them originating in the British Isles. Twenty-two breeds have been introduced in the United States, 12 of which are well established and generally known. On the basis of wool production, the better-known breeds may be divided into four classes:

1. Medium-wool or down breeds,
2. Fine-wool breeds,
3. Coarse-wool breeds, and
4. Fur sheep.

Table 1 (page 12) summarizes all the more important data for the breeds represented in the Michigan State College flocks.

Medium-Wool Breeds

Shropshire—This is the most popular breed in Michigan, owing to their combination of excellent lamb- and wool-producing qualities. They possess a low-down, compact, and blocky form, mature rapidly, and the lambs reach market condition at a weight of 70 pounds. The nose, ears and legs, where not covered with wool, are dark brown to a soft black. Mature ewes weigh from 125 to 150 pounds, and mature rams from 175 to 250 pounds. This breed lacks the milking ability of some of the larger breeds, and in many cases too much emphasis has been placed on refinement and wool covering. Over a period of 30 years, the College Shropshire flock has produced on an average a 140-per cent lamb crop, and has averaged 8 pounds of wool per fleece annually, 82 per cent of the fleeces grading ¾- and ¼-blood staple.

Hampshire—The Hampshire is one of the largest of the medium-wool breeds. Mature rams weigh 225 to 300 pounds and ewes from 160 to 200 pounds. They are a heavy-boned, rugged, somewhat up-standing, muscular sheep. The open face, with jet black color of the head, face, and legs, is a distinguishing feature. The ears are heavy and as a rule slightly drooped. Their high-milking ability, combined with an abundance of pasture, often produces a fat lamb at weaning time weighing 90 pounds. When the lambs need to be fed after weaning they may become too coarse or heavy for the market. The College flock has produced on an average a 137-per cent lamb crop and has sheared a 7½-pound fleece. Eighty per cent of the fleeces have graded ¾- to ¼-blood staple, with a higher percentage of ¼-blood fleeces than the Shropshire.

Oxford—The Oxford ranks second in popularity in Michigan due to its size and ruggedness, combined with heavy-shearing qualities.

The heavier shearing qualities are due largely to a longer staple of wool. Mature rams weigh from 250 to 300 pounds, and ewes from 160 to 200 pounds. They lack the muscular development of the Hampshire and are somewhat upstanding. If not marketed at weaning time or soon thereafter, they have a tendency to become too heavy and coarse. In color markings, the Oxford ranges from a dark grey to a soft black, sometimes with a white spot on the nose. They are woolled only over the forehead. The Oxford is one of the more prolific breeds of sheep. The College flock has produced on the average a 143-per cent lamb crop, and has sheared a 9-pound fleece. Eighty per cent of the Oxford fleeces have graded ¼-blood staple.

Southdown—The ideal mutton carcass is more nearly approached by the Southdown than by any other breed. They are a short, thick, low-set sheep with an abundance of quality and refinement. The face is a dark grey to mouse color. An active alert carriage of the head and ear is a characteristic of the breed. Mature Southdown rams weigh from 175 to 200 pounds; ewes, from 125 to 150 pounds. They are one of the small breeds which lack the rapid growth qualities desired in a commercial flock of sheep. The College flock, over a period of 20 years, has produced on the average a 144-per cent lamb crop with fleeces averaging 6¼ pounds per ewe. Sixty-three per cent of the fleeces have graded ¾- or ½-blood staple, and 30 per cent as ¾- or ½-blood clothing.

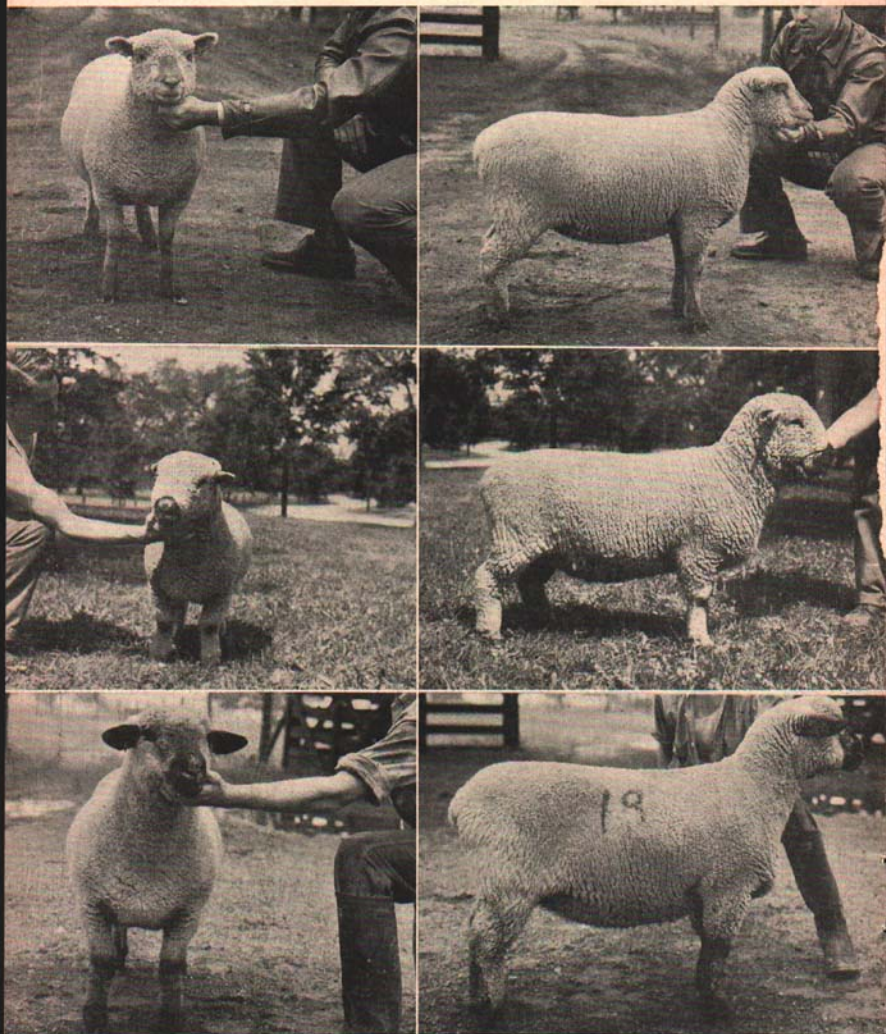


Fig. 1.

1. Front and side view of a yearling Southdown ewe.
2. Front and side view of a yearling Shropshire ewe.
3. Front and side view of a yearling Hampshire ewe.

Dorset-Horn—While not numerous in Michigan, the Dorset is a popular breed in the East, because of its adaptability to the production of "hot-house" lambs. Their excellence in this respect is due to the fact that the ewes are excellent "milkers" and will mate in the spring of the year. The statement is often made that the Dorset will produce two crops of lambs per year. Under practical conditions, the best that one can expect is three crops of lambs in two years. They are a medium-to-large breed of sheep, with a thick covering of flesh. A tendency exists, however, for them to be long in body and coarse at the shoulders. Rams weigh from 200 to 225 pounds, and ewes 150 to 175 pounds. The face and legs are white with no wool covering, and both male and female possess horns. The College flock has produced a 151-per cent lamb crop and has averaged 7¼ pounds yearly in wool production, the wool grading ¼-blood staple.

Cheviot—The Cheviot is one of the smaller breeds of sheep, mature rams weighing from 175 to 200 pounds and ewes from 125 to 150 pounds. The Cheviot is one of the most attractive and "showy" breeds. The head and legs below the knees and hocks are free from wool, and are white in color with occasional black spots. They shear 6 to 8 pounds of wool annually, grading ¾- to ¼-blood staple. They are one of the more prolific breeds.

Suffolk—The Suffolk is one of the larger breeds of sheep, being very similar to the Hampshire in size. Mature rams average from 200 to 250 pounds and mature ewes from 160 to 200 pounds. They possess a jet black color of face and legs, with very little covering of wool over the head or on the legs. They are not so heavy "shearers" as the Shropshires, Hampshires or Oxfords. This breed is distinguished by very thick flesh, and a heavily-muscled body. They produce, under good care, an excellent market lamb. Care must be exercised in the selection of breeding stock to obtain individuals that are low-set, smooth in frame, possessing a clean fleece, free from dark fibers. They are especially noted for their good milking qualities and the rapid maturity of the lambs.

Corriedale—The Corriedale is a comparatively recent breed, originating in Australia from a cross of Lincoln and Leicester rams on Merino ewes. They carry an excellent fleece of bright, lustrous wool, grading from ¼- to ¾-blood staple. They shear a somewhat heavier fleece than the other medium-wool breeds, most flocks ranging from

10 pounds up. The face, ears and legs, where not covered with wool, are a clear white in color. While producing a superior quality of wool this breed lacks the growthiness of the Hampshire, Oxford or Suffolk.

Other medium-wool breeds are: Columbia, Romney, Panama, Romeldale, Tunis and Black-faced Highland. Only occasional representatives of any of these breeds are found in the state.

The Fine-Wool Breeds

Merino—The Merino is one of the oldest breeds of sheep. Until 1880 a majority of the sheep of this country were of Merino breeding. Three types of Merino sheep were formerly recognized by registry associations and fair classifications, namely, the A, B, and C.

The A type is small, very wrinkly, of inferior conformation, slow maturing, is not prolific, and the wool produced is seldom of staple length. They do possess a very fine, dense fleece and are extremely hardy.

The B type is somewhat larger, of smoother body conformation and possesses a slightly longer fleece.

The C type, represented by the Black-Top Delaine, has replaced, to a large extent, the A and B Merinos in Michigan.

Black-Top Delaine—The Black-Top Delaine, a C type strain of Merinos which has been bred pure in Michigan for many years, possesses a smooth body, virtually free from wrinkles, an open face or one not covered by wool below the eyes, and a staple ranging from 3½ to 4 inches in length at a year's growth. The Delaine possesses better mutton conformation and more rapid maturity than either the "A" or "B" Merinos. The College flock of Black-Top Delaine Merino ewes has averaged a 14-pound fleece of wool, 85 percent of the fleeces grading fine staple. The average lamb crop produced is 117 per cent. The farmer who wishes to breed for late producing lambs on pasture and is in a position to feed out his lambs the following winter will find the Black-Top Delaine a desirable breed.

Rambouillet—The Rambouillet is the largest of the fine-wool breeds of sheep, matures more rapidly, and possesses greater growth ability, and decidedly better mutton conformation, than the A, B, or C types of Merino sheep. They are strong in bone, and possess an excellent covering of wool, the face, legs and underside of the body being well covered. Excessive wool covering over the head is a handicap to any sheep. In no case should the covering be such as to obstruct the

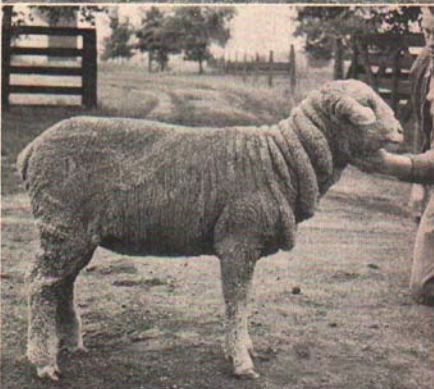
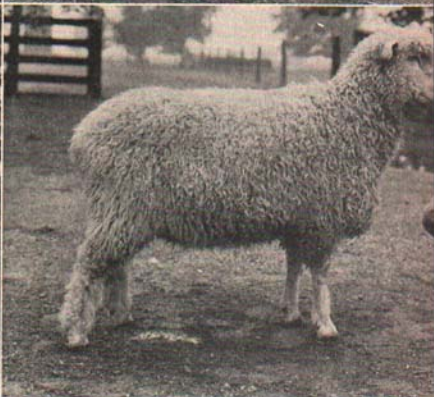
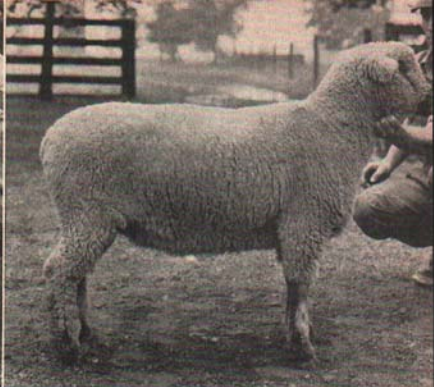


Fig. 2.

1. Oxford yearling ewe.
2. Cotswold yearling ewe.
3. Rambouillet yearling ewe.

vision. The modern Rambouillet should be almost smooth of body or without wrinkles, except one or two on the neck, and an apron or wrinkle, extending from the point of one shoulder to the point of the other shoulder, giving the animal a full-appearing breast. The Rambouillet is a hardy, rugged breed and may be criticized only in lacking somewhat in length of staple. Mature rams weigh from 175 to 250 pounds and ewes from 125 to 150 pounds. The College flock shears, on the average, 12 pounds of wool, 65 percent of the fleeces grading fine staple or French combing and the remainder fine clothing. The flock has produced a 123-percent lamb crop.

The Coarse-Wool Breeds

These are the Cotswold, Lincoln, and Leicester, all of which are found in the state but are not numerous. They are a larger, more upstanding sheep than either the medium or fine-wool breeds. Mature rams often weigh upwards of 300 pounds and mature ewes exceed 200 pounds. All have a clean, white color of face and legs (although a grayish-white or occasional brownish spot is not objectionable in the Cotswolds). The Cotswold has a long foretop; the Lincoln, a tuft of wool on the forehead; and the Leicester is virtually devoid of wool to a point back of the ears. They all possess a long, coarse fleece which grades as braid. Owing to the open fleece, these sheep cannot

TABLE 1--Data from the Michigan State College flocks

Breed	Average Mid-gestation Ewe Weight 1938-42	Average Ewe Fleece Weight 1907-34	Live Lambs Dropped per 100 Ewes 1905-42	Average Daily Lamb Gain to Weaning 1939 and 1940	Ewe Fleece Grades and Percent of Total, 1933-38
	Pounds	Pounds	No.	Pounds	
Shropshire.....	148	8.09	141	.44	51% $\frac{3}{4}$ -staple—31% $\frac{1}{4}$ -staple—9% $\frac{3}{8}$ -clothing
Oxford.....	183	9.02	141	.54	66% $\frac{1}{4}$ -staple—14% $\frac{3}{8}$ -staple—14% low $\frac{1}{4}$ -staple
Hampshire.....	169	7.46	137	.54	40% $\frac{3}{4}$ -staple—39% $\frac{1}{4}$ -staple—14% $\frac{3}{8}$ -clothing
Blacktop.....	127	14.84	119	.40	84% fine staple—10% fine French combing
Rambouillet....	143	11.8	128	.46	41% fine staple—24% fine French combing—34% fine clothing
Southdown.....	133	6.2	142	.35	46% $\frac{3}{4}$ -staple—16% $\frac{1}{2}$ -staple—22% $\frac{3}{8}$ -clothing
Cotswold.....	160	11.44	136	.48	100% braid
Dorset.....	7.22	151	84% $\frac{1}{4}$ -staple—16% low $\frac{1}{4}$ -staple

withstand exposure to severe storms so well as the more common breeds. Lambs do not finish at desirable market weight, and consequently the coarse-wool breeds are not popular in Michigan, although they have possibilities for cross-breeding with fine-wool sheep to produce a heavy-shearing flock of commercial ewes. The College flock of Cotswolds has averaged 12 pounds of wool yearly and produced an annual lamb crop of 132 per cent.

Fur Sheep

Karakul—The Karakul breed of sheep is not so valuable for the production of wool and lamb as the medium, fine and coarse-wool breeds which have been discussed. The breed lacks in mutton conformation, and a bunch of fat which covers the rump and tail is objectionable from a meat standpoint. Karakul sheep produce a fleece weighing from 7 to 8 pounds, grading as carpet wool which is less valuable than the medium, fine or coarse wool produced by the more common breeds. The claims made for this breed are based on the value of the pelt of new-born lambs for fur. The pelt must be taken soon after birth. Pelts produced in this country have lacked in uniformity and have a wide range in value. The average value of the pelt has not been sufficient to give a return so satisfactory as that received from the medium, fine or coarse-wool breeds.

CHOICE OF A BREED

Selection of a breed of sheep is a matter of personal choice. The breed itself has less to do with success or failure than the individual animal. The indifferent, careless flockmaster will fail with the finest type of sheep obtainable, regardless of breed, while the careful, painstaking shepherd will succeed with any breed.

Breeds most common in Michigan are: Shropshire, Oxford, Hampshire, Rambouillet and Black-Top Delaine. Other breeds present in lesser numbers are: Suffolk, Southdown, Dorset, Cotswold, Lincoln, Cheviot, Corriedale, Romney, and Karakul. A visit to farm flocks of different breeds will aid materially in making a choice.

Literature on the breeds of sheep may be obtained from the secretaries of the respective registry associations:

American Shropshire Registry Association, Mr. Charles Osborn, Lafayette, Ind.

Hampshire Down, Mrs. Helen T. Belote, 72 Woodland Avenue, Detroit.
Oxford Down, J. M. McHaffie, Clayton, Ind.

- Rambouillet, Jack B. Taylor, San Angelo, Texas.
Black-Top Delaine, Robert Mast, Dexter, Mich.
American and Delaine Merino, Walter Staley, Jr., Marysville, Ohio.
Southdown, W. L. Henning, State College, Penn.
National Suffolk Sheep Association, C. A. Williams, Secretary, Middleville, Mich.
American Corriedale, Rollo E. Singleton, 120 N. Garth St., Columbia, Mo.
Cheviot, Mrs. Catherine Turrell, Oneonta, N. Y.
Lincoln, Ralph O. Shaffer, West Milton, Ohio.
Dorset, J. R. Henderson, Hickory, Penn.
Cotswold, F. W. Harding, Union Stock Yards, Chicago, Ill.
Karakul Fur Sheep Society, L. K. Brown, Friendship, Wis.
Columbia Sheep Breeders Association of America, LeRoy Johnson, Fargo, N. Dakota.

CROSS-BREEDING

Purebred animals are the foundation and backbone of the livestock industry. The purebred sire has wrought tremendous improvement in the past and must be our dependence in the future. Most breeds have been developed to fill a particular need or fit a given location. Some of the traits which make a breed pre-eminent in one locality or under a given set of conditions may be highly desirable in the commercial output or breeding flocks of another locality. The purchase of purebred sires for cross-breeding is the most rapid way of obtaining these traits in a commercial flock.

The dual nature of sheep (wool and lamb production), the wide range in conditions under which they are grown, and a frequent change in emphasis (from wool to lamb or *vice versa*) has resulted in systematic cross-breeding for commercial production. There is no one cross or breed that will give optimum results from the standpoint of market lambs, wool production and desirable traits in the breeding ewe flock. The small flock owner is, therefore, at a disadvantage in practicing cross-breeding.

Cross-breeding should not be resorted to without a careful study of the breeds involved and the formulation of a definite plan for the future mating of the flock. Results obtained will depend upon the individual excellence of the animals mated and not upon the mere fact that cross-breeding is practiced.

In experimental trials carried on at a branch of the Michigan station at Chatham, a plan of cross-breeding using Lincoln and Black-Top Delaine rams has proved satisfactory in the production of wool and lamb. A grade Hampshire flock maintained at that station had proved unsatisfactory from the standpoint of wool production. Shear-

ing an average of 6.3 pounds, 20 percent of the fleeces were graded "clothing". A Rambouillet flock, kept at the same station, sheared 8.3 pounds of wool with the majority of the fleeces of clothing length. Very few of the Rambouillet lambs possessed sufficient size to sell satisfactorily off pasture.

Cross-breeding was inaugurated by mating the grade Hampshire ewes to a Black-Top Delaine ram and the Rambouillet ewes to a Lincoln ram. Subsequent matings were determined by the fleece and body characteristics of the $\frac{1}{2}$ -blood ewes, although as a whole, those sired by Black-Top Delaine rams were mated to a Lincoln ram and *vice versa*. Both flocks were handled under the same conditions as the purebred and the grade Hampshire flocks. The weight of lambs at weaning time has been as follows: 231 Hampshire lambs have averaged 72.5 pounds; 121 lambs sired by a Black-Top ram, 68.5 pounds; and 127 lambs sired by a Lincoln ram, 75.5 pounds. The weight of 280 cross-bred fleeces has been 9.05 pounds each, and of 233 Hampshire fleeces, 6.5 pounds. Eighty-nine percent of the cross-bred fleeces and 81 percent of the Hampshire fleeces have graded $\frac{1}{2}$ -, $\frac{3}{8}$ -, or $\frac{1}{4}$ -blood staple.

In the College flock at East Lansing, a cross of a Cotswold ram on Rambouillet ewes has produced rapid-maturing lambs which have developed into large, heavy-shearing ewes producing a $\frac{3}{4}$ -blood fleece, averaging nearly 12 pounds in weight. While each of the foregoing crosses has produced excellent commercial breeding ewes, best results in market lamb production have been obtained by mating these ewes to a Hampshire ram.

SELECTING THE FLOCK

The ewe flock selected should possess good breeding, conformation, and wool-producing ability. Age, soundness, and health are equally important. The question of breed is not nearly so important as the individuality of the animals selected.

Breeding

Native ewes of either the medium of fine-wool breeds are available in most localities. Ewes of the medium-wool breeds are larger, superior in conformation and produce an early-maturing lamb more acceptable on the market. Fine-wool ewes are longer-lived, hardier and produce more wool. For the production of market lambs, fine-

wool ewes should be bred to a medium-wool ram. A coarse-wool ram is preferable if the ewe lambs are to be retained in the flock.

Western ewes are available at central markets and from local dealers. As a rule, they are more uniform in breeding and less likely to be infested with internal parasites than native ewes. They should be mated to a medium or coarse-wool ram.

Conformation

The breeding ewe should have good size, a moderately low-set, compact body with well-placed legs, wide apart and straight at both knees and hocks. The head should be comparatively short, with good width between the eyes and ears. A short, deep, full neck, smoothly attached to the shoulder is desirable. A long, narrow head and neck are frequently associated with a narrow body and lack of constitution.

The shoulder should be wide, deep and smooth both over the top and at the shoulder point. A deep, full breast, wide between the forelegs, indicates a strong constitution.

The back and loin should be strong and level with a wide spring of rib and even width from end to end. Depth of ribs and fullness of flanks are associated with good feeding capacity.

The rear quarters should be long, wide and deep with a level rump, full dock, and deep twist.

Fleece and Skin

A good wool clip will pay for the cost of wintering the flock. Quantity and quality will determine the value of the fleece. A complete covering over all parts of the body, good length of staple (not less than 3½ inches), and density or thickness of fibers will give a heavy fleece of wool.

Quality refers to the actual diameter of the wool fiber (fineness) and texture of the fleece. A large number of serrations or waves per inch of length and a soft, velvety texture indicate fineness of fiber. To show good texture, the wool fiber must be fine and have a free flowing yolk (oil), which prevents sand and grit from penetrating the fleece. The fleece should be clear white in color (below the surface) and possess a bright, glistening varnished-like appearance. Wool of staple length (3 inches or longer), and grading ¼-blood or finer, produces a more satisfactory return than clothing wools (short staple) or wools graded as braid. Wools having many black fibers, or of a

dull grey color, are discriminated against on the market. A bright pink skin indicates thrift and freedom from parasites.

Age

A sheep's age may be determined by the teeth until it has passed four years of age. Beyond that age, the teeth indicate the usefulness and value of the animal in the flock, but not the exact age.

The lamb has eight milk teeth in the lower jaw. They are rather small, wide at the crown and narrow at the base. Between 12 and 18 months of age, the center pair of incisors is replaced by permanent teeth which are longer, wider at the crown and more uniform in width from base to crown than are the milk teeth. The permanent teeth are at approximately right angles to the jaw. At two years of age the second pair of incisors, or the second teeth back from the center on either side, is replaced by permanent teeth. At three years of age the third pair is replaced, and at four years the fourth pair or corner teeth are replaced, and the sheep is said to have a full mouth.

At this time teeth are beginning to slant slightly forward and at five years they are elongated, more slanting and slightly spread apart. As the sheep becomes older the teeth elongate and spread, sometimes breaking off or falling out. When this occurs, ewes are known as "broken-mouthed" (Fig. 3).

Unsoundness

Unsoundness in a ewe is anything which hinders production when the ewe is well fed.

Broken Mouth—Do not select "broken-mouthed" ewes. They cannot forage well, are usually in poor condition and not good milkers.

Deformed Jaw—The upper and lower jaws should be even in length with the incisors of the lower jaw fitting against the cartilaginous pad of the upper jaw. A sheep with either jaw protruding beyond the other is a poor forager.

Unsound Udders—The udders and teats should be soft and pliable. A hard core in the teat prevents the lamb from getting the milk. If either or both sides of the udder are enlarged and hard, the ewe has had mastitis and will not milk from the affected part.

Breach—Any ewe noticeably heavy or enlarged directly below the rear flank undoubtedly has a weak abdominal wall, if not a breach, and is unsatisfactory as a lamb producer.

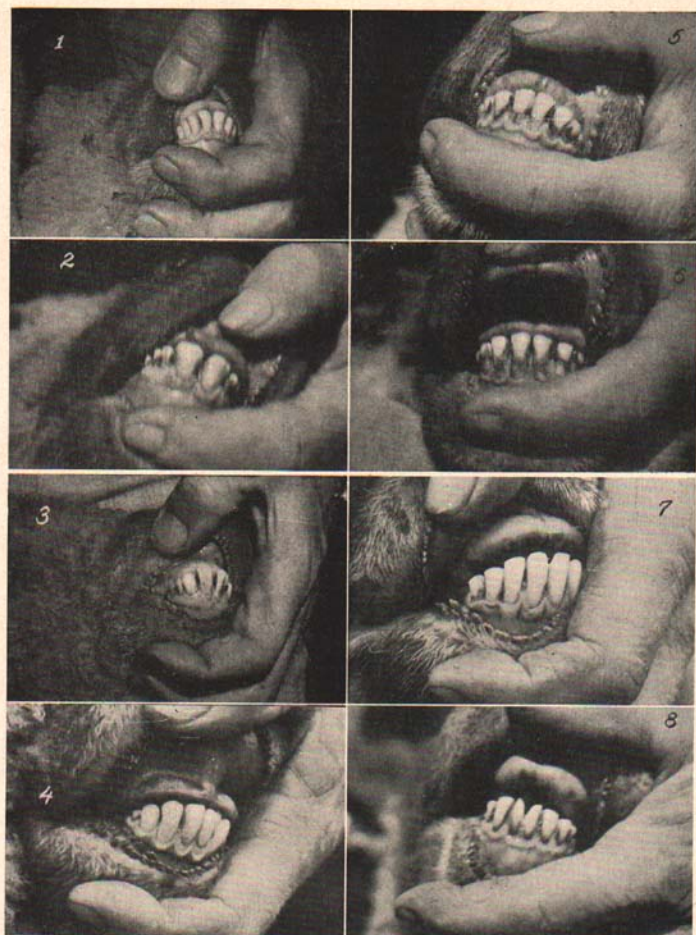


Fig. 3. Teeth as an indication of age.

- | | |
|--------------------|--------------------|
| 1. Lamb. | 5. Four-year-old. |
| 2. Yearling. | 6. Five-year-old. |
| 3. Two-year-old. | 7. Six-year-old. |
| 4. Three-year-old. | 8. Seven-year-old. |

Health

The sheep should be in thrifty condition, active and free from any indication of either external or internal parasites (pages 36 and 41). Allowance should be made for the fact that a good ewe is frequently in thin flesh following the weaning of her lambs.

SELECTING THE SIRE

The sire has an influence on every lamb raised in the flock, while one ewe influences only one or two lambs. To effect improvement, the sire selected must be superior to the ewes, and capable of transmitting his characteristics. A high-class individual, correct in conformation and possessed of a concentration and purity of bloodlines, found only in the purebred animals, should be used.

The ram should possess larger size, heavier bone, more ruggedness and a heavier fleece than the ewes. A short, broad, full head, especially wide over the nose and between the eyes, with a short, thick neck, indicate desirable masculine character. The ram should be active and alert, showing a bold, vigorous character. The chest should be deep, wide and full, with the shoulder well covered with meat and laid back smoothly over the ribs. A short, deep middle, a wide spring of ribs, and depth of flank are desirable. The hindquarters should be long, wide, full at the dock and deep in the twist. The legs should be straight, strong, and well placed at the corners of the body.

FALL CARE OF THE FLOCK

Foundation for the success of the succeeding year's lamb crop is laid during the fall months. This is also an opportune time to select a foundation flock or purchase ewes for replacements. Ewes are usually thin in flesh, carry very little wool, and can be purchased more reasonably than at other seasons.

Commercial producers frequently make a practice of selling all lambs and purchasing replacements. When heavy-shearing ewes of good size can be obtained and are mated to a ram of superior mutton type, this is a good practice. This method does not offer opportunity to make improvement in the ewe flock through breeding and selection.

Culling

The flock should be carefully culled each fall. As a basis for culling, each ewe should be given an ear tag and an accurate record made

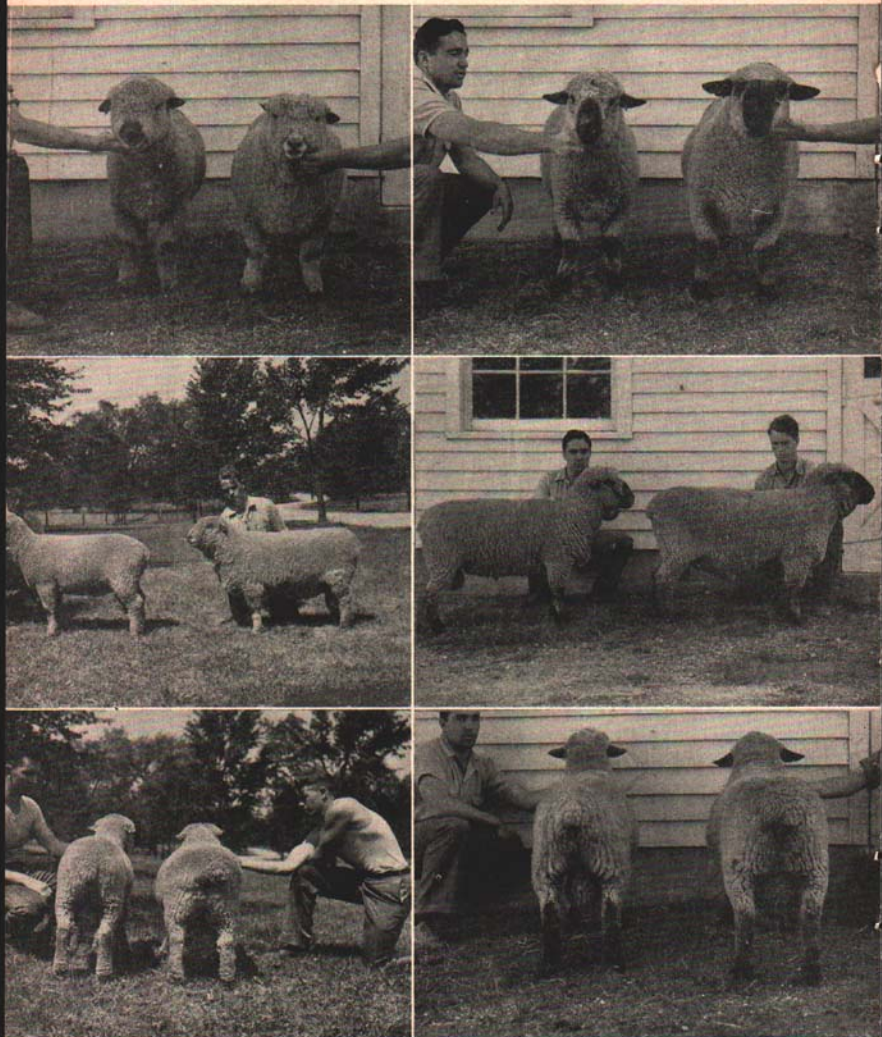


Fig. 4.

Three views of two Shropshire rams.

Three views of two Hampshire rams.

In each case the ram on the right shows desirable characteristics. A ram of the type shown on the left should not be selected as a sire.

of the weight and grade of both her fleece and lamb. Only high-producing ewes should be retained (page 25). Age, soundness and conformation should also be considered.

The flock owner who grows his own replacements should save each year from 1/5 to 1/6 as many ewe lambs as he has breeding ewes. Rapid improvement can be made in a flock by the use of a purebred sire of correct form and breeding, and the selection of ewe lambs from heavy-shearing, good milking dams.

Flushing

The breeding ewe which is gaining in condition usually conceives at the first service and frequently produces twin lambs. The thin ewe, one losing weight, or excessively fat, is difficult "to get in lamb" and seldom produces twins. For two weeks previous to and during the mating season, give the flock the best pasture on the farm. A change to fresh pasture, such as rape or second-cutting alfalfa or clover, gives an increase in quality of the ration. When it is not possible to provide improved pasture, the ewes should be fed from $\frac{1}{2}$ to $\frac{3}{4}$ pound of oats or other grain per head daily. Good care during the fall season not only insures a more even lamb crop, but the ewe in good condition is more easily wintered than the thin ewe. A change to fresh pasture often results in a laxative condition. As a result, all ewes should be carefully tagged to prevent soiling of the fleece and facilitate mating.

Mating

The period of gestation is 147 days, although an occasional ewe will lamb at 140 days. The normal breeding season is from the middle of August to the end of December. The period of heat lasts about one day and occurs each 16 to 17 days.

Where suitable conditions are available in the way of shelters and high-quality feeds, early lambs born in January, February or March are most satisfactory. Early lambs have many advantages. The labor required at lambing time is over before spring work starts. They are ready for the market before the heavy run of western lambs. The lambs may be marketed before pastures become dry and ahead of the season when parasitic infestation is most severe.

Late lambs born in April and May may be sold fat off grass in the fall if free from parasites and provided with good pasture, or may be finished on grain and hay at the close of the grazing season.

A strong, vigorous ram will serve 40 ewes when allowed to run

with them. If separated from the flock during the day and fed liberally, one ram will serve 60 ewes. If the ram is confined and the ewe flock brought in daily, each ewe being allowed one service, a ram will serve more than 100 ewes. If several rams are to be turned together with a large flock, there should be one ram for each 25 ewes. A well-grown ram lamb may be used on 20 ewes.

The stock ram should be in good flesh at the start of the season and so fed that he will remain in vigorous condition. When possible, it is good practice to give the ram one pound of oats daily for some time previous to and during the breeding season. The wool should be trimmed from around the ram's eyes and sheath.

Well-grown ewe lambs weighing 100 pounds may be bred with satisfactory results. They should be separated from the flock and given extra care during the gestation period.

Check the Sire

Occasionally a sire will prove impotent. Loss of potency between seasons or during a season is not unusual. After the ram has been with the flock 16 days, smear a thick paste of oil and yellow ochre on his breast between the front legs so that all ewes re-bred will be marked. This should be applied to the ram's breast every third day. After the ram has been with the flock 32 days, change to lamp black and oil. If any ewes are bred a third time, another sire should be obtained. If it is not practical to mark the ram, turn in a second ram after five weeks, either by purchasing a second ram or exchanging with a neighbor.

FEEDING

Sheep can obtain most, if not all, of their feed from pasture during the fall and early winter months. Second or third crops of alfalfa-brome grass can be pastured after October 1 without injury to the stand. Permanent pastures not grazed closely during the late summer and early fall will provide good feed until covered with snow. The utilization of sugar beet tops or cornstalk fields will prolong the grazing season and reduce winter feed costs. In no case should the ewe flock be allowed to lose weight. Hay should be fed if pastures are not sufficient.

Buildings

Winter quarters need not be elaborate but should be roomy, dry, and free from drafts. If the doors to the barn are on the side away from the prevailing winds, they should be left open at all times. The sheep with a coat of wool will do better if not housed too closely. A close, ill-smelling, poorly-ventilated barn will always result in more trouble than will occur with sheep maintained in the open with only a wind-break for protection.

Doors to the sheep barn should be large to avoid crowding and injury to pregnant ewes. For ewes bred to lamb after they go to pasture, 10 square feet of floor space per ewe is sufficient. When lambs are born in winter quarters, 15 square feet of floor space per ewe should be provided.

Equipment

While only meager equipment is required for handling or feeding breeding ewes, the fleece should be kept free from dirt and foreign material and sufficient rack space provided to avoid crowding. A rack having solid sides will prevent grain or chaff from getting into the fleece. Figure 5 shows such a rack. Both hay and grain may be fed in this rack and the sides folded back so that one can walk into it to clean and feed. When made in 10- or 12-foot lengths, the rack may be conveniently moved and used as a partition.

Another type of rack is shown in Fig. 6. It is somewhat more economical, but does allow some chaff to fall on the sheep's neck. If grain is fed in a V-shaped trough and hay placed in the rack when the sheep are out of the barn, the amount of chaff getting into the wool will be reduced to a minimum.

From 16 to 24 inches of rack space (depending upon the size of sheep and the stage of pregnancy) should be provided for each ewe to avoid crowding and to permit all sheep to eat at the same time.

Winter Feeds

The basis of the winter ration for breeding ewes should consist of some good legume hay such as alfalfa, clover or soybean hay. Breeding ewes may be wintered entirely upon legume hay. A cheaper ration is one consisting of from 1½ to 2 pounds per head, daily, of legume hay, with the remainder consisting of cheaper roughage, such as cornstalks, bean pods, corn silage, or oat straw, fed freely.

A timothy-clover mixture makes a satisfactory sheep hay if it is cut early or when the clover is ready and before the timothy or other grass becomes coarse.

For exercise it is well to allow the ewes to run in a cornfield (from which the ears have been picked) during the day, and feed them legume hay at night. If this is not possible, hay or cornstalks may be fed some distance from the barn in the morning to force the ewes to exercise.

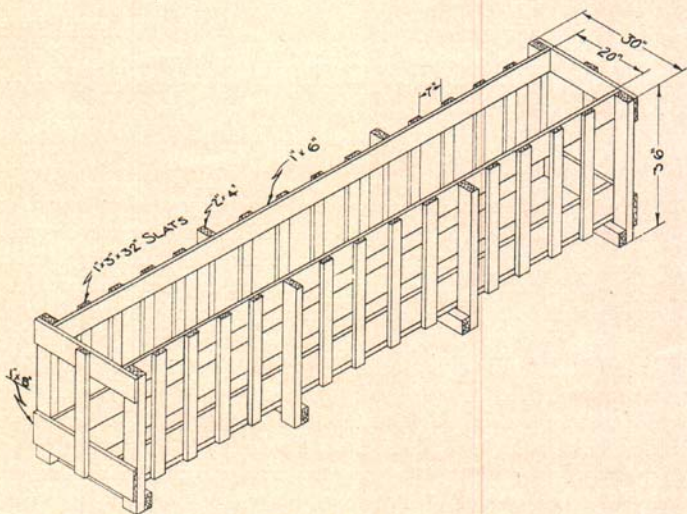


Fig. 6. Feeding rack. Care should be taken in placing hay in this rack, if the sheep are to be kept clean.

Corn silage of good quality (free from spoiled or moldy material and not frozen) fed at the rate of 2 to 2½ pounds per head daily, in combination with legume hay, makes an excellent ration. If silage is fed with the cheaper roughages, some protein concentrate such as linseed meal, cottonseed meal, soybean meal, or cull beans should be fed.

For most satisfactory results, the higher quality roughages should be fed the latter part of the gestation period. Water should be available at all times.

Suggested Rations

The following are suggested rations for breeding ewes, the amount fed varying somewhat with the size of the ewe:

Ration 1: 3 to 4 pounds per head daily of high-quality clover or alfalfa hay (first cutting).

Ration 2: 2½ pounds of corn silage per head daily, and 2 pounds of alfalfa or clover hay.

Ration 3: 2 pounds of alfalfa or clover hay, with free access to cornstalks, bean pods or oat straw.

Ration 4: Access to a cornstalk field or a pasture, if snow is light, with 2 pounds of legume hay at night.

Ration 5: Unlimited quantity of mixed hay, with that left being fed to cattle or horses.

Grain Feeding

When the quality of the roughage is poor, the quantity limited, or the ewes thin in flesh, it may be desirable to feed ½ pound of grain per head daily throughout the winter. The ewe which is given an abundance of quality roughage and is treated regularly for parasites can be carried to within 30 days of lambing without the use of grain.

A month previous to the start of the lambing season, it is advisable to add ½ pound of grain to the ration. Oats are the best single grain for ewes, followed in order by barley, wheat and corn. When wheat or corn is used, it is desirable to add some bulk by combining oats or bran with them. Bran is an excellent addition to the ration of pregnant ewes. It is bulky, slightly laxative, and high in minerals. With an abundance of good-quality, leguminous roughage available, the feeding of a high-protein concentrate is not necessary. When the cheaper, carbonaceous roughages are being used, or when corn or wheat are the only grains available, 1/10 to 1/6 pound per head daily of a high-protein concentrate should be fed.

Minerals

The flock should have access to salt at all times.

During pregnancy, either potassium or sodium iodide should be fed as a preventative of goiter. One-half ounce of either added to each 50 pounds of salt will prevent goiter. The one-half ounce of potassium iodide should be thoroughly mixed with one pound of salt, then with 4 or 5 pounds, and then with the entire 50 pounds.

When grass hay, cornstalks, bean pods, and corn silage are being fed, a mixture of 50 pounds of salt, 25 pounds of special steamed feeding bonemeal and 25 pounds of limestone should be kept before the flock in place of salt.

A cobalt deficiency has been found in some areas of the northern half of the Lower Peninsula and in the Upper Peninsula. One-half ounce of cobalt sulphate added to each 50 pounds of salt will correct this deficiency.

The flock grazed on pastures where there are some legumes and fed leguminous roughage during the winter seldom has need for any minerals other than salt and iodine.

CARE DURING PREGNANCY

Pregnancy disease (paralysis) is not an uncommon trouble of breeding ewes. It occurs most frequently with old ewes and ewes carrying twin lambs. The affected ewe loses weight, is dull, listless, walks with an unsteady gait, and unless remedial measures are taken, becomes paralyzed and unable to rise.

This trouble may be due to an insufficient amount of feed, a poor quality of roughage or failure to increase the quality and quantity of the ration as the gestation period progresses. Feeding badly weathered hay and forcing the flock to consume all roughage offered them are frequent causes of this trouble.

Observe the flock closely. Segregate and feed more liberally any ewes which are losing weight. When this trouble occurs, increase the ration, and feed from $\frac{1}{4}$ to $\frac{1}{2}$ pound of molasses per head daily.

CARE DURING THE LAMBING SEASON

The lambing period should be considered the harvest season, and every effort made to save as large a percentage of lambs as possible.

About 4½ months after the ewes have been mated, the barn should be cleaned and bedded down with fresh, clean straw in preparation for lambing. This is one season of the year when a warm barn, free from drafts, is needed to prevent chilling of the lambs. If the barn is too open and cold for lambing, that part most protected from cold winds should be partitioned off for use at this time. It is a mistake to allow the barn to become damp and the air foul because of insufficient ventilation.

Just previous to lambing, the ewe flock should be carefully tagged and the wool clipped away from both flanks and about the udders to aid the lambs in finding the teats.

Lambing Pens

Individual lambing pens should be provided. They can be made with two hurdles, 4 feet long, hinged together at one end. By starting in the corner of the barn, the shepherd may use two of these hurdles to make a temporary pen which is easily accessible. When pens of this kind are used, it is possible to: (1) regulate the ewes' feed; (2) prevent young lambs from becoming separated from their mothers; (3) prevent older lambs from taking the milk supply from the younger lambs, and (4) give the lamb an opportunity to get started.

Care During Parturition

When lambing time arrives, the ewes should be visited frequently and given assistance in lambing when necessary. One should hesitate to give assistance if the presentation is normal (both front feet presented first with the head lying between them). On the other hand, help should be given if there is an abnormal presentation such as the head or one forefoot back, the rear legs appearing first, or if the ewe fails to make progress after considerable labor. When a rear presentation is discovered, the lamb should be delivered as soon as possible.

Before attempting to help a lambing ewe, the fingernails should be cut, the hands washed with some good disinfectant and rubbed with vaseline or oil to guard against infection or tearing of the organs. First, get the lamb in normal position and then pull gently and slightly downward, making your efforts coincide with the efforts of the ewe. When the nose is exposed, the film should be removed because occasionally the navel cord is broken before the lamb is completely delivered, resulting in suffocation.

CARE IMMEDIATELY FOLLOWING BIRTH

The navel cord should be broken 2 inches from the lamb's body. Hold the cord close to the body with the left hand and sever by pulling with the right hand. Disinfect the navel by immersing the end of the cord in iodine.

Frequently a lamb which appears lifeless may be saved by some

method of respiration such as slowly moving the front legs backward and forward and blowing into the lamb's mouth at the same time.

After the ewe has started to dry the lamb she will need no help unless the weather is cold. In cold weather the lamb should be rubbed dry with a coarse flannel rag or sack after the ewe has had a chance to "own" it. Lambs which have become chilled may be revived by placing them in warm water (100° F.) for a few minutes, then rubbing dry, and placing them in a box heated by a jug of warm water. The milk should be started from both nipples because strong lambs will be on their feet attempting to nurse within 30 minutes after birth. It is frequently desirable to help the lambs with the first nursing.

The ewe and her offspring should be placed in one of the individual lambing pens and left there for two or three days.

The breeding ewe at this time should be given an abundance of roughage, but the grain allowance should be limited until the lamb is well started and able to consume more milk.

IDENTIFICATION AND RECORDS

Before being released from the lambing pen, the lamb should be given an ear tag, and a record should be made of both the lamb and the ewe. When tags are not available, a system of ear marks put in with a punch may be used (Fig. 7). One hundred lambs may be identified by using not more than three notches in the ears of any animal. Accompanying is a record card used with the College flock (Fig. 7a).

Use of this record enables the flock owner to cull the flock on the basis of production and select ewe lambs for replacements that come from the most profitable ewes.

FEED THE EWES LIBERALLY

The most economical gains are those made by the young lambs while nursing their dams. Amount of these gains will depend upon one's liberality and judgment exercised in feeding the nursing ewes. The rations on page 22 may be continued, but for best result leguminous hay should supplant such feeds as cornstalks, bean pods and straw. The grain ration should also be increased and some protein supplement added. It is good practice to separate the ewes with twin lambs (feeding them from 1½ to 2 pounds of grain daily) from the ewes with single lambs (feeding the latter ewes from 1 to 1½ pounds daily). An excellent grain mixture consists of:



Fig. 7. An easy, convenient method of identification.

- 4 pounds corn
- 4 pounds oats
- 1 pound wheat bran
- 1 pound soybean meal, linseed meal, or cottonseed meal.

OBSERVE THE UDDERS

Ewes' udders should be examined frequently, and any full udders milked out daily. Sheep-pox, the development of small pimples containing pus, is not uncommon. These are irritated by the nursing lamb. Sores develop, the ewe refuses to let the lamb nurse and a caked udder (mastitis) results. Lambs nursing these ewes may contract sore lips. The trouble may be due to an infection. Affected ewes and lambs should be segregated and the sores treated daily by an application of zinc oxide ointment. Copper sulphate solution, recommended for drenching, followed by greasing with petroleum jelly or oil, has been used successfully. In severe cases, it may be necessary to remove the scabs before treating.

Caked udders should be bathed with warm water and massaged

with petroleum jelly or lard. Gangrene frequently occurs resulting in the death of the ewe. Any ewe which recovers from mastitis should be culled from the flock.

TROUBLES OF YOUNG LAMBS

Disowned or Orphan Lambs

Frequently a ewe disowns her lamb or dies. Occasionally triplets are born. In either instance, it is desirable to transfer a lamb to another ewe. There are various methods employed to encourage the

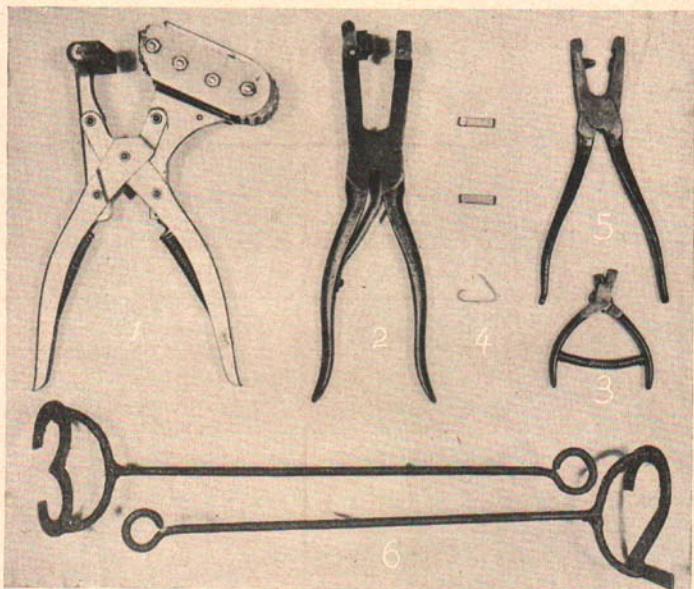


Fig. 8.

1. Rotary tattooing outfit for tattooing number in sheep's ears.
2. Large punch for notching ears.
3. Small punch for notching ears.
4. Ear tags.
5. A punch for inserting ear tags. May also be used for notching ears.
6. Stencils for numbering sheep after shearing. By having these stencils numbered from 0 to 9, a large flock may be numbered and identified. A branding fluid which can be washed out of the fleece should be used.

ewe to "own" the lamb. Smearing some odoriferous material, or ewe's milk on the lamb's back and on the ewe's nose, giving them both the same scent, frequently results in the ewe's "owning" the lamb. Bringing a strange dog into the barn to frighten the lamb will arouse the "mother" instinct of the ewe, resulting in her assuming the defense of the lamb and "owning" it. If a lamb dies, remove the pelt from the dead lamb and fasten it over the body of the disowned or orphan lamb. The pelt can usually be removed from the adopted lamb in two or three days.

The ewe and adopted lamb should be confined together in a small pen or the ewe placed in a stanchion, thus permitting the lamb to nurse frequently.

Orphan lambs may be raised on cow's milk. Rather than add fat or sugar to imitate ewe's milk, it is best to feed cow's milk unaltered. Milk from a cow, which has recently freshened and is giving rich milk, is preferable. The milk should be fed at body temperature and in small amounts. As a rule, 2 tablespoonsful of milk fed every two hours the first day, is sufficient for a new-born lamb. As the lamb gains in strength, the amount of milk may be increased and the number of feedings decreased, until at 2 or 3 weeks of age, 6 ounces of milk fed 4 times a day is sufficient.

Constipation

A common difficulty of lambs raised as orphans is constipation. The first milk, or colostrum, from the ewe has laxative properties and cleans out the digestive tract of the new-born lamb. If colostrum is not available, one-half teaspoonful of castor oil should be placed in the first milk given to the orphan lamb. Constipation is also a frequent occurrence with nursing lambs. Affected lambs elevate the back, raise the tail, strain severely and bleat from the pain. An enema of luke-warm soapy water may be all that is necessary, but if this fails, from 1 to 2 teaspoonsful of castor oil should be given with a small amount of the ewe's milk. Feeding the ewes a succulent ration will eliminate much of this trouble.

Sore Eyes

Sore eyes in young lambs are usually due to irritation caused by eyelids which fold in against the eye. These may cause an ulcer and loss of the eye. In some cases, rubbing the eyelid back several times a day so that it returns to its normal position will overcome the dif-

ficulty. In obstinate cases, one may need to take a sterile needle and thread, run the thread through the edge of the eyelid and tie it back to prevent its turning in. Making an elliptical slit just back of the middle of the lid and sewing the edges together is sometimes necessary.

The beards of some plants, such as downy brome grass, often cause sore eyes and blindness. Either hay or pasture is equally objectionable. Foreign bodies of this nature should be removed by rolling back the eyelids.

At certain times (frequently in the fall) inflammation of the eyes becomes prevalent in a community. This may be caused by an infection, exposure to severe winds, pollen, seeds. The eyes "water" profusely, the membranes are swollen and red, and the eyeball becomes clouded or milky white. The eyeball may ulcerate and rupture, causing blindness. Affected sheep are very sensitive to light and seek shady places. Segregate affected sheep and place in a dark pen.

In all cases of eye trouble, examine for and remove foreign bodies, bathe the eye twice daily with a 3-percent solution of boric acid and place a few drops of a 15-percent argyrol solution on the eyeball.

Diarrhea

Diarrhea may be due to young lambs eating some coarse material which irritates the digestive tract and to faulty or irregular feeding of the nursing ewe. A variety of nutritious feeds fed regularly in adequate amounts is essential. A ewe may be giving too much milk or the character of the ration may be such that the milk does not have the desired physical effect on the lamb. The ailing lamb should be given from a teaspoonful to a tablespoonful of castor oil in a like amount of milk. The ration of the ewe should be studied carefully and changes made gradually until the desired effect is obtained on the lambs.

Pinning

Young lambs are troubled with pinning or gluing of the tail to the body by the thick, sticky feces. Elimination of the feces may be stopped and the lamb lost if care is not given. The tail and rear parts should be cleaned and the lamb docked when it is strong enough.

Navel Ill

This is an infection which enters the lamb's body through the navel cord soon after birth. Clean quarters and the treatment of the broken



Fig. 9.

1. Iron used in docking.
2. Pruning shears convenient for foot-trimming.
3. Emasculator used for docking lambs or severing the cords when castrating older animals.
4. Pincers used in castrating.

end of the cord with tincture of iodine as soon after birth as possible are preventive measures.

Pneumonia

Pneumonia may result from exposure and chilling or housing the ewes and lambs in tight, poorly-ventilated barns. At times severe outbreaks may occur regardless of conditions, apparently owing to a specific infection. No satisfactory treatment can be given young lambs after they have contracted pneumonia; therefore, every precaution should be taken to avoid the disease.

In many cases a light attack will not be noticed by the shepherd. Nevertheless, the lamb becomes unthrifty and fails to make normal growth. Vaccination with mixed bacterins apparently has been a preventive in some instances.

Stiff Lambs

Paralysis of the hindquarters, accompanied by inability of the lamb to stand and nurse, is known as white muscle or stiff lamb disease. The cause is not known. It has been attributed to an infection at lambing time and also to rich, concentrated rations lacking variety. This trouble undoubtedly is closely associated with the feeding of the breeding ewe during the gestation and nursing period. It may occur in flocks fed high-quality feeds and supposedly receiving ideal care. The only recommendation which can be made at this time is that the breeding ewe be given as wide a variety of both grain and roughage as the farm affords. Abrupt changes in the ration, and feeding entirely on rich, concentrated feeds (either grain or roughage) should be avoided.

Docking and Castrating

Ram lambs more than 3 to 4 months of age sell at a discount of \$1 per hundredweight. During the fall season, they lose finish and retard the gains of other lambs. Long-tailed lambs are discriminated against on the market, and the filth which collects about the long tail invites fly-blows and maggots. Lambs should be docked and castrated between one and three weeks of age.

Either a hot iron (heated to a dull red), sharp knife, chisel, an emasculator (with crushing side to body) or an elastrator can be used in docking lambs (Fig. 9). A hot iron (Fig. 10) sears the arteries and prevents bleeding, but the wound is slow to heal. If lambs docked

with a knife fail to stop bleeding, the arteries on the under side of the tail may be seared with a hot iron or a string tied about the stump and left for a few hours. The use of an emasculator is the most satisfactory method of docking (Fig. 11).

Male lambs should be castrated at the time they are docked. After applying a disinfectant, one-third of the scrotum is cut off with a sharp

Fig. 10 Use of a hot iron for docking. Note that the operator using the iron is pushing the skin toward the lamb's body so that there will be a good covering over the stump.



Fig. 11. Docking with the emasculator.



Fig. 12. Applying a fly repellent to the wound.



knife, the testicles grasped firmly between the thumb and forefinger and drawn out one at a time. With older lambs, the casing should be slit and allowed to slide back over the cord before the testicle is drawn. Bath the wound with disinfectant. If flies are present, docking and castration wounds should be covered with a fly repellent (Fig. 12). A mixture of 1 pint of pine tar, 8 ounces of machine oil, and 3 ounces of turpentine is excellent for this purpose.

Use of a pincers (Fig. 13) for castration permits a bloodless operation with no danger of infection or maggots from fly blows. Anyone who is careful may use one of these pincers successfully.

Elastrators (tight rubber rings) have been used with satisfactory results for both docking and castrating.

Ewes should not be left to lamb, nor should lambs be docked or castrated in any place where an animal affected with tetanus has been confined.



Fig. 13. Castration with the pincers.

Note that the operator is holding the cords between jaws of pincers with thumb and forefinger of left hand.

FEEDING YOUNG LAMBS

Lambs will begin eating grain at two or three weeks of age. A creep (to which the ewes do not have access) where the lambs are offered fine, leafy hay and grain should be provided. The troughs should be cleaned daily and any feed left by the lambs fed to the ewes.

An excellent grain ration for young lambs is one consisting of 3 parts cracked corn, 3 parts crushed or rolled oats, 1 part bran and 1 part of either linseed, soybean, or cottonseed meal. When an excellent quality of second-cutting legume hay is available, a grain mixture of equal parts of cracked corn and oats is satisfactory.

With an abundance of green succulent pasture, it is not as a rule profitable to feed grain to nursing lambs. Grain should be fed when pastures are dry and scanty or when there is an advantage to be gained in getting the lambs ready for an early market.

SHEARING

Shearing time will depend upon weather conditions and facilities for shelter. When facilities permit, there is some advantage in shearing before lambing time. Ewes can be shorn late in the gestation period without danger of injury. Wool shorn previous to lambing time is not soiled during lambing or by the young lambs romping on the mother's back. The lambs have less trouble finding the teats of shorn ewes. If the barn is cold or April pasture used, shorn ewes lack sufficient wool to withstand the raw winds and cold rains of early spring. The most common shearing time is around the first of May or after the first few days of warm weather which are uncomfortable for unshorn sheep. At this time the oil in the fleece is flowing freely, resulting in easier shearing and a more attractive fleece of wool. Most sheep are shorn by machine, although hand shears are occasionally used. Machine shearing is preferred because it is closer, smoother, and more rapid. Particular care should be taken to avoid second cuts which reduce the value of the fleece. A good job is more important than speed. Sheep shorn closely with a machine may sunburn unless given an opportunity to keep out of the sun during warm weather.

If a clean floor is not available a canvas should be put down to prevent dirt and chaff from getting into the fleece. The sheep must be dry when shorn. Careful handling is necessary to avoid injury of the sheep and separation of the fleece which should remain intact. If the wool is to be sacked immediately, the fleece may be tied loosely by

hand, but if it is to be stored or handled, the use of a wool board is advisable. A satisfactory wool board with a box 16 inches square is shown in Fig. 14.

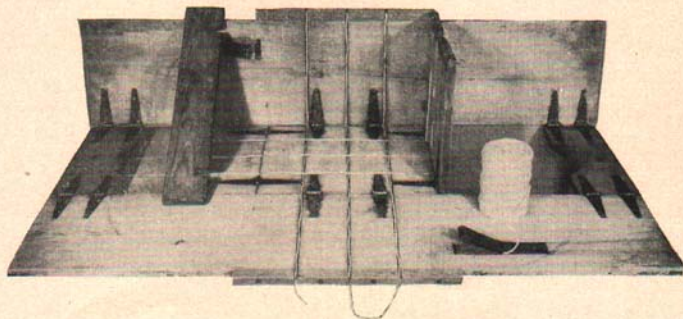


Fig. 14. A well-made wool board and ball of paper twine.

The fleece should be placed skin-side down on the board, any dirt or tags removed, pressed closely together, and folded in from the sides and ends before being tied in a loose package. A tightly packed and tied fleece gives the impression of excessive weight and shrinkage. In tying the fleece, only paper twine should be used. Sisal or binder twine should never be used. Neither sisal nor binder twine will take a dye. Their fibers adhere to the wool and must be removed from the finished cloth by hand. The value of wool is materially reduced when they are used.

Wool stored on the farm should be kept in a dark bin where rats and mice cannot enter. The bin should be lined and covered with tar paper to protect against moths.

MARKETING WOOL

Marketing of farm wool is not on a satisfactory basis. Many local buyers are not familiar with the grading of wool and buy virtually all wool in a community on three classifications: namely, fine wool, coarse wool, and medium wool. There is a large number of grades of wool, and the alert flockmaster will study the market classifications of wool, prices for the different grades, and insist upon getting a price in keeping with the quality of wool produced. Development of cooper-

ative wool pools and payment for wool on a graded basis should do much to improve the quality of wool produced. In fact, every producer should study the wool which his flock is yielding and in the purchase of rams select those which will add to the flock the qualities which are lacking.

Following are wool trade terms which will enable the producer better to understand market quotations:

Domestic Wool—That grown within the United States.

Territory Wool—Refers to wools grown in the western range states, except Texas and California, whose wools are designated by the names of the respective states.

Fleece Wools—Refers to wool produced by farm flocks of the mid-western and eastern states.

Fleece wools are divided into bright and semi-bright wools. Bright fleece wools are light in shrinkage and possess a bright color. Most of the bright wools are produced east of the Mississippi River. Semi-bright wools are dull or dark in color and have a heavier shrinkage than the bright wools. Most of the semi-bright wools are produced in the Dakotas, Nebraska, Kansas, Oklahoma, and parts of Missouri, Iowa and Minnesota. Michigan produces light-shrinking bright wools.

Pulled Wool—Wool pulled from pelts of sheep which have been slaughtered. This is usually washed, has a longer staple, and is more carefully sorted than wool which has been sheared.

Dead Wool—Dry, harsh fleeces from dead animals or those in a low state of vitality.

Discards or Rejects—Fleeces of low value because of being dead, cotted, bury, seedy, black or gray in color.

Buck Fleeces—Those excessively heavy because of a high grease content and as a result shrink heavily in scouring.

Cotted—This term refers to fleeces the fibers of which are matted together.

Wooltops—This is the term given to wool which has been sorted, scoured, carded and combed.

Grease Wools—Wools in their natural state as put up on the farm or ranch.

Scoured Wools—Those which have been cleansed free of all grease and dirt, or other foreign material.

MARKET GRADES OF WOOL

There are two methods of grading wool: the American system, in which the term "blood" is used to designate degrees of fineness, and the English or count system, in which numbers are used to designate different degrees of fineness. The term "blood" has no reference to the breeding of the sheep.

American System	English System
Fine or Delaine	64's - 70's - 80's
½-blood	58's - 60's
⅜-blood	56's
¼-blood	48's - 50's
Low ¼-blood	46's
Common	44's
Braid	36's - 40's

The English system recognizes three degrees of fineness in fine or Delaine wools and two degrees of fineness in ½-blood, ¼-blood, and braid wools. The English or spinning count system has been recognized by the Bureau of Agricultural Economics as the official standard for grading wool.

The foregoing grades are divided into combing and clothing wools as determined by their length.

Fine wools exceeding 2 inches in length are known as fine combing (staple), those 1¼ to 2 inches in length as French combing, and those less than 1¼ inches as clothing.

To grade as combing ½-blood should be 2¼ inches long; ⅜-blood 2½ inches long; ¼-blood 2¾ inches long; and low ¼ more than 3 inches in length. Wools of less than the prescribed lengths are known as clothing wools.

Clothing wools are less valuable than those of combing (staple) length.

SUMMER MANAGEMENT

External Parasites

Late spring or early summer is the most favorable time to treat the flock for external parasites. Weather conditions are favorable, the wool is short, thus requiring less dip, and the parasites are destroyed before the lambs have been stunted.

Ticks—The sheep tick is a blood-sucking parasite which when present in large numbers, interferes with the thrift of the flock, increases feed requirements, and reduces the value of the wool clip. After the flock is shorn, the ticks transfer their activities to the young lambs and seriously retard their growth. The flock (both ewes and lambs) should be dipped preferably from one to two months after shearing. Two dippings are necessary, 20 to 24 days apart, if a nicotine sulphate or coal tar dip is used. One annual dipping with an arsenical dip will successfully control ticks and lice.

Lice—The two kinds of lice found on sheep are sucking lice and biting lice. The biting louse is prevalent in Michigan. This louse is barely visible to the naked eye, having a small red head and a white, almost transparent body. They cause an exudate of lymph which leaves a small yellow scab. Sheep infested with lice rub severely, giving the wool a very ragged appearance. There is considerable loss of wool and marked unthriftiness of the sheep.

The same dips may be used for lice as for ticks, with satisfactory results. In using coal-tar or nicotine sulphate dips, the two dippings should be 14 to 16 days apart.

Figure 15 illustrates the portable dipping vat similar to those in service in many parts of the state. Figure 16 shows a permanent con-



Fig. 15. A portable dipping vat now in common use. Operation of one of these portable vats is an excellent project for F.F.A. chapters and older 4-H club members.



Fig. 16. A permanent concrete dipping tank. Many of these tanks are constructed on a community basis and large numbers of sheep are dipped cooperatively.

crete tank which is more satisfactory for a large flock of sheep or for use as a community dipping tank.

Sometimes a few ticks or lice are observed late in the fall or early winter. If weather conditions prevent dipping, the ticks and lice may be temporarily held in check by applying derris powder with a dust gun. If facilities are not available for dipping, ticks and lice may be materially reduced by crowding the flock into a small pen and sprinkling them with dip. Both wool and lamb production are increased by controlling ticks and lice.

Sheep Scab—Sheep scab is caused by a minute parasite invisible to the naked eye. Sheep afflicted with scab rub continually, are in an unthrifty condition, and shed considerable wool. They bite the afflicted areas or dig at them with their feet. The skin is reddened, inflamed, and in advanced cases, scabs are found, owing to the parasites burrowing into the skin. This parasite is so infectious that dipping for scab must be performed under the direction of a state or federal veterinarian.

ian. Only two dips are recognized as an efficient control: the lime sulphur and nicotine sulphate dips.

Foot Rot—Trimming feet (Fig. 18) before the sheep go to pasture reduces the possibility of trouble from foreign bodies and filth lodging in or between the toes. Inflammation of the feet from either of these causes should be treated by washing and applying either coal tar dip or a saturated solution of copper sulphate.

An infectious form of foot rot is not uncommon. It occurs most frequently and is most persistent when sheep are pastured on low, wet

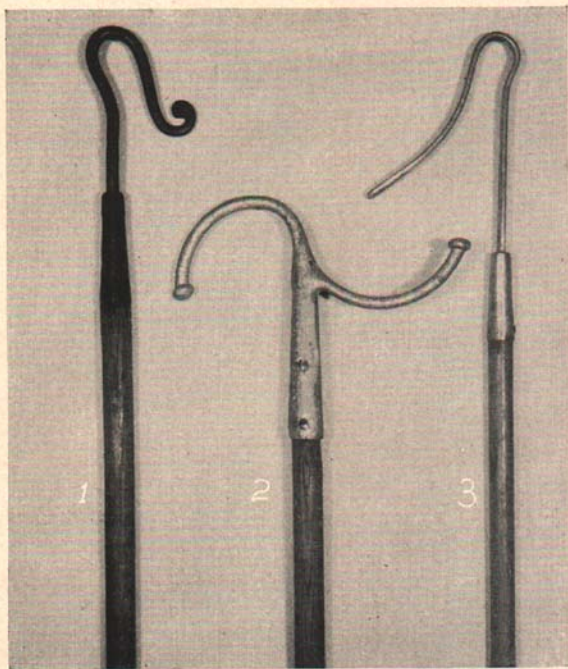


Fig. 17.

Numbers 1 and 3 are shepherd's crooks, which are very convenient in catching sheep.

Number 2 is a dipping hook, one side for immersing sheep and the other side for lifting or assisting them from the dipping vat.



Fig. 18. Trimming feet. Top, the untrimmed feet; middle, front feet being trimmed; bottom, feet correctly trimmed.

ground. Infected sheep must be removed from the flock and treated immediately. The coronary band is hot and swollen. Then, sores appear, accompanied by pus of a very pungent, disagreeable odor. In the early stages, foot rot yields readily to treatment. The foot should be trimmed, and all diseased portions removed. The sheep should then be driven through a trough containing a saturated solution of copper sulphate, followed by another trough of air-slacked lime to dry the injured surface. A wooden trough 12 inches wide and 4 inches deep with a hurdle or gate on each side is satisfactory. Care must be taken to see that the sheep do not drink any of the solution as they are passing through, and the trough must be kept covered when not in use. In severe cases, individual treatment must be given each sheep. In this instance the wounds may be packed with powdered copper sulphate or butter of antimony applied to the sores with a feather.

Internal Parasites

Internal parasites take a heavy toll in the farming states, especially when sheep run continually on the same pasture. They are a serious problem because of the decreased gains, increased feed costs, and the frequent death of lambs from parasitic infestations. Stomach worms, tapeworms and lung worms occur most frequently and give the most trouble.

Stomach Worms—This parasite is from $\frac{1}{2}$ to $\frac{3}{4}$ inch long and has the appearance of a red and white thread twisted together. It inhabits the fourth stomach. The mature parasites lay eggs which are dropped with the feces. These hatch and the young larvae attach themselves to blades of grass and are eaten by other sheep. The infestation is more severe on permanent pasture, especially those that are low, moist and closely grazed. Infestation is more common during a summer of heavy rainfall and high humidity. Avoiding close grazing and a frequent change of pasture aids materially in controlling internal parasites.

Symptoms of Stomach Worms—Lambs infested with these parasites become dull and listless. The wool is dry and harsh, and the skin pale and colorless. In advanced cases, the eyelids are a milky white in appearance and the lamb scours easily. Shortly before death an edemic swelling may appear under the jaw. Healthy sheep and

lambs have a bright lustrous wool, a clear pink color of skin, and the eyelids are a network of bright red blood vessels.

Nodular Worms—These are small, round worms found in the large and small intestines. The larvae of this worm imbed themselves in the wall of the intestine where they develop, later emerging into the intestinal tract as mature worms. They leave a knot or nodule in the intestinal wall containing a greenish or yellow, cheesy material, or it may be hard and limy in nature. These nodules seriously interfere with the digestion and assimilation of food. Intestines of infected sheep are useless as sausage casings or surgical sutures.

Control of Stomach and Nodular Worms—Both stomach and nodular worms can be controlled with phenothiazine. The following program using phenothiazine-salt mixture and phenothiazine drench has given excellent results in most cases where it has been carefully followed.

Mix Phenothiazine with salt in the ratio of one pound phenothiazine to 12 or 14 pounds of salt. This mixture should be kept before the flock at all times during the grazing season. It should be easily available to both ewes and lambs. It should be fed in a box protected from weather. No other form of salt should be available to the flock. This includes pure salt for other farm animals or ready mixed minerals which contain a large amount of salt. If minerals such as calcium and phosphorus are needed, they should be fed separate from the phenothiazine-salt mixture.

A phenothiazine drench can be made according to the following directions. Add one pint of molasses to one pound of phenothiazine and stir vigorously until a thick paste is formed. Either feeding molasses or table molasses is satisfactory. Add enough water to the paste to make two quarts of solution. Dosage—4 ounces of mixture for adult sheep, 2 ounces for lambs. Two quarts is enough for 16 sheep or 32 lambs.

Phenothiazine boluses or capsules are available and should be used according to the manufacturer's directions.

Seasonal Program—**SPRING:** Phenothiazine drench after ewes have lambed and about the time flock is turned to pasture.

SUMMER: Keep phenothiazine and salt mixture before the flock at all times during the grazing season. Warm, wet, humid weather is especially favorable for parasite development. In such cases, the con-

sumption of the phenothiazine-salt mixture may not be sufficient to prevent infestation and the entire flock should be drenched with phenothiazine at the first sign of parasite infection.

FALL: Phenothiazine drench for breeding flock before ram is turned with ewes or at least by the time the pasture season ends.

It is not recommended to start the phenothiazine program until a flock has finished lambing. However, once the flock is accustomed to phenothiazine, many flock owners keep it before the sheep all the year around. It is recommended that the flock be checked carefully

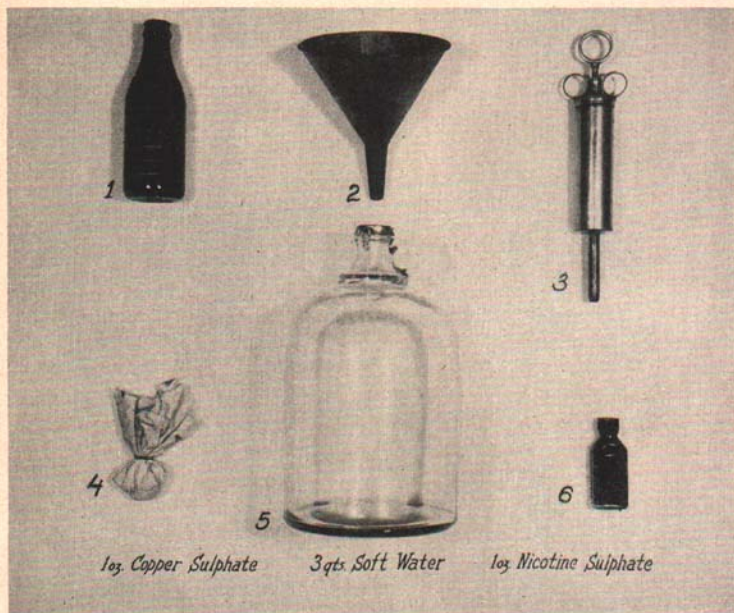


Fig. 19. Equipment useful in drenching.

1. A bottle with file marks showing 1, 2, 3, and 4 ounces.
2. A funnel.
3. A 4-ounce dose syringe.

Either a bottle or a dose syringe is satisfactory for drenching.

4. One ounce of copper sulphate ready to immerse in water.
5. A glass jug containing 3 quarts of water.
6. A one-ounce bottle for measuring nicotine sulphate.

during the summer. Ewes or lambs not doing well should be drenched at once.

The older treatment of a copper-nicotine sulfate drench still gives good results. Tests have proven, however, that it is seldom as effective or as efficient as phenothiazine, even when the latter is used only as a drench.

Method of Administration—To treat sheep, the person administering the drench should straddle the sheep's shoulders or stand at the right side of the sheep. Elevate the head slightly with the left hand, but in no case should the nostrils be above the level of the eyes. Administer prescribed dose slowly from the mouth of a small-necked bottle or syringe. Keep the mouth of the bottle or syringe against the roof of sheep's mouth and tickle throat with fingers of left hand to facilitate swallowing. (Fig. 20).

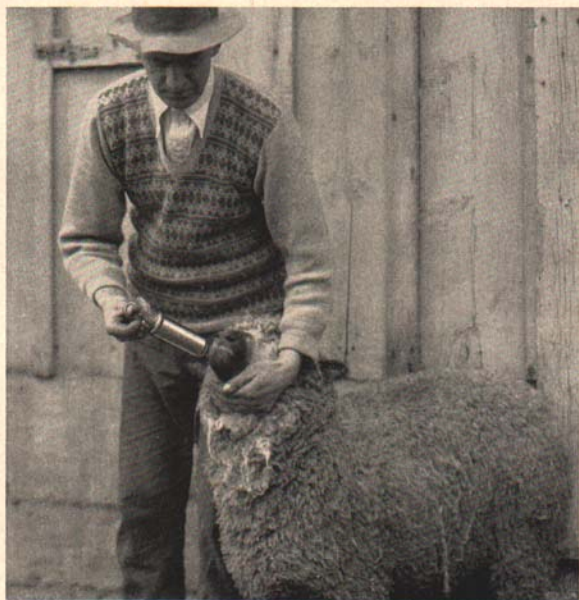


Fig. 20. Drenching with a syringe. A bottle is satisfactory.

Tapeworms—The tapeworm is a long, flat segmented worm found in the small intestine. They attain a length of several feet. The rear (mature segments) may be $\frac{1}{4}$ to $\frac{3}{8}$ inch long and nearly as wide. Infestation by this parasite frequently occurs before the flock leaves winter quarters. A fair degree of control is attained by using the drench already recommended for stomach worms. Powdered kamala is the most satisfactory treatment for tapeworms. Lambs should be given $\frac{1}{2}$ and mature sheep 1 level teaspoonful of kamala in 3 ounces of skimmilk. Each dose should be mixed separately and shaken frequently while administering.

Kamala is a severe purgative. Sheep should be tagged and a fly repellent applied to the rear parts before treating.

FLY TROUBLES

Grub in the Head

This trouble is caused by a fly which deposits its larvae on the nose of the sheep. These flies are very annoying to the sheep. They stamp their feet and stir up dust in efforts to avoid the fly. The larvae work their way up the nostrils, attach themselves to the lining of the respiratory ducts, and develop into a grub approximately $\frac{1}{4}$ inch in diameter and $\frac{3}{4}$ inch long. The growing larvae are painful, and the sheep resort to frequent sneezing trying to dislodge them. They cause intense irritation, difficult breathing, loss of appetite, a profuse discharge from the nose, and occasionally the death of the sheep.

The only control is prevention. If an abundance of shade is provided or a dark barn is available, the sheep can avoid the flies. A furrow plowed across the field, enabling the sheep to stir up some dust and repel the flies, is of material help.

Blow Flies

Eggs of the flies are laid on wool befouled by urine or feces. Wounds and the gummy wool about the base of the horns are also attacked. During a protracted period of frequent rainfall and muggy weather the larvae or eggs may be deposited on any part of the body where the wool is damp. Sheep with long fleeces should be watched closely in May and June. The larvae hatch in a few hours and cause intense irritation as shown by the sheep stamping their feet and endeavoring to bite the infected parts. The growing maggots work

their way into the skin, causing intense suffering and in severe cases, the death of the animal.

The sheep should be tagged, the wool clipped from infested parts, removing as many of the maggots as possible, and a strong solution of coal tar dip applied to kill any maggots remaining. Kerosene or turpentine may be used. After disinfecting and removing the maggots a fly repellent should be applied to prevent reinfestation. A mixture consisting of 1 pint of pine tar, 8 ounces of oil, and 3 ounces of turpentine will serve the purpose. If the wool is short this preparation will destroy the maggots.

Maggot trouble is most frequently found in sheep which are scouring and the wool soiled about the tail. Flocks treated to control parasites seldom scour. Occasional tagging of all soiled wool about the rear parts will decrease trouble from flies.

BLOAT

Bloat is due to excessive fermentation in the paunch caused by over-eating or impeded elimination of wastes.

Sheep grazing on green, succulent, palatable legume pastures or forage crops, such as rape, should be handled carefully to avoid bloat.

Over-eating is due usually to some error in management within the control of the observant flockmaster.

When turned into fresh pastures, the sheep should be full and the pasture or forage dry. Thereafter, they should be left in the pasture continuously.

SHADE, WATER, SALT, ESSENTIAL

Provide shade in the field where the sheep will never be far from feed.

The water supply should be readily accessible and, if possible, near the shade. A clean, fresh supply of water at all seasons of the year is necessary for best results with sheep.

Locate the salt supply near the shade and water and keep a supply available at all times. See the recommendations under parasite control on the use of a phenothiazine-salt mixture.

Empty water tanks, infrequent feeding of salt, shade far removed from feed or water, are all conducive to over-eating on wet or succulent feeds with the consequent danger of bloat.

PASTURES

Many flocks well cared for during the winter feeding season are allowed to become unthrifty during the grazing season. This may be due to parasitic infestation, lack of adequate pasture, or to pasture of poor quality.

Permanent Pastures

A few permanent pastures of bluegrass and white clover give satisfactory results throughout the grazing season. The majority of permanent pastures, consisting largely of June grass, will not produce finished lambs off grass or even keep the lambs growing rapidly after July 1.

When permanent pastures only must be relied upon, it is best to have the lambs born late in February or early in March and have them ready for market by July 1. The ewe flock may be satisfactorily maintained on the permanent pasture for the remainder of the season, although it is desirable to transfer the flock to a meadow before mating unless fall rains have revived the grass.

Lambs not ready for market early in July should be given access to grain in a creep, or be weaned and transferred to a field of second-cutting alfalfa and fed grain.

Sown Pastures

Sudan grass is an excellent supplement to permanent pastures during July and August, provided sufficient stock is available to prevent it from becoming too coarse and woody. This crop is destroyed by the first frost.

Dwarf Essex rape, sown either in rows or broadcast, furnishes an ideal supplement to permanent pastures for both ewes and lambs. It is ready to graze from six to eight weeks after being sown, and provides forage until late October. Rape does best on rather fertile soils, being retarded or even destroyed by aphids unless it is growing rapidly.

If seedlings are not made with the small grain crop, 2 pounds of rape per acre may be broadcast from one to two weeks after the grain is sown and will provide an abundance of late summer and fall pasture.

If an abundance of moisture is available, fall pasture may be provided by broadcasting from 2 to 3 pounds of rape or 1 bushel of rye per acre in the cornfield at the time of the last cultivation.

Rotation Pastures

Rotation pastures are unquestionably more satisfactory than permanent pastures and more economical than sown annual crops. A rotation pasture reduces the risk of parasitic infestation, provides more feed per acre, and enables one to market the lambs earlier with more finish and weight than does a permanent pasture.

With good management, the income from a rotation pasture will exceed that which could be obtained by harvesting a hay crop. Experimental work conducted on the W. K. Kellogg Farm at Augusta indicates that one acre of alfalfa-brome grass pasture will carry five ewes and seven lambs from May 1 until September 1 and four ewes per acre from October 1 to the close of the grazing season.

In the above-mentioned trials, each acre of alfalfa-brome grass has yielded more than 1,000 days of sheep grazing and produced from 200 to 370 pounds of gain. The alfalfa-brome grass mixture has proved superior to any grass or combination of grasses and legumes which has been used in these trials. With such pastures there is seldom need of either weaning or feeding grain to lambs.

A full realization of the fact that sheep will harvest the leguminous hay crop and give as great, and in many cases, a greater return, than by harvesting in the usual way, should encourage the production of sheep on improved lands and reduce labor to a marked extent.

MARKETING LAMBS

The fat lamb weighing from 80 to 90 pounds is most satisfactory from the market standpoint and will usually command a better price than either a heavier or a lighter, thinner lamb.

The native lamb will have less competition from the western range lambs during June, July and August than at any other season of the year, and there is usually a distinct price advantage in favor of the producer who can market during these months. In no case should thin, lightweight, under-finished lambs be marketed. Four hundred pounds of grain plus an equal amount of hay, or its equivalent, will produce 100 pounds of gain with lambs; hence, there is in most cases, an excellent profit in having all lambs sold of desirable weight and finish.

Well-bred lambs in good flesh are always in demand and sell readily at the farm, on local markets, or at terminal market points.

The seller who does not know the weight of his lambs and is not thoroughly conversant with market grades and values should consign his lambs to a reliable commission firm on a central market. Truck transportation is such as to permit most producers to sort their lambs frequently and market in small lots as desirable finish and weights are attained.

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