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Lamb Feeding in Michigan

Michigan State University Extension Service

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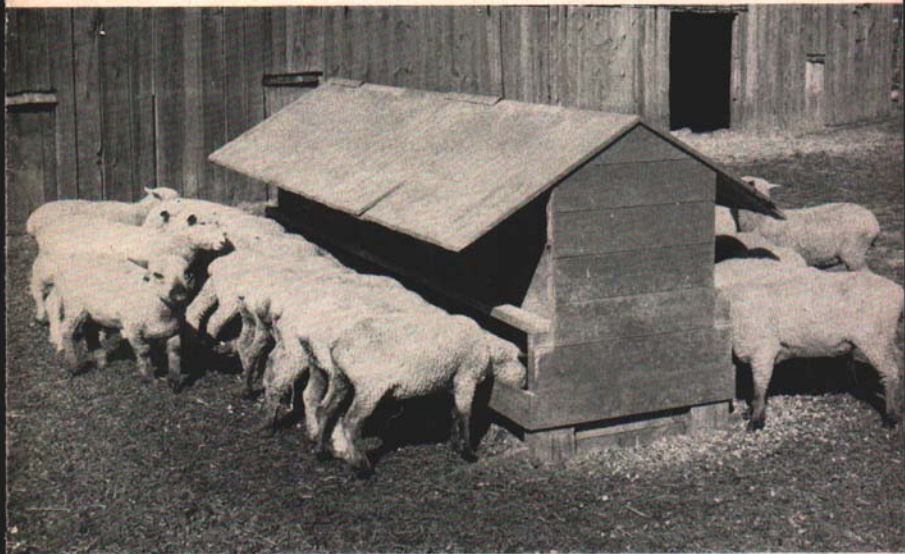
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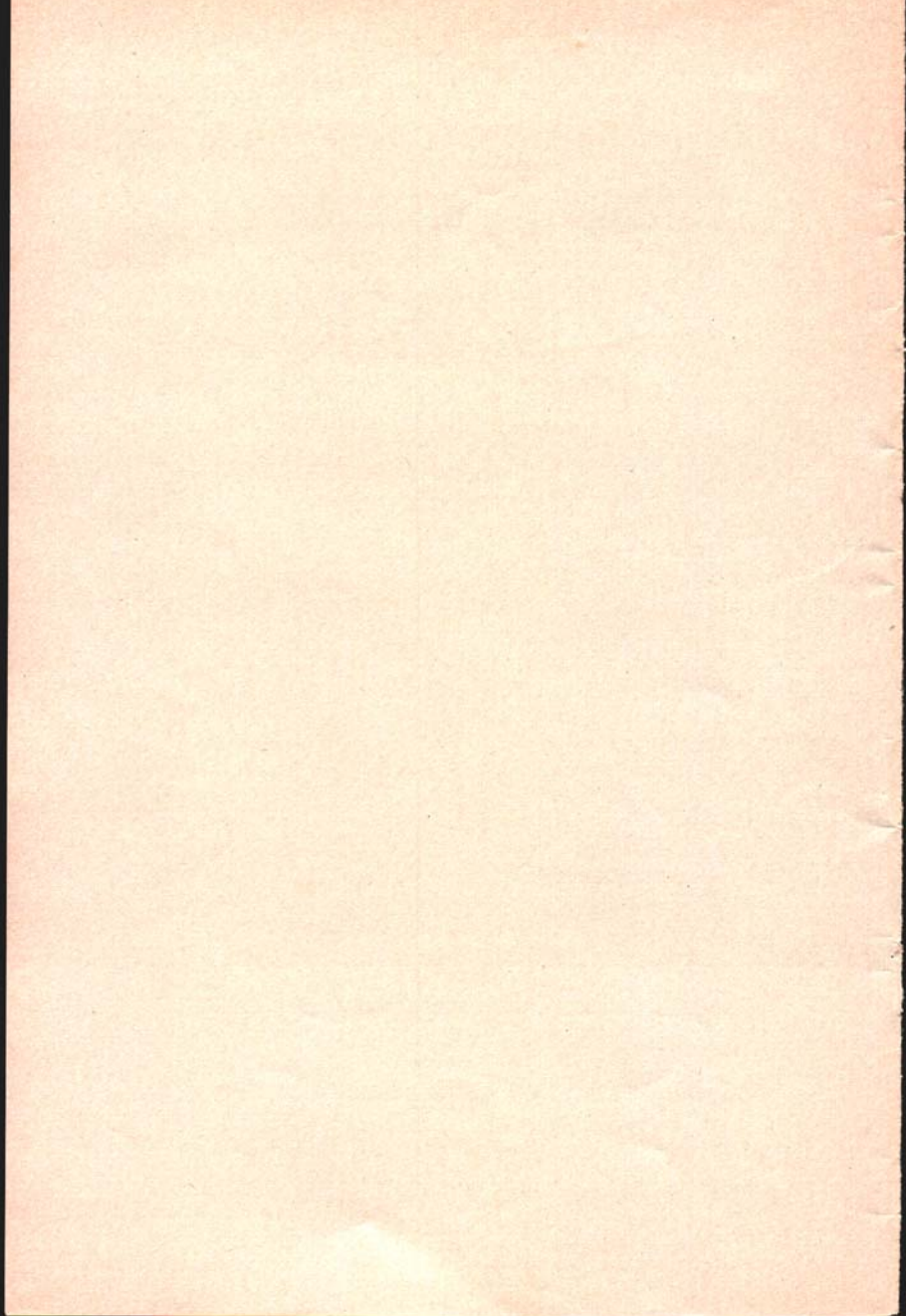
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Lamb Feeding in Michigan



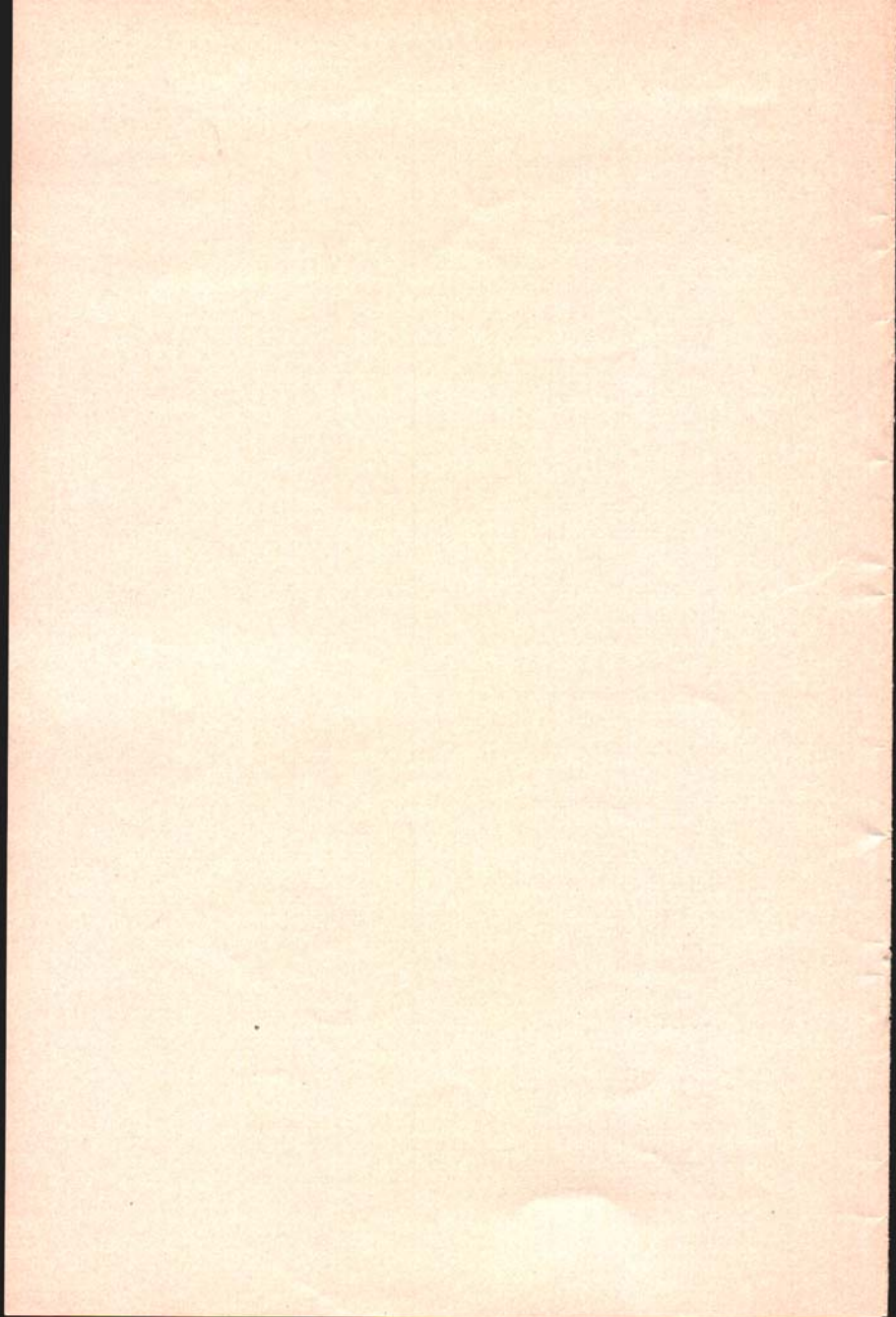
By **L. H. BLAKESLEE, GRAYDON BLANK, and R. E. RUST**

**Cooperative Extension Service
MICHIGAN STATE UNIVERSITY
OF AGRICULTURE AND APPLIED SCIENCE
EAST LANSING**



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Lamb Feeding in Michigan

By L. H. BLAKESLEE¹, GRAYDON BLANK², and R. E. RUST³

The fattening of lambs in Michigan is a common enterprise where abundant supplies of pasture, other roughages, and grains are available. Over a period of years, after costs are deducted, feeder lambs can return more dollars for the feeds they consume than could be obtained by marketing these feeds away from the farm. Lambs will normally consume about equal amounts of grain and legume hay while they are being fattened for market.

Besides providing a market for farm-grown grains and roughages, lambs can also be used to salvage fall pastures, glean grain or cornfields after the combine or picker, or harvest the corn crop, thus converting all these feeds into a more valuable and more marketable product.

Most lambs are fed during the late fall and winter seasons, making profitable use of available labor during a time when labor requirements for other enterprises are likely to be low.

Michigan farmers who feed lambs can be divided into two classes: those who raise their own lambs but are unable to market them as fat lambs at weaning time; and those who purchase either native or western feeder lambs for finishing.

It is the purpose of this bulletin to discuss feeding and management problems commonly encountered with feeder lambs. Much of the information in this bulletin is derived from experiments conducted at Michigan State University, East Lansing.

FEEDS USED FOR FEEDER LAMBS

Since the feeding of lambs is a method of marketing farm-grown feeds, one of the first considerations is the kind and amount of feed required. The most common feeds used for lambs in Michigan are shelled, cracked, or ear corn; and alfalfa, clover, or mixed hays. These feeds are usually available. They may, however, vary in quality and nutrient content. Lambs must have palatable and nutritious feeds if satisfactory gains are to be made.

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CORN is the most widely used fattening feed. It is high in energy and very palatable, but low in protein. No. 2 yellow corn contains 7 to 8 percent protein.

BARLEY is worth about 91 percent as much as corn, based on the amount of feed required to produce 100 pounds of gain. Barley is higher in protein than corn and is commonly used when corn is not available. Lambs usually prefer it whole. Tests show that grinding or crushing tends to reduce its palatability.

OATS are worth about 80 percent as much as corn, depending upon the amount of hull. They are high in fiber, containing about 10 percent. Oats are bulky but palatable, and are frequently used by feeders to get lambs started on feed. Lambs fed oats gain and fatten slower than those fed corn or barley.

WHEAT is not commonly fed to lambs because of its high price. In trials at Michigan State University, it was found to be 75 percent as valuable as corn when fed with alfalfa hay. This is also true when fed with corn silage and linseed oil meal. Lambs prefer wheat whole, but it may be coarsely ground with good results. Other grains should be fed along with wheat to prevent the lambs from going off feed, and to prevent occasional cases of bloat.

RYE, while not very often used, is similar to wheat. In general, the same recommendations may be followed.

PROTEIN CONCENTRATES. The common protein concentrates are soybean, cottonseed, and linseed oil meals. Other good sources of protein are corn gluten meal or feed, red dog, wheat bran and various distillers' or brewers' by-products. Sheep or lambs will eat any of these and the best guide to their purchase is the cost. The most logical basis for comparing costs of these concentrates is the cost per pound of protein, rather than per pound of meal.

When feeding good legume hay and corn to lambs, there is seldom need for adding protein concentrates. Feeding 1/10 to 2/10 pound protein supplement per lamb daily will increase the gains but, in most experiments, the added gains have been more costly.

When rations are fed containing grass hays or corn silage, the adding of 2/10 pound per lamb daily of the protein oil meals will increase the gain, and usually maintain or improve the economy of the ration.

ALFALFA is the best roughage for fattening lambs. If properly cured at an early stage of maturity, it provides a very palatable and highly nutritious feed. Alfalfa may vary in protein content from 10 to 15 percent or more, according to its quality. Alfalfa high in protein can be used to make up the protein deficiency found in rations containing large amounts of corn. Almost equally good results can be obtained when feeding RED CLOVER OR OTHER LEGUME HAYS, if they are comparable in quality to alfalfa.

TIMOTHY, BROME, and OTHER GRASS HAYS are of less value than legumes. Grass hays are low in both protein and calcium. These nutrients should be added to the ration if grass hays are to be used.

CORN SILAGE, free from mold and not frozen, improves the quality of the lamb's ration when fed as a supplement to hay. Due to a high water content, it requires about 3 pounds of corn silage to equal 1 pound of hay. Rations high in corn silage require added protein and calcium for best results. Corn silage is usually fed at the rate of 1 to 1½ pounds per head daily.

GRASS SILAGE should be considered as another method of preserving the hay crop. If made from high-quality legumes and properly preserved, it can replace some of the hay in the ration. Because grass silage usually contains three times as much moisture as hay, the limited digestive capacity of a feeder lamb prevents this form of roughage from replacing hay entirely. If grass silage is made from brome grass, timothy, or similar grasses, it is necessary to add from 1/10 to 1/4 pound of protein supplement to the daily ration of the lamb. Bone meal, or some other good source of calcium like dicalcium phosphate, should be fed free choice or mixed with trace mineralized salt, at the ratio of one part of the calcium supplement to one part salt by weight.

METHODS OF FEEDING LAMBS

There are three common systems of feeding lambs. These are hand-feeding grain on pasture, hand-feeding grain and hay in dry lot, and self-feeding in dry lot. Many farmers use variations of these systems, such as hand-feeding hay and self-feeding shelled corn, or hand-feeding grain and self-feeding hay. There is no set rule in deciding the best system to use. The following points should be considered in selecting the method of feeding:

1. Weight and previous treatment of lambs.
2. Length of feeding period and time of marketing.
3. Approximate amount of grain and hay available.
4. Number of lambs to be fed.
5. Labor available.
6. Equipment available.

Hand-Feeding Grain on Pasture

Good pasture with water and trace mineralized salt provides the nutrients for cheap gains and continued growth, but little fattening. The rate of gain can be greatly increased and lambs fattened more rapidly by hand-feeding barley, corn, oats, and other grains while on pasture. This is a common method of finishing native lambs. Where ample supplies of grain are available, it is strongly recommended that this practice be followed, rather than to market the lambs as feeders at a considerably lower price and lighter weight.

It is generally advisable to treat all native lambs for internal parasites before they are placed on feed. Recommended methods of treatment are described on page 31. Hand-feeding grains while the lambs are still on pasture is a common method of starting western



Fig. 1. Typical western lambs feeding in a corn field in winter. (Fig. 2 shows ears before and after they have been stripped by lambs.)

lambs on feed. This practice makes it possible to use the pasture to help reduce the cost of gains. This is also an excellent method when lambs are purchased late in the summer or early in the fall while the weather is still too warm to confine them to dry lot. It places the lambs in surroundings to which they are more accustomed, as well as making good sanitation easier.

When feeding lambs on pasture, it is a good practice to place the grain trough near the water and salt supply, or in some other convenient shady place. Provide 10 to 12 inches of trough space per lamb. If the lambs do not take to the grain readily, confine them to a small area of pasture until they start eating. All weights of lambs can be handled by this feeding system. Start with 1/10 to 1/4 pound of grain per lamb daily, and increase this slowly as the lambs begin to eat the grain.

Feed only as much as the lambs will clean up in 15 to 20 minutes. If some of them eat a very small amount, leaving the greater portion of the feed to the others, it may be necessary to limit the entire amount of feed, or sort the flock and feed the various groups according to their appetite.

Hand-feeding grain on pasture can be continued as long as the pasture is of good quality and readily available to the lambs, and as long as the weather remains favorable. Many native lambs will reach market weight and finish on this system of feeding.

Hand-Feeding Grain and Hay

When pastures are not available, lambs are commonly started in dry lot on hay alone for about one week. It is best to use first-cutting mixed hay, rather than second or third cutting legume hays, for this purpose.

Hand-feeding is considered to be the safest method of feeding lambs. All weights of lambs can be handled. Generally, labor requirements are greater than for the other feeding systems. Good gains can be obtained when feeding the usual ration of corn and alfalfa or other legume hays.

The schedule in Table 1 is suggested by the Illinois Experiment Station for feeding corn and legume hay. Over a period of years, this schedule has resulted in less than 0.5 percent death losses. This is a conservative schedule but, if followed, it will give reasonably good gain and low death losses resulting from digestive disturbances.

Lambs are roughage-consuming animals, and changes to grain must be made slowly if digestive upsets are to be prevented. If lambs go off feed in warm weather, reduce the amount of grain to prevent overeating ailments. If one desires to fatten lambs more rapidly, corn can be increased faster. Amounts up to 2 pounds per head per day may be fed to large-framed, heavy lambs. It must be remembered, however, that when large amounts of corn are fed, there is always a danger of overeating disease (enterotoxemia).

TABLE 1—Schedule for feeding corn and legume hay

	Corn per lamb per day	Legume hay per lamb per day
	<i>Pounds</i>	<i>Pounds</i>
First 5 to 7 days.....	none—0.25	1.75—2.00
2nd Week.....	0.25—0.50	1.75—2.00
3rd Week.....	0.50—0.75	1.50—1.75
4th Week.....	0.75—1.25	1.50—1.75
5th Week to finished weight.....	1.25—1.75	1.00—1.50

Since some lambs may consume too much grain and not enough hay when using this system, it is extremely important to observe the lambs carefully at each feeding and to make sure that none are backing away from the grain, leaving the excess amounts to the other lambs. If this occurs, the amount of grain fed should be regulated accordingly. Regularity of feeding time is very important with this system. With hand-feeding, it is possible for operators to market larger proportions of roughages through the sale of lambs than when self-feeding.

Self-Feeding Lambs Mixtures of Cracked Corn and Ground Hay

The safest method of self-feeding lambs is to feed a mixture of cracked corn, and ground or finely chopped legume hay. Fed in this manner, lambs cannot sort out the grain and must consume the roughage which provides the necessary bulk and promotes normal digestion. All weights of lambs can be handled with this system. The hay may be ground, using a $\frac{3}{4}$ inch screen, or it can be chopped $\frac{1}{4}$ inch long and then mixed with the corn.

Most portable mills are equipped for grinding hay and mixing it with the grain. It is very important that the hay and grain be thoroughly mixed. This system is best adapted to larger feeding operations, where the investment in the necessary equipment can be justified.

The correct proportion of hay to grain is an important factor in controlling death losses from overeating. To start the lambs on feed, use 75 percent ground legume hay and 25 percent cracked corn. At the end of the first week, the hay can be safely reduced to 65 percent and the corn increased to 35 percent. If the lambs are eating well and are not scouring, the mixture can be changed the third week to 55 percent hay and 45 percent corn. This mixture is considered ideal for fattening lambs when on full feed. It can produce a choice to prime finish, with daily gains of one-third of a pound or more per lamb.

When more rapid gains are desired, the mixture for the last month of feeding can be 40 percent hay and 60 percent corn. For big, rangy lambs, the ration during the last 6 or 7 weeks of the feeding period should contain 40 percent hay and 60 percent corn. This is necessary in order that the lambs may reach a desirable finish before they get too heavy.

It must be kept in mind that with high levels of corn there is always a danger of overeating losses. With rangy, heavy lambs, however, it may be desirable to take some risks in order to secure desirable finish while they are still relatively light in weight, rather than market them at a discount in price because of their heavy weight.

When non-legume hays are used, 5 to 10 percent protein supplement such as soybean meal, cottonseed meal or linseed meal should be added to the mixture. Some source of calcium like steamed bone meal should also be provided free choice, or mixed with equal amounts by weight of trace mineralized salt when grass hays are used.

Self-Feeding Shelled Corn or Other Grains, and Hand-Feeding Hay

Self-feeding grain and hand-feeding hay is perhaps the most risky method of feeding lambs. It is not recommended with light lambs, but it may be used with extreme care on heavy lambs in order to obtain a quick finish. This system makes it possible to market a larger amount of grain as compared to roughage. Follow the plan outlined in the section on hand-feeding grain and hay. (See page 9.)

Bring the lambs slowly up to a full feed of grain and then, after the lambs are receiving a normal full feed of grain, place the self-feeder before them. Good-quality hay must always be kept before the lambs so that they can consume a sufficient amount to balance the grain. It is extremely important that the grain feeders never be allowed to become empty at any time. It is generally recommended that the lambs be vaccinated for overeating disease when this system of feeding is followed. (See page 34.)

Cornfield Feeding of Lambs

It is a common practice to turn lambs into the cornfield to clean up after the picker. "Lambing" down corn is also a common practice, although there is a considerable risk of overeating losses due to the fact that the lamb feeder has very little control over the relative amounts of corn and roughage consumed. If no palatable roughage such as legume hay or green pasture is available in addition to the corn, daily gains in the corn field may average only 0.2 pound or less per lamb. The seeding of soybeans or rye in the corn, or having pasture adjacent to the cornfield available will provide additional palatable feeds and help improve the lamb's gains.



Fig. 2. Ears of standing corn before and after they have been stripped by lambs.

In an experiment at Michigan State University, 40 lambs were placed in $4\frac{1}{2}$ acres of corn and fed about 1 pound of legume hay per head daily. They averaged about 0.25 pound daily gain per lamb. Only 1 lamb (2½ percent) was lost. In a comparable lot, when one-tenth pound per head of soybean meal was added to the daily ration, the lambs gained 0.29 pound daily, with 2 death losses (5 percent). In a third lot, one-fourth pound of molasses was fed daily instead of

the soybean oil meal, and the lambs gained 0.35 pound per head daily. These lambs apparently consumed more feed. Out of this group, 5 lambs (12½ percent) died.

This experiment illustrates the problem of losses in cornfield feeding due to overeating, and methods of increasing the gain. By making palatable roughages available and easily accessible, it is possible to decrease or even eliminate the death losses common in cornfield feeding.

FEEDING GROUND CORN, EAR CORN, AND GROUND EAR CORN

There is no improvement in the palatability or nutrient value of corn due to grinding. Feeder lambs do a thorough job of grinding shelled corn themselves. Two reasons for grinding corn are to make it easier to mix with hay or other bulk, or to make it more palatable when it is very hard.

Ear corn can be fed to lambs, but it may be difficult for them to eat. Breaking the ears helps overcome this difficulty.

Ground ear corn is fed by some lamb feeders with fair results. The lambs get very little, if any, value from the cob. However, the cob helps to control the amount of grain consumed, and thus controls death losses from overeating. When ground ear corn is fed, it may be necessary to restrict the amount of hay in order to obtain an acceptable finish on the lambs when they reach market weight.

Antibiotics for Lambs

Antibiotics are commonly fed to hogs, which are simple-stomached animals, with beneficial results.

Recent tests have shown that antibiotics may be fed with beneficial results to fattening or growing lambs. The benefits are increased efficiency of gains and a reduction in numbers of unthrifty lambs. In the several tests, the amounts of antibiotics fed varied from 5 to 15 milligrams per pound of grain.

Hormones for Feeder Lambs

The Progesterone and Estradiol hormone implant is now approved by the Pure Food and Drug Administration for use with feeder lambs. Increased gains of 25 to 40 percent have been made on 15 to 25 per-

cent less feed over the control ration, a mixture of ground hay, corn and soybean oil meal self-fed without implants.

These results have been obtained with pellets containing 250 milligrams of Progesterone and 10 milligrams of Estradiol implanted beneath the skin of the ear. However, at these levels some death losses in wether lambs have occurred due to stoppage of the urinary canal. Implanting of lambs on pasture or on a light grain ration is not advisable. To date experiments indicate that greater benefits and least difficulties result when this hormone combination is implanted six weeks previous to the end of the feeding period.

Since the hormone implant stimulates the appetite of the lambs, it is advisable also to vaccinate for overeating disease as discussed on page 34.

AMOUNT OF FEED NECESSARY TO FATTEN LAMBS

While the primary purpose of feeding lambs is to market farm grown grains and roughage, profits can only be expected when the lambs are fed to a desirable market weight and finish. Therefore, it is extremely important for the feeder to know how much feed it will take to finish out a certain number of lambs.

Generally a feeder will have available only a specific amount of feed and it becomes a problem of knowing how many lambs can be fed to market weight and finish on this amount. This will depend on the type and quality of feed available, the method of feeding, the weight of the lambs when placed on feed, the man who is doing the feeding, and the weather.

In an experiment conducted at Michigan State University (Table 2), 117 hand-fed lambs consumed an average of 367 pounds of shelled corn and 437 pounds of alfalfa hay for each 100 pounds of gain. These lambs averaged 57 pounds when put on feed and were finished at 87 pounds, thus gaining 30 pounds in 83 days, or .36 pound per day. The average consumption of feed per lamb for the 83 days was 112 pounds of shelled corn and 133 pounds of alfalfa hay.

In a similar group (Table 2), 110 self-fed lambs required 413 pounds of shelled corn and 315 pounds of alfalfa hay to produce 100 pounds of gain. These lambs started and finished at about the same weight as the preceding group. However, they made their 30

pounds of gain in 79 days, or 0.37 pound per day. The average feed consumption per lamb was 123 pounds of shelled corn and 93 pounds of alfalfa hay.

Table 2 shows a comparison of five different methods of feeding corn and alfalfa.

TABLE 2—Average of three years' results: Hand-feeding and self-feeding lambs

Lot No.	Days fed	Average amount of feed per day		Average daily gain	Feed per 100 pounds gain		Feed per lamb		Percent of lambs lost
		Grain	Alfalfa hay		Grain	Alfalfa hay	Grain	Alfalfa hay	
		Pounds	Pounds		Pounds	Pounds	Pounds	Pounds	
<i>Shelled corn hand-fed; hay hand-fed</i>									
1.....	83	1.34	1.60	0.36	367	437	112	133	0
<i>Cracked corn and ground alfalfa hay self-fed: 34% corn first 10 days; 50% corn second 10 days; and 66% corn thereafter</i>									
2.....	83	1.52	1.05	0.36	416	289	126	87	2.56
<i>Shelled corn self-fed; hay hand-fed</i>									
3.....	79	1.54	1.18	0.37	413	315	123	93	6.77
<i>Cracked corn (30%); ground alfalfa (70%) self-fed</i>									
4.....	101	.89	2.08	0.34	260	625	90	218	0
<i>Ground ear corn self-fed; alfalfa hay hand-fed</i>									
5.....	83	1.72*	1.27	0.34	403	372	114	105	5.12

*The 1.72 pounds represent ground ear corn. The actual amount of grain per cwt. gain would be 80 percent of this.

Here are some guides to use in determining the amount of feed needed and the length of the feeding period.

1. Under full grain feeding, lambs should be expected to gain one-third of a pound or more per day per lamb.

2. A desirable market weight is generally 90 to 100 pounds.

3. Lambs will usually require about 400 pounds of grain and 400 pounds of hay per 100 pounds of gain. On an individual lamb basis, a 60 pound feeder lamb finished at 90 pounds will require about 120 pounds of grain and 120 pounds of hay.

MARGIN

Since lambs are fed over a relatively short period of time and make a relatively small increase in weight, the feeder must invariably anticipate the price per pound of the fat lamb being higher than the cost per pound of the feeder lamb. It is from this positive margin that the feeder pays his operating costs and obtains his profits. Over a period of years, it has been a rule of experienced lamb feeders to buy their feeder lambs at several dollars per hundredweight less than what they anticipate the fat lamb price will be.

Additional profit can be made when the price per pound of the fat lamb is above the cost per pound of the gain. Knowing the price of grain and hay, and the amount of feed required per hundredweight of gain (Table 2), it is much easier to determine the possible margin on the cost of gain than it is to calculate the possible margin between purchase and selling price. The feeder can never be certain of his selling price until the day he takes his lambs to market.

From both of the preceding margins all expenses of the operation must be paid. These expenses include transportation, veterinary fees, death losses, labor, interest, and depreciation on housing and equipment. These costs vary, but seldom exceed one dollar per lamb, depending on death losses and volume of feeders. With efficient management, costs will be held to a minimum, thus increasing profits which must come from the margin.

The following example will illustrate a basis for calculating costs before purchasing lambs.

Feed cost

Corn — 400 pounds @ 3c.....	\$12.00
Hay — 400 pounds @ 1c.....	4.00
	<hr/>
Cost per hundredweight gain.....	\$16.00

Lamb and feed costs

60 pound feeder lamb at \$17 per hundredweight.....	\$10.20
Feed cost of 35 pounds of gain @ \$16 per hundredweight...	5.60
	<hr/>
Total lamb and feed costs.....	\$15.80
Sale value of 95 pound lamb at \$18.00 cwt.....	\$17.10
	<hr/>
Margin per head to cover other expenses and profit.....	\$ 1.30

Use the following form and current values when calculating your margin to cover your expenses and profit:

_____ pound feeder lamb at _____ per cwt....	\$ _____
Feed cost of _____ pounds of gain at \$ _____ per cwt...	\$ _____
Total lamb and feed costs.....	\$ _____
Sale value of _____ pound lamb at _____ per cwt....	\$ _____
Margin to cover other expenses and profit.....	\$ _____

WHEN TO PURCHASE FEEDER LAMBS

The proper time to buy lambs depends upon the price, availability, feed, labor, and capital. A feeder should consider all of these factors and, in addition, study the seasonal trends of fat lamb prices. Fall is generally the best time to buy, since feeder lambs are usually most reasonable in price and abundant in supply some time during September, October, or November.

Many feeders plan to buy lambs at several different times in order to insure against the possibility of buying all the lambs at a high peak in the price cycle. This will also spread the marketing over a longer time and lessens the possibility of selling all the lambs on a low market. Filling the feed lot two or three times during the season provides opportunity for more efficient use of buildings and equipment, and increases the volume of business.

WHERE TO PURCHASE

Both western and native feeder lambs are normally available from September through the fall and winter. As pasture becomes short and scarce in the sheep producing areas, lambs are weaned and moved either to market or to the feed lot. This movement of lambs is in an easterly direction, since the large consuming centers for lambs are located in the East, and the majority of feed lots are located in the Midwest. Those lambs which are not sufficiently finished to be marketed directly for slaughter are moved into areas where plentiful supplies of grain and roughage are available for their fattening.

Native feeder lambs are usually found either on farms where they are produced, or at local auction or commission yards. Where native lambs are to be purchased, they can usually be secured through a

local livestock dealer or through the local auction yards. Often the feeder instructs the proprietor of the local auction yard to purchase for him a certain number of lambs of a specified type and grade at a given price. This saves the feeder a fruitless trip to the yards, should no lambs be available on that specific day.

Native lambs are generally of medium wool-type or, in some cases, out of Western ewes sired by medium wool rams. The desirability of buying native lambs will depend largely upon price, type, thriftiness, and previous handling. Native lambs may be infested with parasites. It is a good practice to dip and drench them as soon as they enter the feed lot. (Recommendations for parasite control will be found in the Disease and Parasite section.) Thrifty, native lambs free from parasites are preferred by many Michigan feeders, since they gain well in the feed lot.

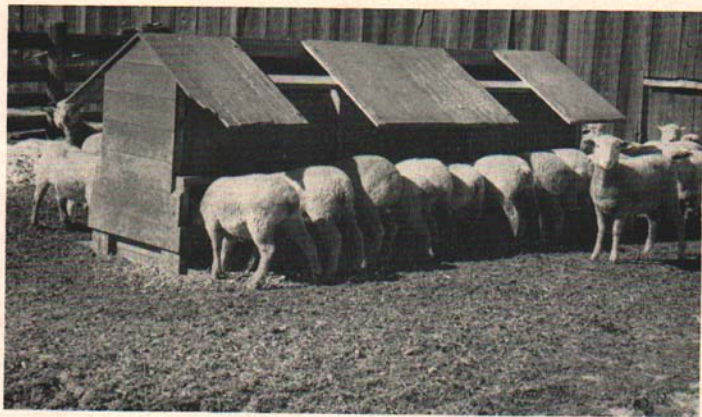


Fig. 3. A self-feeder. Sheet metal trapdoors cover the openings which are used for filling the feeders. (This feeder is diagrammed in Fig. 4.)

Western feeder lambs are usually purchased in larger lots with more uniform breeding than native lambs. These lambs may be purchased through private or cooperative commission firms and dealers in Michigan. These concerns have contacts at concentration yards in the Midwest and the range areas. These firms can provide better service if the feeder makes his wants known to them in advance. Large feeders often find it advantageous to purchase lambs through an order buyer, or direct from the range.

Lambs shipped any distance are generally transported by rail. Trucks are used when shorter distances are involved or less than a full carload are to be transported. Table 3 gives the capacity of

TABLE 3—Lamb capacity of trucks and railroad cars

Weight of lambs.....	50 pounds	75 pounds	100 pounds
	<i>Number of lambs</i>		
13 ft. truck.....	50	40	34
16 ft. truck.....	65	54	45
20 ft. truck.....	84	67	56
24 ft. truck.....	100	80	70
36 ft. car (single deck).....	155	124	105
40 ft. car (single deck).....	170	138	116

various size railroad cars and trucks. Sheep and lambs shipped interstate by rail are subject to what is commonly known as the "28-hour law". This law requires railroad carriers to unload, feed, water, and rest livestock every 28 hours of travel for five consecutive hours. This 28 hours may be (and is commonly) extended to 36 hours by the purchaser signing a release. This procedure is justified, since the lambs can reach their destination sooner.

It is important that lambs be properly bedded, fed, watered, and handled in transit. Injuries and infections sustained while they are being shipped are often the cause of losses and poor gains later on. Care in shipping means:

1. Avoid rough handling and grabbing the wool when the lambs are loaded or unloaded.
2. Check for pileups and downed lambs enroute.
3. Avoid sudden stops and starts.
4. Avoid overcrowding, or loading with other classes of livestock unless they are separated.
5. Provide proper bedding, feeding and watering.

~~WHAT KIND TO PURCHASE~~

Weight is an important consideration when purchasing feeder lambs. The length of time on feed largely depends upon the weight of the feeder lamb, since most lambs finish out at a weight of 90

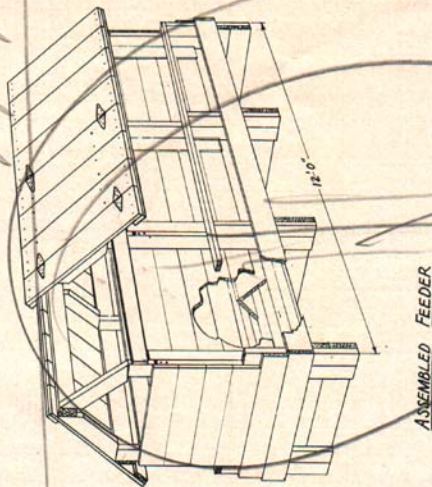
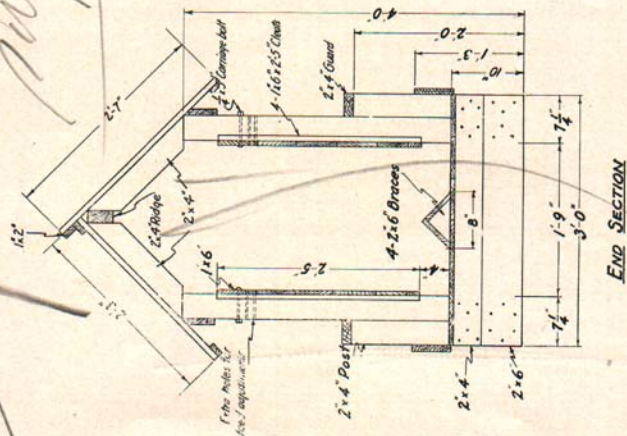
ASSEMBLED FEEDER

Fig. 4. A cheap and easily constructed feeder. The roof makes it suitable for outside use. (Pictured in Fig. 3. See Appendix for material list.)

END SECTION

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to 100 pounds. Feeder lambs, if classified by weight, are usually divided into lightweights (60 pounds and down), medium weights (60 to 70 pounds), and heavies (70 pounds and up).

Lightweight lambs will provide a market for more feed, particularly roughages, than will heavy weight lambs. Lightweights may be handled to an advantage if the lambs are to be pasture fed prior to the dry lot feeding. Since these lambs lack finish, they are usually a better buy than heavy lambs because of a lower total cost per head, and the fact they are able to market more feed for the producer.

Heavyweight lambs are fed to an advantage where feed supplies are short. These lambs will reach market weight more quickly and finish more rapidly than the lighter weights. Some feeders believe that heavyweight lambs are less risk than lightweights when handled on self-feeders, or when used for "lambling down" corn. Often heavyweight lambs have had some previous grain feeding, and less difficulties are involved in getting them started on feed.

Health and thriftiness are of number one importance in selecting feeder lambs. A healthy lamb is vigorous, bright-eyed, active, and possesses a bright fleece with a pink skin. Inactive, droopy lambs with dead, dull fleeces are a poor risk, and should be purchased at a substantial discount in price if they are to be purchased at all. Sometimes these lambs, although heavily infested with parasites, can be successfully treated and profitably fed.

Feeders prefer a lamb with dense or tight fleece and few, if any, wrinkles in the skin. Open, loose fleeces give less protection from the weather; lambs with this type of fleece will require better shelter.

Conformation is very important, since it is much easier for a lamb of good mutton-type to be fed to top market grades. The price differential between grades may often spell the difference between profit and loss to the lamb feeder. Both fleece and conformation are determined by the breeding of the lamb.

Many feeders prefer black-faced lambs since they are a more desirable mutton-type.

Previous care and feeding are important considerations. Lambs that have had some previous grain feeding are easier and quicker to start on feed. Lambs that are dirty, taggy, and have fleeces full of foreign matter indicate poor handling at some time during their lives. When these outward signs are present, one may often suspect poor sanitation practices; and hence the lambs may be infested with both internal and external parasites.

BUYING LAMBS ON CREDIT

The purchase of large lots of feeder lambs may often involve a larger sum of money than the feeder has readily available. At the time he is ready to purchase lambs, the major portion of his capital may be tied up in feed. Banks and local farm loan associations are able to provide credit on the basis of short term loans. Since feeder lambs are seldom held for a period of more than three to four months, the interest involved on such short term loans is a relatively minor consideration.

WHEN THE LAMBS ARRIVE

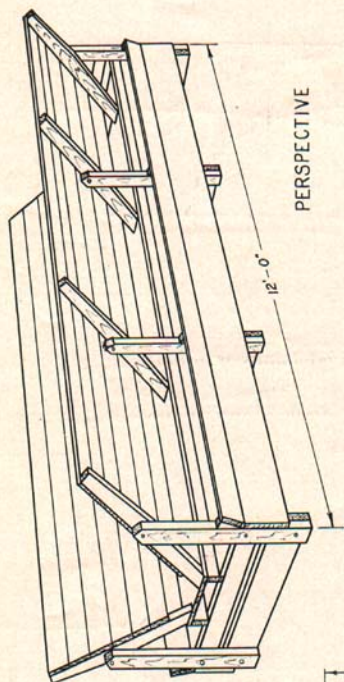
Careful handling of newly-arrived lambs is important to prevent future troubles. Lambs shipped long distances are thirsty, tired, and hungry. They may be subject to disease and digestive disorders—unless given fresh water to drink, a rest, and a slow fill of roughages. Blue grass, brome grass, timothy, or similar pastures are preferred for the first feed.

Lambs should not be turned directly to green, lush, or frozen alfalfa, or other legume pastures; nor should they be given immediate access to large amounts of high-quality legume hay. Feeding first-cutting grass or mixed hays will allow the lambs to get a slow fill while still receiving an adequate amount of nourishment. After two or three days, small amounts of trace mineralized salt should be put before the lambs. After they become accustomed to the salt, it should be provided at all times.

Turning western and native lambs on good, clean, grass pasture with plenty of space to spread out, helps to prevent infection from coccidiosis and the occurrence of para-typhoid dysentery.

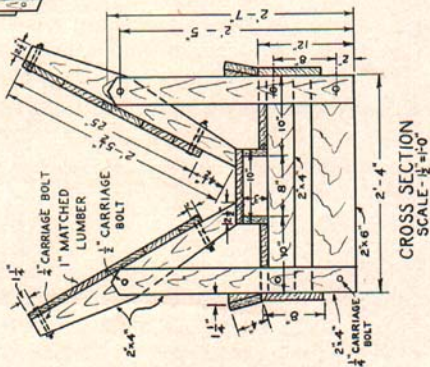
Lambs heavily woolled in the face should be clipped around the head so they can see their feed better, and gain faster. Clipping around the dock will keep the lambs from becoming dirty and wet, thus preventing maggot trouble in late summer and early fall.

Smear EQ 335, available from livestock supply houses and some drug stores, is an excellent maggot preventive when applied to open wounds. When diluted with nine parts of water, it can be used to expel and kill maggots from affected areas.



PERSPECTIVE

Fig. 5. A movable sheep feeding rack. This is an excellent rack for hand-feeding both hay and grain, or for self-feeding a mixture of ground hay and grain. (See Appendix for material list.)



GENERAL MANAGEMENT

Since lambs are principally a roughage-consuming animal, the feeding of grain must always be done carefully and with good judgment. The difference between enough and too much grain is sometimes very slight, especially at the start of the feeding period. Therefore, it is important to feed regularly, provide adequate feeder space, spread the feed evenly in the troughs, and avoid irregular disturbances among the lambs. Develop a definite system of feeding and stick to it.

SORTING LAMBS IS SOMETIMES DESIRABLE

If there is much variation in the size of feeder lambs, their feed requirements will also vary. This may result in the crowding out of the smaller lambs by the larger ones, and these larger lambs may then overeat. It is much easier to regulate the feed if the lambs are uniform in weight. It also makes it more convenient at marketing time if the lambs are relatively near the same degree of finish, and sorting can be kept to a minimum. If it is at all possible, sort the lambs into uniform weight groups. Generally, those lambs below 60 pounds need not be pushed as rapidly as lambs nearer market weight.

SHEARING FEEDER LAMBS

Before a feeder decides whether or not he should shear his lambs, he should carefully consider these points:

1. Will the value of the wool offset the cost of shearing, the lowered market price received for the lambs, and the higher feed requirements? Unless feeder lambs are carrying an extremely heavy fleece, the wool clipped cannot be expected to run much more than 4 to 5 pounds. After a lamb is sheared, it will generally take 8 to 12 weeks before a number-one pelt will be produced. (A number-one pelt has a staple length of from one inch to three-fourths of an inch, a number-two pelt from one-half to three-fourths of an inch, and a number-three pelt from one-fourth to one-half of an inch.) When pelt credits are high, clipped lambs may sell for a considerable discount. The price of clipped lambs may be several dollars less per hundred weight than for woolled lambs. Experiments both at Michigan State and other experiment stations have indicated that clipped

lambs require more feed to produce 100 pounds of gain than do woolled lambs. This is particularly true in cold weather.

2. Is adequate shelter available? Considerable loss may result when recently sheared lambs are exposed to wet or cold weather. Unless adequate shelter is provided, lambs should not be sheared.

3. Are the lambs uncomfortable and making slow gain? If the weather is extremely warm, lambs may be uncomfortable and do poorly. Also, if they are infested with external parasites, clipping may be desirable. However, if the weather turns cold, the rate of gain for clipped lambs is generally below that of woolled lambs, since more feed is required to keep the lambs warm.

SHELTER, HOUSING, AND VENTILATION

There is little need for shelters for woolled lambs from the standpoint of warmth. Some shelter should be provided, however, to protect the lambs from rain, snow, and wind, and to make feeding and handling more convenient. Shelter also protects the feed and conserves the manure. If the lambs have been sheared, good shelter is extremely important.



Fig. 6. Oil drum self-feeder in use. (Diagrammed in Fig. 7.)

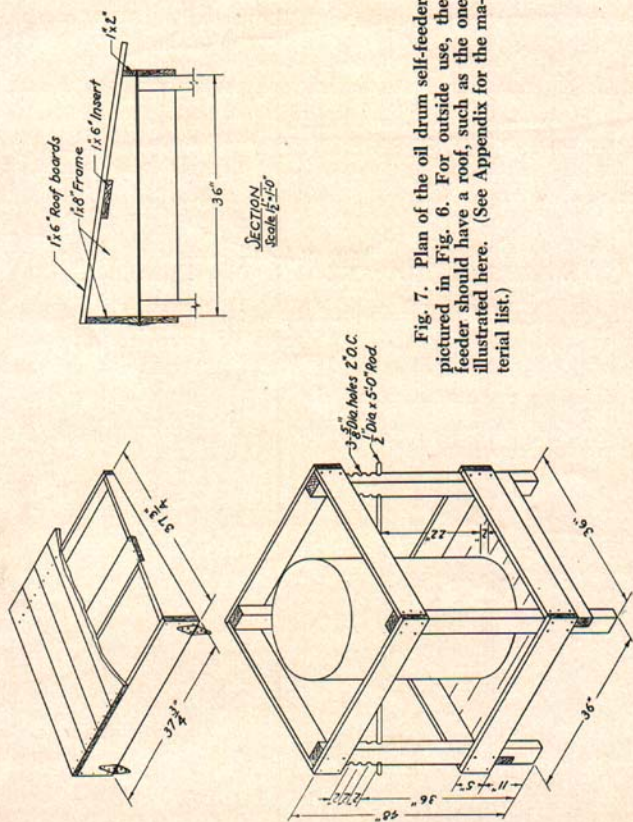


Fig. 7. Plan of the oil drum self-feeder pictured in Fig. 6. For outside use, the feeder should have a roof, such as the one illustrated here. (See Appendix for the material list.)

Close confinement in damp, poorly ventilated quarters is undesirable. Lambs should be allowed 6 to 8 square feet of well-ventilated shelter area per lamb. An open shed 60 by 30 feet will shelter 300 lambs. Access to a yard, allowing 10 to 12 square feet of space per lamb, should be provided. Lots need not be larger, since gains are usually faster when the lambs are kept in a rather restricted area.

Frequently a shed or similar building that is already on the farm can be easily and cheaply converted into an adequate lamb feeding shed. If possible, a southern exposure is preferred for the shelter and the adjacent yard.

FEEDING SPACE

Each lamb should be allowed 10 to 12 inches of feeder space if they are to be hand-fed. Self-fed lambs require about 4 inches of feeder space for each lamb. An adequate supply of water should be available at all times.

BEDDING

Lambs marketed with dirty, muddy fleeces are usually sold at a severe discount in price. For best results, they should be kept in a dry, well-bedded area and provided with a dry place to rest. When a good shelter is provided, extra bedding may not be necessary, especially if abundant amounts of hay are fed since the unwanted hay will serve as bedding. If hay is fed in limited amounts, then extra bedding may be desirable. This is especially true as the grain is increased, since lamb droppings become soft when large amounts of grain are fed. If silage makes up a large part of the ration, more bedding is needed since large amounts of water are eliminated by lambs.

LAMB FEEDING EQUIPMENT

The main pieces of lamb feeding equipment are hay and grain feeders, salt or mineral boxes, and watering equipment.

Hay and grain feeders can be simple in construction, whether feeding hay and grain separately, or if used as a combination hay-and-grain feeder. It is common practice when hand-feeding grain to provide troughs 10 to 12 inches wide with 3 to 4 inch sides. These can be made in 10 to 16 foot sections, and should be about 12 inches

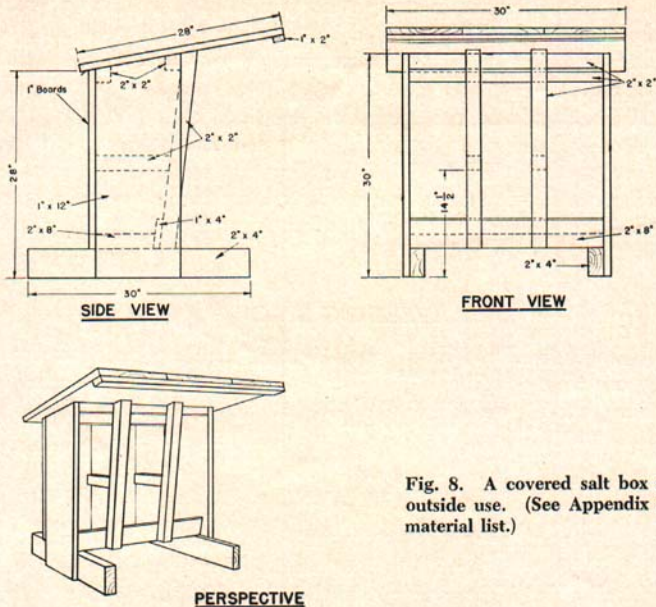


Fig. 8. A covered salt box for outside use. (See Appendix for material list.)

from the ground. Often these troughs are made reversible by using 6 to 8 inch lumber as side pieces with a common bottom, so that they may be turned over and cleaned automatically at each feeding. Flat bottom troughs are preferred over the V-shaped type.

Salt or mineral boxes should be made large enough or sufficient in number to give all animals free access to salt and/or minerals at all times. When lambs are on pasture or in the corn field, a covered box should be provided to keep out the rain. (Fig. 8)

Watering equipment should provide clean, fresh water at all times. In winter, freezing should be prevented. Electrically heated automatic waterers that can be readily cleansed are now available. When large numbers of lambs are fed, these automatic waterers save labor. Adequate water helps promote normal digestion, proper utilization of feed, and faster gains.

A feeder commonly used in Michigan is shown in Fig. 5. This is a combination feeder which is easily cleaned, and the grain put in from the central alley without interference from the lambs. The

solid panels are then turned to the normal position shown in the diagram, giving the lambs access to the grain. Hay can then be fed while the lambs are eating grain, without the hay falling into the fleece of the lamb. This equipment can also be used to self-feed mixtures of ground hay and grain.

There are other types of adjustable self feeders that give good results. On page 20 is shown the plan for an adjustable straight-sided feeder for inside or outside use. The picture on page 18 shows the feeder in use.

When handling large numbers of lambs, some system of self-feeding or mechanical handling of feed should be considered to cut down or control labor costs. Visits to established lamb feeders may help give some good ideas on labor saving devices.

MARKETING

A successful lamb feeding job is not complete until the lambs are marketed. Lamb feeders should keep in constant contact with marketing agencies so as to sell the fat lambs at the most favorable price. Since extremely heavy lambs are often severely discounted, check weight and finish frequently. The time to market lambs is when they are fat and the discount for heavy lambs makes further feeding unprofitable.

Finished lambs are commonly sold at the farm, at local auctions, or by commission companies at terminal markets. Buyers from various markets are usually available to advise feeders when the lambs are fat and on the prevailing market prices. Lamb feeders should avail themselves of this service.

The grades of fat lambs are prime, choice, good, utility, and cull. Commercial fat lambs are usually finished to a choice grade. For show purpose, a prime finish is necessary. The feeding of commercial lambs above a choice grade is costly, and the consumer often objects to buying excessive amounts of fat. Except in unusual cases, feeding above the choice grade is generally not profitable.

Ability to grade lambs can be developed only by practice. The degree of finish on a lamb can be determined by touching the lamb over the rib, back and loin. The backbone and ribs of cull and utility lambs feel prominent to the touch. In choice and prime lambs, a covering of fat over the rib, back and loin give a smoother impression to the touch, and a thicker appearance.

The packer thinks in terms of finish and yield. The reputation of a lamb feeder on the market is largely determined by the feeding and handling the lambs have received previous to shipment. Proper handling and feeding of lambs at marketing time is important to prevent excess shrinkage from farm to market. A shrinkage of from 1 to 3 percent is expected, but heavy shrinkage can be prevented by quiet and careful handling of lambs.

The lambs should be given a normal feed if shipped or trucked any distance. Heavy feeding to increase market weight may result in digestive upset and an abnormal shrink or even death. This will lead to a bad reputation for the lamb feeder. Clean, well-bedded trucks, protected from the weather, add to the comfort of the lambs during shipment and protect their appearance.

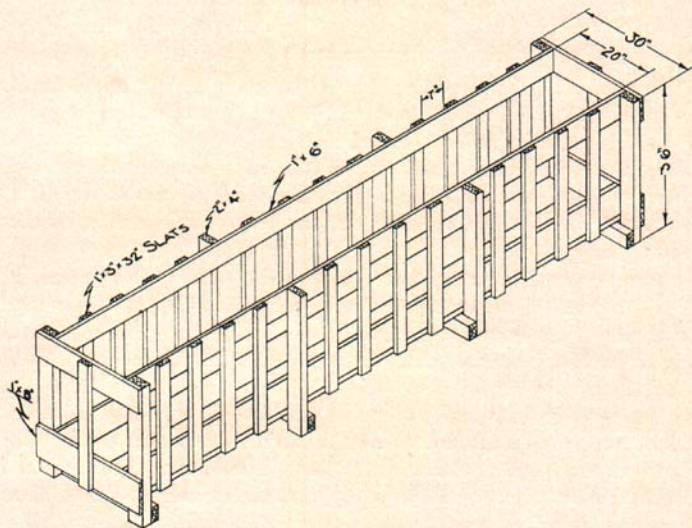


Fig. 9. Feeding rack. Care should be taken in placing hay in this rack, if the sheep are to be kept clean.

DISEASES AND PARASITES*

When diseases and parasites enter the feed lot, the profits vanish. Even though the disease may not be fatal, the reduced growth and feed efficiency of the lambs can easily spell the difference between a successful feeding enterprise and financial disaster. Eighty percent of the disease problems encountered in a feeder lamb operation can be directly traced to improper feeding and management. The diseases in the following paragraphs are listed in the order in which anyone bringing lambs into the feed lot may expect them to occur.

Internal Parasites

Lambs showing symptoms of infestation by internal parasites should be drenched as soon as they enter the feed lot. Stomach and nodular worms are the most common internal parasites in Michigan. Infected animals are unthrifty, dull, and listless. The wool is dry and harsh. The eyelids and skin are pale and the lambs fail to grow. These parasites can be controlled by using phenothiazine as a liquid drench, bolus or pill.

If infestation by tapeworms is present, a lead arsenate drench should be used. Since lead arsenate is a deadly poison, follow the directions of the manufacturer when mixing and using this drench.

A combination phenothiazine-lead arsenate drench can be used when both stomach and nodular worms, as well as tapeworms, are present. It is safest again to use a prepared drench, and to follow the manufacturer's instructions.

When the lambs are to be fed on pasture, it is a good plan to mix 1 pound of phenothiazine with 12 or 14 pounds of trace mineral salt. This phenothiazine-salt mixture should be kept in front of the lambs throughout the grazing season. It should be fed from a box protected from the weather. Under no circumstances should lead arsenate be used in a salt mixture.

External Parasites

Lambs infested with external parasites should be dipped or sprayed as soon as possible after they enter the feed lot, providing the weather is still warm. After dipping or spraying, be sure to protect the lambs from becoming chilled. Use rotenone as a dip at the rate of $\frac{1}{2}$ pound of 5 percent rotenone per 100 gallons of water, or

*Reviewed by Dr. Frank Thorp, Jr., Animal Pathology Department.

an arsenical dip according to the manufacturer's instructions.

As a spray, use DDT at the rate of 8 pounds of 50 percent wettable powder per 100 gallons of water. Do not use DDT within 60 days of slaughter.

Sheep scab or scabies is caused by an extremely small mite which burrows in the skin, resulting in the formation of scabs. As a result of the irritation, the sheep rub and pull out the wool.

All sheep shipped into the state must be accompanied by a health certificate indicating that the lambs have originated in a scab free area, or have been dipped under supervision of federal livestock health authorities. Persons buying lambs out of the state should insist that this health certificate accompanies each shipment.

Since there is always the possibility of an outbreak of scab in the state, lamb feeders should constantly be on the lookout for symptoms. If any unusual condition is noted, it should be reported to local or state veterinarians for proper diagnosis and to receive aid in dipping the lambs if scab is found to be present.

Shipping Fever

Although shipping fever is not too common, this disease may occur when the lambs are first received. It may be caused by exposure or by a weakened condition resulting from poor feeding enroute. Shipping fever is characterized by high temperature and respiratory distress. It may also be associated with pneumonia. Losses are rarely great. It can best be prevented by keeping the lambs dry, and providing feed and water regularly as soon as the lambs enter the feed lot.

Antibiotics and the sulfa drugs are helpful in controlling shipping fever.

Sore Mouth

This virus disease is characterized by vesicles or blisters and later scabs on the lips (Fig. 10). Mortality is low but the sore condition of the mouth interferes with the capacity to eat both grain and hay. It is particularly serious inasmuch as it affects the lambs in a period when they are becoming adapted to the hay and grain. Sore mouth may be picked up at any point where the lambs come in contact with other diseased animals, or where they have had an opportunity to get in contact with scabs dropped by diseased ani-

all the sheep. A reliable vaccine is available which should be administered by a veterinarian as soon as the lambs reach the feed lot. Removing the diseased tissue and painting the wound with iodine will help the lambs already affected.

Paratyphoid Dysentery

While this is an infectious disease, it is closely associated with poor feeding practices. The organism causing this disease is constantly present in the intestinal tract of the sheep. Starving for a long period of time will cause an outbreak. The best control measure is to prevent starvation and get the lambs on feed as soon as they arrive. It is widespread, but not generally encountered except where lambs have been starved in shipment or where lambs are subjected to poor pasture, particularly in a drought-stricken area.



Fig. 10. A typical case of sore mouth.

Coccidiosis

This disease is caused by a protozoan parasite and is characterized by a bloody dysentery or diarrhea. It is often referred to as red or black scours. Few outbreaks have been encountered in native lambs since they are exposed to the parasite and develop an early immunity. It is particularly serious, however, where western lambs are fed since they have had little or no exposure to this parasite and consequently have developed no immunity. An outbreak of coccidiosis will occur in susceptible lambs almost exactly 21 days after the lambs have been exposed. This exposure occurs either in the yards where they have congregated or on reaching the feed lot.

To prevent coccidiosis, or to stop it should an outbreak occur, put the lambs on pasture — don't allow them to congregate in a confined area where they may pick up droppings left by infected animals. If susceptible animals are put on pasture for three weeks as soon as they reach the farm a break will not generally occur. The

mortality is usually 4 percent to 7 percent when a break does occur, and considerable financial loss will result due to decreased gaining ability.

Overeating Disease or Enterotoxemia

Overeating is the primary curse of the lamb feeder. It is responsible for more deaths in feeder lambs than all other diseases combined. The first sign of an outbreak of enterotoxemia or overeating disease is sudden death among the fattest, heaviest, and most vigorous lambs. These animals usually die suddenly and rather violently. There will often be signs of considerable thrashing about and the animal may be found lying in a running position. After the first few deaths occur, one may notice scouring and possibly vomiting among some of the other affected lambs. Indigestion and founder may be generally associated with enterotoxemia. Lambs may stagger about or stand in a humped position as if experiencing extreme intestinal pain. When sudden deaths are encountered among lambs on full feed, it is probable that enterotoxemia is to blame.

Overeating disease is a well-applied term for this malady. The organism causing enterotoxemia is constantly present in the intestinal tract of the lamb. When large amounts of carbohydrates are consumed, this organism produces a deadly toxin which may result in death or illness so serious that the feeder's profits may well be wiped out.

A break in this disease may be caused in many different ways; for example, feeding excessive quantities of high carbohydrate feeds, or sorting of hay and grain mixtures in the self-feeder so that the lambs get too much grain for the amount of hay consumed. The outbreak of some disease such as sore mouth which will cause part of the lambs to go off feed, and therefore allow the remainder to eat more than would normally be their share, may be another cause of enterotoxemia.

When lambing-down corn, the farmer may find that the heavier lambs are beginning to break down the stalks, eating large quantities of corn. Once grass, weeds and lower leaves in the field have been consumed, the lambs tend to overeat on corn. The same condition can result following a severe windstorm, when large numbers of fallen ears can be easily reached by the lambs.

An immunizing agent in the form of a vaccine is beneficial. However, vaccination is no substitute for good judgment in feeding lambs.

It is an excellent practice to have a veterinarian vaccinate all lambs for overeating disease as soon as they enter the feed lot. The vaccine for enterotoxemia is not effective until 10 days to 2 weeks after vaccination.

The addition of baking soda or sulphur to the feed has been suggested, but the main value in these lie in the fact that they tend to reduce the grain consumption.

Urinary Calculi

Urinary calculi are hard or soft stones which are observed in the bladder and urinary tract of wether lambs. These obstructions may make urination difficult or impossible and result in the development of a serious toxemia. Since it is impossible for sheep to successfully eliminate excessive minerals from the body, the feeding of high mineral content feed, excessive quantities of bran or fodders such as corn, millet, sorgum, etc., may cause the development of urinary calculi.

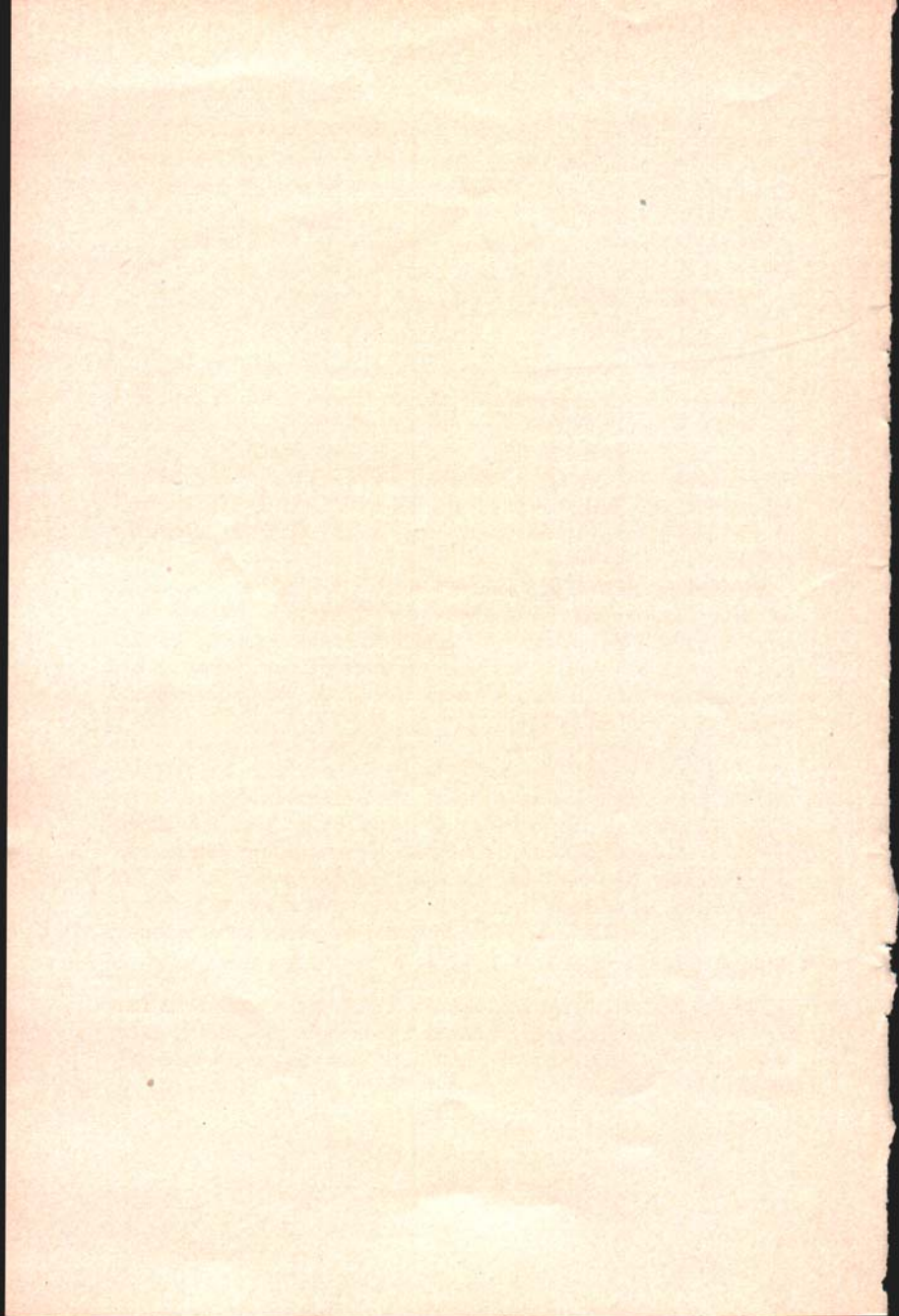
In feeding mineral supplements, one should be very careful in selecting those specifically designed for sheep, and feeding them according to the manufacturer's recommendation. Although the exact reason is unknown, the incidence of urinary calculi drops when feeds that are high in carotene and Vitamin A, such as alfafa and yellow corn, are fed.

Stiff Joint

Stiff joint may result from the delayed outbreak of an infection picked up through the navel at lambing time. This is commonly known as navel ill and affects may be seen from any time shortly after lambing until they become quite sizable feeder lambs. This problem may also result from founder which may occur during an outbreak of enterotoxemia. Stiff joint does not occur too frequently.

Miscellaneous Problems

Besides the foregoing diseases and parasites, other problems may be encountered. Foot rot, listerellosis, pink eye, and various other infectious, parasite caused, and nutritional diseases may occasionally be seen.



APPENDIX

Materials Required for Feeding Equipment Illustrated

The different types of lamb feeders and the salt box illustrated in this bulletin can be constructed on the farm. Figures 4, 5, 7 and 8 have been reproduced from actual plans prepared jointly by the Departments of Agricultural Engineering and Animal Husbandry. Those figures can be used as working drawings. Material lists for each are given below and on page 39; they are approximate but will provide adequate material. Exact dimensions should be taken from the diagrams. (The two pages can be detached by tearing or cutting along the dotted line without damaging the rest of the bulletin.)

Self-Feeder

This is the self-feeder diagrammed in Fig. 4, page 20. It is also shown in use in the photograph in Fig. 3.

Quantity	Size	Length	Name or Use
8 pieces	2 x 4	4' 0"	Frame
8 pieces	2 x 4	2' 0"	Frame
4 pieces	2 x 4	3' 0"	Frame
4 pieces	2 x 6	3' 0"	Frame
36 bd. ft.	1"		Floor
2 pieces	1 x 10	12' 0"	Floor
1 piece	2 x 6	2' 6"	Floor
12 pieces	1 x 6	3' 0"	Ends
14 pieces	1 x 6	12' 0"	Sides
8 pieces	1 x 6	2' 5"	Cleats
2 pieces	2 x 4	12' 0"	Guard rails
27 pieces	1 x 6	2' 6"	Roof
27 pieces	1 x 6	2' 3"	Roof
4 pieces	1 x 2	12' 0"	Cleats
2 pieces	1 x 6	12' 0"	Cleats
8 pieces	2 x 4	1' 7"	Rafters
1 piece	2 x 4	12' 0"	Ridge

Strap hinges, screws, bolts and nails as needed

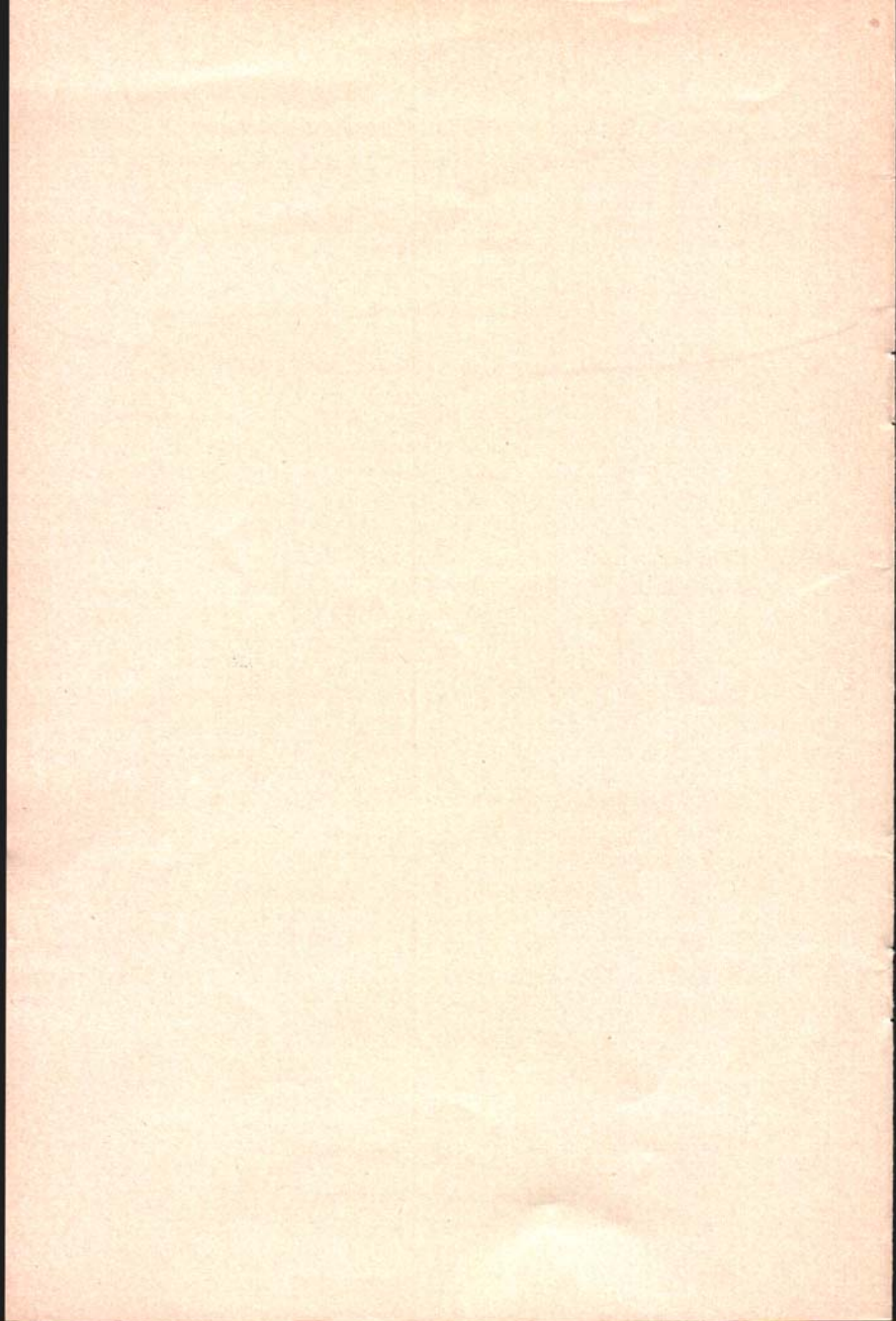
Movable Feeding Rack

This is the movable feeding rack diagrammed in Fig. 3, page 23.

Quantity	Size	Length	Name or Use
8 pieces	2 x 4	2' 7"	Frame ^o
8 pieces	2 x 4	2' 5½"	Frame†
4 pieces	2 x 4	2' 4"	Frame†
4 pieces	2 x 6	2' 4"	Frame†

^o Long-cut from 2 pieces of 2 x 4, 12 ft. long.

† Long-cut from 4 pieces of 2 x 4, 10 ft. long.



3 pieces	1 x 10	11' 8½"	Trough
2 pieces	1 x 3	11' 8½"	Trough
2 pieces	1 x 4	12' 0"	Trough
8 pieces	2 x 1¼	4"	Wedges
2 pieces	1 x 8	12' 0"	Lateral tie
60 bd. ft. of tongue & groove flooring			Siding
8 carriage bolts, ¼" x 5"			
32 carriage bolts, ¼" x 4"			
2 lb., 8d nails; 2 lb., 16d nails			

Oil Drum Self-Feeder

This is the self-feeder shown in use in the photograph in Fig. 6, and diagrammed in Fig. 7, page 25. Although the feeder in the photograph has an open top, for outside use a roof (shown in the working drawing) is definitely recommended.

Quantity	Size	Length	Name or Use
4 pieces	2 x 4	4' 0"	Frame
2 pieces	2 x 4	3' 0"	Frame
4 pieces	1 x 6	3' 0"	Frame
4 pieces	1 x 6	3' 2"	Frame
9 bd. ft.	1"		Floor
1 steel rod	½"	5' 0"	
Oil drum	22" diam.	2' 11"	Tank
7 pieces	1 x 6	3' 4"	Roof
1 piece	1 x 6	3' 2"	Roof
1 piece	1 x 2	3' 2"	Roof
2 pieces	1 x 8	3' 0"	Roof
1 piece	1 x 8	3' 2"	Roof

Strap hinges, screws, bolts or nails as needed

Covered Salt Box

This is the covered salt box diagrammed in Fig. 8, page 28.

Quantity	Size	Length	Name or Use
2 pieces	2 x 4	30"	Skids
2 pieces	2 x 2	27"	Front spacers
2 pieces	2 x 2	10"	Braces
2 pieces	2 x 2	26"	Roof supports
1 piece	2 x 8	26"	Floor
2 pieces	1 x 12	30"	Side boards
3 pieces	1 x 10	24"	Back
3 pieces	1 x 12	28"	Roof boards
1 piece	1 x 4	26"	Front
1 piece	1 x 12	30"	Brace

Screws or nails as needed

Cooperative extension work in agriculture and home economics. Michigan State University and U. S. Department of Agriculture cooperating. Paul A. Miller, Director, Cooperative Extension Service, Michigan State University, E. Lansing. Printed and distributed under acts of Congress, May 8 and June 30, 1914.

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