

Commercial Lamb Feeding in Minnesota

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In the 1920's and 1930's, well over 1,000 Minnesota farmers annually fed out 250 (one double-decked railroad car) to 2,500 Western feeder lambs. They consistently netted, over feed expenses, \$1 to \$4 per lamb. Since the 1950's, the number of available feeder lambs has decreased 60-70%; more lambs are fed in the West (particularly Colorado, Texas, and California); net returns over feed costs per lamb are no greater in the 1980's than they were in the 1930's; and, as a consequence, in 1988 there are less than 100 actual lamb feeders in Minnesota.

But there are some unique traits and characteristics of feeding out lambs (either home-grown or purchased feeder lambs) that will better enable sheep producers to make good decisions on buying, selling, management, and diet choice, and to avoid the many pitfalls commonly encountered.

There are few similarities between a farm flock and lamb feeding, other than the fact that both enterprises require keen observation of abnormal health, feed intake, and attention to management. Lamb feeding is a short time, big numbers, high capital, low labor, minimal land and equipment but risky "game." A farm flock is almost completely opposite in all aspects.

Sources of Profit

Lamb feeders realize a profit from feeding lambs from two sources: 1) margin, selling the finished lamb for a higher price/100 lb than it cost as a feeder lamb/100 lb; 2) profit on the gain, producing weight gains (30-40 lb/lamb) for a lower cost/100 lb than they sell for; and 3) both sources of profit.

Sources of Losses

1. The major, and most frequently occurring pitfall to making a profit is a negative buying and selling margin of such magnitude that it erases any and all profit that may have been made on the weight gained.
2. Lamb mortality detracts from profits in three ways:
 - a) A 1% death loss increases the initial cost/100 lb of the remaining feeder lambs by 1% per 100 lb. (A 3% death loss on 80-pound feeder lambs bought for \$80/100 lb increases the cost on the remaining lambs to \$82.47/100 lb.)
 - b) If the lamb consumes 150 lb of lamb feed before dying, that amount of feed lost detracts from the feed efficiency of the remaining lambs.
 - c) The original weight, as well as the potential weight gains, reduce the pounds of lamb sold.

3. Interest and Depreciation

An 80-pound feeder lamb that cost \$.80/lb or \$64 at 12% interest has a \$7.68 interest cost/year, or \$1.92 for a three-month

feeding period. Interest and depreciation on the feedlot fence, feeders, waterers, shelter, etc., are more variable and difficult to affix appropriate costs to, but a \$10,000 cost for facilities used to feed 1,000 lambs per year would amount to \$1.50 to \$2 per lamb.

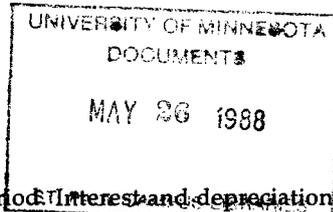
4. Shrink in Lamb Weight

Incoming and outgoing weight shrink can easily be 25 to 35% of the total weight gains made. A 10% shrink on 80-pound feeder lambs costing \$.80/lb changes the arrival cost to \$.889/lb. Shrink from feedlot to market of 5 lb/lamb changes the value of the feedlot weight appreciably (100 lb sale weight at \$.80/lb becomes \$.75/lb on feedlot weight).

5. Inefficient weight gains due to: a) small framed and early fattening lambs; b) environmental stress such as muddy yards and extremes in temperatures; c) chronic illness such as coccidiosis, heavy parasite infection, pneumonia, acidosis, etc.; and d) inappropriate diets. The typical 6- to 7-month-old feeder lamb should gain .5 to .6 lb daily, be marketed at a weight of 110-120 lb, and require 6 to 8 lb of feed/lb gain. If fed inadequate amounts of feed daily, under conditions of stress, and to heavy weights (over fat), the amount of feed/lb gain may escalate to 15 to 20 lb of feed/lb gain.

Enlightened Lamb Feeding Practices

1. Calculate the break-even selling price before buying feeder lambs. Use current feed costs and average feed efficiency values to determine the anticipated costs to produce 1 lb gain. (Lamb diet @ \$.04/lb x 8 lb lamb ration/lb gain = \$.32/lb gain.) If the 80-pound feeder lamb cost \$.80/100 and 40 lb gain is put on (80 lb x \$.80 = \$64 + 40 lb x \$.32/lb = \$12.80), then \$64 + \$12.80 = \$76.80/115 lb selling weight = \$66.80/100 lb break-even selling price. Keep in mind that no allowance has been made for 1 to 3% lamb mortality, interest and depreciation, or labor; but it does provide an essential guide in deciding whether or not to feed lambs.
2. The break-even selling price also aids in deciding whether to forward contract with a packer and lock in a price that will assure a profit.
3. Vaccination against enterotoxemia (overeating disease) is an absolute essential.
4. Hedge buying and selling. Feeding only one set of lambs/year, feeding all lambs for the same period of time, and selling all lambs on the same day is extremely risky. Some lambs will gain .7 lb/day, while others gain .4 lb/day. The rapid gaining lambs become too fat and inefficient in feed utilization if fed until the slower gaining lambs are ready to market.



- Lambs fed at 75 to 80% of the nutrient intake necessary for maximum weight gains use a disproportionate amount of the feed for mere maintenance, resulting in very inefficient weight gains.
- Diet costs/ton certainly influence costs to produce 100 lb of lamb. If processing (pelleting), special supplements, or feed additives increase the cost of the diet 20%, then efficiency must be improved 20% via feed efficiency, reduced lamb mortality, and labor.

Health Aspects

At best, feeder lambs are very stressed after riding 200 to 500 miles from their point of origin to the feedlot. Often they have moved through sales barns where they have come in contact with a variety of bacterial and virus infectious agents. The management and nutrition program of the first few days following arrival is important to recover from the stresses of shipping and handling. They need fresh water, rest, and an energy-protein restoring diet, in that order, to avoid serious health problems.

Respiratory infection resulting in high fever and little or no feed intake may surface within the first few days and, if not treated, may linger on for two weeks or until death. Bacteria such as *Pasturella haemolytica* and *P. multocida* as well as viruses such as parainfluenza and syncytial virus that overwhelm the lamb's natural defenses, lowered by shipping stresses, are usually responsible. Oxytetracycline (intramuscular injections) at 5 mg/lb body weight for 5-6 days or medicating the water with sulfonamides are the usual treatments.

Acidosis, a condition in which the rumen pH drops from a range of 7.2 to 8.0 to a range of 5.5 to 6.5 due to high grain intakes is a common problem that can cause death. It very often precedes *enterotoxemia*, which is the major killer of feedlot lambs that have not been vaccinated against *Clostridium perfringens*, type D. Two subcutaneous type D injections about 10-14 days apart are necessary for protection. Vaccination virtually eliminates enterotoxemia. Death loss among unvaccinated lambs can easily exceed 5%.

Polio encephalomalacia affects some feedlot lambs fed high grain diets. The thiamin produced in the rumen becomes unavailable to the lambs. The symptoms are very similar to those of enterotoxemia, except the lambs may live one to three days before dying. Injections of thiamin, if administered soon after the onset of the malady, may produce dramatic recovery.

Urinary calculi, which blocks urine excretion among wether lambs, is usually caused by excessive intakes of phosphorus in relation to calcium. The addition of 1% calcium to the grain diet plus .5% ammonium chloride aids greatly in preventing this problem.

Rectal prolapse may occur in either male or female lambs of any breed that are eating high levels of grain, fat, coughing, or with an inherited predisposition to prolapse.

Coccidiosis is caused by an overwhelming infection of coccidia protozoa. It can be very debilitating, reduce feed intake, and cause death; but it can be prevented and cured by adding 30 to 40 grams of Bovatec per ton of diet.

Diets

Feeder lambs can be finished in a variety of ways, including pasturing on legumes, brassicas (rape or turnips), and standing corn. The conventional method is to feed local feedstuffs in drylot that are surplus and inexpensive and at high enough intake levels to result in weight increases. These feedstuffs might include corn or small grain screenings, sunflower or soybean by-products, sprouted grains, corn silage, haylage, legume hay, and corn, barley, wheat, and rye grains. In addition to these sources of energy, protein supplements (proprietary, SBM, linseed meal, lupine, canola, fish meal, etc.) should be provided. Sources of minerals (phosphorus from the grains and calcium

from legume forages) are often augmented by adding rich sources of those minerals to trace mineral salt.

Lamb feeding research conducted at the University of Minnesota during the last 60 years provides a wealth of information on the response feeder lambs make to a variety of grains, protein supplements, forages, methods of feed processing, and management schemes. Some of the pertinent points include:

- Protein supplements normally cost 4 to 6 times more per pound than the grain portion of the diet. Overfeeding protein supplements or using supplements that cost appreciably more than conventional sources soybean meal (SBM), without increasing lamb performance over levels attained with SBM, add tremendously to the costs of lamb feeding. For example, SBM costs about 44% as much as blood meal and 65% as much as corn gluten meal. However, these two by-pass sources of protein have not improved lamb gains in Minnesota trials involving over 1,000 lambs.
- Replicated studies comparing SBM with lupine seed (28-38% protein), sunflower meal (24-38% protein), linseed meal (34-36% protein), fish meal (60% protein), cottonseed meal (41% protein), feather meal (85% protein), turkey litter (24-28% protein equivalent), and urea (281% protein equivalent) indicate that if feed intake is not reduced due to palatability (a slight problem with fish meal, turkey litter, and occasionally urea) and equal protein intakes are provided, lamb performance is not significantly affected by the supplements fed. The choice of supplement to feed becomes a matter of availability and cost per unit of protein.
- Lambs fed urea-containing supplements (1 part urea and 7 parts corn contains about 42% protein equivalent) normally gain appreciably slower during the first two to three weeks than lambs fed SBM. After that rumen adjustment period, weight gains are comparable between SBM- and urea-supplemented diets.
- Alfalfa hay is the standard for comparison among other forages. Quality of forage makes a tremendous difference in feedlot lamb performance. Feedlot lambs fed early-cut alfalfa hay gained significantly faster than those fed alfalfa hay with similar appearance but cut 20 days later. The higher the proportion of hay in the diet, the greater the influence of forage quality on lamb performance. Legume forage, in contrast to non-legume hay, usually results in greater hay and protein intake and always in higher calcium intakes. On rare occasions, non-legume hay may contain 15 to 18% protein but more often contains 10 to 12% protein. To provide the same intake of protein in the diet, twice as much protein supplement is required, which in turn may negate any price advantage that the non-legume hay had.
- Fresh-fed and well-preserved legume haylage is an excellent forage for feedlot lambs. It does present the problem of varying in dry matter and, therefore, nutrient content from one part of the silo to another. In addition, haylage not consumed one day may spoil in the bunk, and the bacteria *Listerella* may develop, resulting in lamb death due to listeriosis affecting the central nervous system.
- Corn silage may serve as the sole forage source for finishing lambs. Corn silage as 50 to 60% of the diet will produce very slow weight gains. It must be limited to about 2.0 lb or less per lamb daily to assure adequate corn intake (2.5 to 2.7 lb/day). Furthermore, it is very low in protein (2.5% on an as-fed basis, 8-9% on a DM basis) and calcium. Thus, three times more protein supplement is required/lamb daily than when alfalfa hay is fed.
- Soybean hulls are an excellent source of forage for lambs. Conversely, sunflower hulls (45-50% fiber) fed with corn, retard weight gains.

Grains are the major energy source for feedlot lambs. As a rule, grains are much more consistent in nutrient content from one lot to another than forages. Even between grains, the total digestible nutrients (TDN) vary only about 10% (corn, 80% TDN, and oats, 70%).

Moisture content, sprouting, mold, bacterial decomposition (as in high moisture ear corn), stage of maturity when harvested, and fiber content (as in light weight oats or barley) affect significantly the concentration of energy in the grains. Ensiling shell corn usually reduces feed intake initially, and some molds can make corn very unpalatable.

Successful lamb feeding hinges on maximizing energy intake, but not to the point that it causes acidosis, so that the percent of energy intake used for weight gains is maximized. This should be accomplished at as low a cost as possible. Since grains provide the major portion of the diet and of the energy, any trait that adversely affects intake and utilization affects lambs' performance.

Corn is the standard of comparison for all other grains. It is palatable, needs no processing, is high in energy, and usually is the lowest cost source of energy in the Corn Belt. However, wheat is 98% as good; barley, 94%; oats, 80%; cooked beans, 100%; rye, 85%; and triticale, 80%. Rye lacks palatability, and triticale, while it has twice the protein and equal fat and fiber content as corn, is less digestible. Lambs' gain has been slower when fed triticale than when fed corn. The addition of corn to any of these grains enhances lamb performance.

Lambs can be finished on a wide variety of energy sources

(pelleted alfalfa or beet pulp, rape pasture, stale bread, distillers grains, etc.), provided they consume enough. Thus, price per unit of energy (lb TDN or Mcal digestible energy) and intake are crucial to success.

Gain Enhancers

Antibiotics, fermentation products, Ralgro, and coccidiostats (Bovatec) have been and are being used with mixed success. Under environmental stress, antibiotics are widely used with success. Where stress is minimal, less response is obtained. Minnesota studies have obtained little or no response with fermentation products. With wether lambs, but not with ewe lambs, Ralgro implants have increased lamb gains 8 to 10 percent. If coccidiosis is plaguing the lambs, it can be controlled, and a big response will be obtained by adding Bovatec (lasalocid) to the diet. As a growth promotant *per se*, Bovatec brings about little or no increase in weight gains.

Table 1 presents a lamb feeding budget using typical costs encountered in feeding lambs. While the feeder can't be certain of the selling price, the possibilities of making a profit should be determined by using a budget estimate before any lambs are purchased.

The amount of feed to provide per lamb daily or the proportion of grain in a self-fed diet at various stages in the feeding period (table 2) are those that have been successful for many big feedlots.

Table 1. Lamb feeding budget

Expenses	Feeder lamb costs/100 lb				
	\$50	\$60	\$70	\$80	\$90
80-pound feeder, fed 70 days, gain .5 lb/day	\$40.00	\$48.00	\$56.00	\$64.00	\$72.00
Corn (2.5 bu)	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00
Alfalfa hay (60 lb)	\$ 1.80	\$ 1.80	\$ 1.80	\$ 1.80	\$ 1.80
Protein supplement (10 lb)	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
Labor-management (1 hr)	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00
Veterinarian, vaccination, drugs	\$.50	\$.50	\$.50	\$.50	\$.50
Interest on purchased lamb (3 mos.)	\$ 1.20	\$ 1.44	\$ 1.68	\$ 1.92	\$ 2.16
Power, equipment, fuel, shelter depreciation	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
Death loss (2% of purchase)	\$.80	\$.96	\$ 1.12	\$ 1.28	\$ 1.44
Transportation (100 miles)	\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50
Marketing expense	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
Total expenses	\$58.80	\$67.20	\$75.60	\$84.00	\$92.40
Selling price/100 required to cover: feed and feeder lamb costs (115 lb feedlot wt., 110 lb market wt.)	\$43.45	\$50.72	\$58.00	\$65.27	\$72.54
All costs (110 lb selling wt.)	\$53.45	\$61.09	\$68.72	\$76.36	\$84.00

Prices: corn, \$2/bu; hay, \$60/ton; protein supplement, \$200/ton; interest, 12%. If \$2 corn is priced at \$3/bu, feed cost would increase \$2.50/lamb, and the necessary selling price would increase \$2.50/lamb.

Table 2. Starting feedlot lambs on feed

Day	Method of feeding			
	Hand feed (amt./lamb daily, lb.)		Self feed (percent in diet)	
	Grain supplement	Hay	Grain supplement	Hay
1-5	.3 to .6	1.5 to 2.0	20%	80%
6-12	.6 to 1.0	1.3	40%	60%
13-20	1.0 to 1.5	1.0	60%	40%
21-28	1.6 to 2.0	.8	70%	30%
29 to mkt.	2.0 to 2.8	.6	80%	20%

Table 3. TDN and protein content of various concentrate to roughage ratios

Corn	Alfalfa hay	Amount in mixture	
		TDN	Protein
20	80	56	13.8
40	60	62	12.6
60	40	68	11.4
80	20	74	10.2
90	10	77	9.6

Table 4. Nutrient requirements of feedlot lambs

BW, lb	ADG, lb	Feed lb	Ration content and lamb daily intake						
			TDN, %	TDN, lb	Protein, %	Protein, lb	Ca, g	P, g	Vit. A, I.U./lamb
66	.65	2.9	72	2.1	14.7	.42	6.6	3.2	1410
88	.60	3.5	76	2.7	11.6	.41	6.3	3.3	1880
110	.45	3.5	77	2.7	10.0	.35	5.6	3.0	2350

Feeders should know the approximate energy (TDN) and protein content of various corn:hay mixtures to better access the changes in nutrient content as corn is added to the diet (table 3).

From the information in tables 2 and 3, the feeder can calculate the lambs' daily nutrient intake. If lambs deviate markedly from the nutrient requirements in table 4, their performance will be different as well.

Conclusions

It is evident that skills in buying and selling, use of capital, reducing lamb morbidity and mortality, and maximizing feed intake, rates of gain, and feed efficiency are as important, or more so, than choice of diet or feed additives. It is also evident that there are many costs, aside from feed, that have very sizeable influences on the profitability of lamb feeding.

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