Feed Efficiency and Carcass Characteristics of Ram Lambs Slaughtered at Four Weights

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Story in Brief

Thirty-six crossbred ram lambs were fed in three pens and three lambs from each group were slaughtered as the average weight in each pen reached 100, 120, 140 and 160 lb. Total feed consumption for each pen and individual weight gains were recorded from 70 to 100 lb and each succeeding 20 lb weight interval. Lambs selected for slaughter were trucked from the Southwest Livestock and Forage Research Station, El Reno, Oklahoma, to the Oklahoma State University Meat Laboratory, slaughtered, and the carcasses evaluated for U.S.D.A. carcass grades and detailed carcass cut-out.

For each successive 20 lb weight interval above 100 lb, about one additional pound of feed was required per lb live weight gain. Average daily gains were similar in each interval except 140 to 160 lb, which were lower. As would be expected, lambs slaughtered at increasing live weights yielded fatter carcasses with less desirable U.S.D.A. yield grades and higher U.S.D.A. quality scores. There was also an improvement in dressing percentage of approximately 2 percent for each 20 lb increase in slaughter weight above 100 lb, up to 140 lb. But, at 160 lb, dressing percentage was about 1 percent less than 140 lb.

When considered as a proportion of carcass weight, the increased fatness of heavier lambs resulted in lower percentages of very closely trimmed cuts. However, due to higher dressing percentages, the fatter, heavier weight lambs were similar in yield of very closely trimmed cuts as a percentage of live weight.

These data indicate that ram lambs may, when feed costs permit, be carried to slaughter weights well in excess of 100 lb. Also, the improved dressing percentage of heavier lambs compensates a great deal for the increased fatness of heavier carcasses. Therefore, differences in yield of closely trimmed retail cuts are small if considered as a proportion of live weight.

Introduction

It has been proposed that feeding lambs to heavier weights before slaughter is one alternative to consider in order to increase the supply of lamb to the consumer. In previous trials (Research Report, 1978), ewe lambs were recognized as inefficient converters when fed to 125 lb slaughter weights and also produced extremely wasty carcasses. Ram lambs, on the other hand, although less efficient converters when carried to 125 lb than at lighter weights, produced quite acceptable carcasses with regard to cutability. These results suggested that, depending on the cost of feed, producers could elect to feed rams to heavier weights. Furthermore, when the yield of closely trimmed cuts was considered in relation to live weight, there were no major differences between sexes and weight groups, despite large differences of degrees of fatness among the carcasses.

In order to further evaluate the efficiency of gain and carcass characteristics of ram lambs fed to weights well beyond 100 lb prior to slaughter, and also to evaluate the

effect of improved dressing percentage in heavier lambs, intact male lambs were fed to slaughter weights of 100, 120, 140 and 160 lb. Data from such trials conducted over several seasons should indicate (1) at what slaughter weight does improved dressing percent fail to compensate for the increased fatness of heavier carcasses, and (2) the amount of extra feed required to produce a pound of gain in heavier lambs in various feeding seasons. Moreover, since the ram lambs used in this experiment represent a wide genetic base, there should be some indication if there is sufficient variation to find individuals that can reach heavier weights efficiently and still produce trim carcasses.

Materials and Methods

Ram lambs from the fall 1977 season were placed on feed in January 1978. The lambs were obtained from the eight-month lambing interval project and were progeny of crossbred dams of mixed percentages of Rambouillet, Dorset and Finnsheep that had been mated to Suffolk, Hampshire, Suffolk X Hampshire or Hampshire X Suffolk rams. Each pen was started on feed when 12 lambs could be found weighing between 68 and 72 lb so that the pen average would be 70 lb. Lambs were fed a ration of 45 percent alfalfa, 50 percent milo and 5 percent molasses. When a pen of 12 lambs averaged 100 lb, lambs were sorted by weight into upper, average and lower third weight groups and one lamb from each group chosen at random for slaughter.

The same precedure was followed at pen average weights of 120 and 140 lb. This procedure allowed each lamb an equal chance of being one of the three lambs to be fed from 140 to 160 lb, at which time the remaining lambs were slaughtered. Lambs were shorn before slaughter at 100 lb, and all lambs remaining were shorn when the 120 lb average pen weight was reached. All calculations involving live weight include fleece weight.

Feed efficiency was calculated on total pen feed consumption and gain for each weight interval. Therefore, for each pen, the values involved 12 head for the first interval (70 - 100 lb) and nine, six and three head for the respective, subsequent intervals or in combining the three pens, 36, 27, 18 and nine lambs for each respective interval.

After slaughter, carcasses were chilled for 24 hr at 34°F and then U.S.D.A. quality grade factors were obtained. Carcasses were double wrapped in heavy beef shrouds to prevent undue shinkage prior to cutting, although some dehydration likely occurred especially in the case of trim carcasses with a minimum of external finish. Other carcass factors evaluated included the U.S.D.A. yield grade factors (12th rib fat thickness, actual percent of kidney and pelvic fat, and leg conformation score) and in addition, rib eye area. Dressing percentage was calculated as cold carcass weight divided by the live weight.

The right side was broken into the major wholesale cuts. The leg and loin were separated into bone, lean and fat portions, and the percentage of boneless lean for these cuts calculated as a percentage of carcass and live weight. Two bone-in weights were taken for the rack and loin: (1) a "full cut" weight with all external fat removed; and (2) a "retail cut" weight where the flank portion of the loin and riblets of the rack were removed along with all external fat. The yield of full cut loin and rack was calculated as a percentage of live and carcass weights, and the retail cut rack and loin weights were combined with the boneless leg and shoulder to calculate yield of higher priced retail product in the carcass.

Results and Discussion

Feed conversion

Providing that heavy weight lambs are not discriminated against severely at the market, the most important item for the lamb feeder is feed efficiency. As indicated in Table 1, ram lambs growing from 100 to 120 and from 120 to 140 lb consumed

Table 1. Daily gain and feed efficiency of ram lambs at four weight intervals.

	Weight Interval (lb)			
	70-100	100-120	120-140	140-160
Daily Feed Intake	4.16	4.51	5.31	5.15
A D G[1]	0.72	0.68	0.71	0.60
Pounds feed/pound gain	5.69	6.63	7.47	8.58

[1] Average Daily Gain.

consecutively more feed daily to maintain gains similar to lambs growing from 70 to 100 lb. Therefore, as indicated in the table, it required an extra lb of feed per lb of gain for each 20 lb interval above 100 lb. For example, it took about 8.6 lb of feed for each lb of gain in growth from 140 to 160 lb, or about 3 lb more feed per lb of gain than growth from 70 to 100 lb. The reduction in daily intake in the last interval may be an indication of the increased fatness of these lambs and may have been compounded by the warmer temperatures of late spring and early summer.

Carcass traits

Table 2 shows that as slaughter weight increased, dressing percent increased about 2 percent for each 20 lb live weight, up to 140 lb. Based on previous experience with ewe lambs at 125 lb, which were similar to the 160 lb rams, it was thought that improvement in dressing percent would have been continual with increasing weight. The lower dressing 160 lb lambs may have been the result of chance.

The increase in dressing percent noted was due primarily to an increase in fatness in heavier weight lambs increasing the proportion of carcass components relative to "dress-off" items and probably reducing cooler shrink. As fatter lambs generally have higher quality scores, there was a general increase in U.S.D.A. quality scores in carcasses produced from heavier weight lambs. In general, carcasses from heavier weight lambs had more external finish, more internal fat, and consequently higher numerical U.S.D.A. yield grades. Increased rib eye area was also apparent in heavier carcasses, indicating that muscle growth continues as ram lambs grow to these weights, although fat deposition obviously occurs at a faster rate. Increased loin eye area may serve to make lamb chops appear more attractive in the retail case, offering a meatier appearance especially to infrequent lamb consumers.

As indicated by higher numerical yield grades, carcasses from heavier weight lambs were lower in yield of closely trimmed wholesale and retail cuts as a percentage of carcass weight relative to the 100 lb rams.

In general, as is shown in Table 3, increase in live weight increased the amount of fat trim in the carcass, which is expressed as a decreased percentage of very closely trimmed cuts. Carcasses from 100 lb lambs averaged 3.3 percent more retail cuts than 120 lb lambs, which out yielded the 140 lb group by 2 percent. Carcasses from the 160 lb group yielded only 55 percent of their weight in very closely trimmed retail cuts, or almost 7 percent less than the high cutability 100 lb group.

Table 4 presents the yield of very closely trimmed cuts as a percentage of live weight for each weight group. Due to the higher dressing percentage of lambs from heavier weight groups, the advantage of the 100 lb slaughter group in retail cut yield was greatly reduced. The heaviest lambs (160 lb) yielded the lowest percentage of retail cuts as a percentage live weight, and the lightest lambs (100 lb) yielded the highest. However, the rank of the percent of retail cuts of 120 vs 140 lb groups as a percentage of live weight was reversed from that if yield of very closely trimmed retail cuts was considered as a percentage of carcass weight. With exception of the 160 lb weight group

Table 2. Carcass characteristics of ram lambs slaughtered at four average live weights.

	Average Live Weight (lb)			
	100	120	140	160
Dressing Percentage[a]	46.77	48.79	50.66	49.72
Quality Score[b]	11.9	12.2	13.2	13.0
Fat Thickness[c]	0.18	0.26	0.29	0.36
Percent Kidney/Pelvic Fat	2.8	2.6	4.0	3.7
Rib Eye Area[d]	2.23	2.36	2.70	2.79

[a]Cold carcass weight ÷ Live weight.
[b]Average Choice = 11; High Choice = 12; etc.
[c]12th rib, inches.
[d]Square inches.

Table 3. Yield of very closely trimmed cuts as a percentage of carcass weight.

	Average Slaughter Weight (lb)			
	100	120	140	160
Shoulder[a]	13.86	12.53	12.17	12.10
Leg[a]	17.28	15.18	15.39	14.14
Rack[b]	8.53	8.28	7.85	7.56
Loin[b]	13.47	13.32	12.37	11.56
Retail Cuts[c]	61.93	58.56	56.62	55.04

[a]Boneless, very closely trimmed
[b]Full cut, bone in, very closely trimmed
[c]Retail cut rack and loin, bone in, boneless leg and shoulder, all very closely trimmed

Table 4. Yield of very closely trimmed cuts as a percentage of live weight.

	Average Slaughter Weight (lb)			
	100	120	140	160
Shoulder [a]	6.49	6.09	6.17	6.01
Leg[a]	8.08	7.41	7.79	7.03
Rack[b]	3.99	4.04	3.96	3.76
Loin[b]	6.30	6.49	6.27	5.75
Retail Cuts[c]	28.98	28.55	28.65	27.69

[a]Boneless, very closely trimmed.
[b]Full cut, bone in, very closely trimmed.
[c]Retail cut rack and loin, bone in, boneless leg and shoulder, all very closely trimmed.

being almost a full percent lower, yields of retail cuts as a percentage of live weight were very similar.

The importance of dressing percent has long been recognized by the packer in determining the price of live lambs. In modern meat trade involving the sale of pretrimmed, boxed lamb cuts, cutability in the lamb carcass may be of less importance

if lamb tallow has any saleable value, especially relative to the value of offal and other "dress-off" items. This concept is especially applicable in discussion of the yield of retail cuts as a percentage of live weight. Obviously, the ideal situation would be the production of lambs that would yield both a high dressing percent and a high cutability carcass.

Future Plans

The data reported in this article represent the first season of a three season project. With more repetitions across different feeding seasons, it will be seen how the relationship of feed efficiency and increased slaughter weights are affected by season. Moreover, there may be a seasonal effect on composition of gain. Finally, repeated trials should indicate if there are individuals that can attain heavy weights efficiently and produce high cutability carcasses.