Comparison of Feed Efficiency for Two Weight Intervals and Carcass Composition at Two Market Weights Of Ram and Ewe Lambs

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Story in Brief

Feed efficiency and carcass composition of 60 ram and 60 ewe lambs slaughtered at 100 and 125 lb were determined. The animals were obtained from an eight month lambing interval project in progress at the Southwest Livestock and Forage Research Station, El Reno, Oklahoma. Equal numbers of lambs, both rams and ewes, were used from each of three lambing seasons - fall, summer and spring. All lambs were the progeny of crossbred dams of various levels of Rambouillet, Dorset and Finnsheep breeding mated to Hampshire, Suffolk or blackfaced crossbred rams.

Feed efficiency data were calculated for the ram and ewe lambs for two different weight gain intervals (70 to 100 lb and 100 to 125 lb live weight). Carcass measurements were taken and carcass composition data obtained at two slaughter weights (100 and 125 lb).

The average pounds of feed required per pound of gain was lower for ram lambs than for ewe lambs within their respective weight gain intervals. Ram and ewe lambs fed from 70 to 100 lb required about 2½ lb less feed per pound of gain than ram and ewe lambs fed from 100 to 125 lb. Rams gained about ¼ lb per day more than ewes in both weight gain intervals. Ram and ewe lambs fed from 70 to 100 lb gained about 0.12 lb per day faster than ram and ewe lambs fed from 100 to 125 lb.

Slaughter and carcass data show that ram lambs were lower in all fat measurements, yield grade, quality grade and dressing percentage, but nearly equal in rib eye area to ewe lambs. Additionally, light weight lambs, both rams and ewes, were lower in all fat measurements, U.S.D.A. grades, rib eye area and dressing percentage than heavier lambs. Carcass composition data clearly indicates that rams yield more of their carcass weights in closely trimmed major wholesale cuts, considered to be the best measure of retail value, than ewe lambs. The data also indicate that heavier lambs yield less in percent trimmed wholesale cuts than lighter lambs, but this difference is nearly two times greater in ewe lambs than ram lambs (3.0 *vs* 1.7). Nevertheless when the closely trimmed major wholesale cuts were expressed as a percent of live weight, there was little or no difference between ram and ewe lambs or

between weight groups within sex (about 30.0 percent). Since the principal factor determining the value of live lambs is the percent of retail product, this suggests that the value per pound alive should be similar for rams and ewes, light and heavy if the selling price of the retail cuts from these lambs is the same.

Introduction

Lamb as a meat source has fallen to its lowest per capita consumption (1.3 lb) in recorded American history. One logical explanation for this is the continual decrease in sheep numbers since the mid 1940's causing a low supply of lamb in the retail meat counters. The fact that the supply of lamb is low has been reflected in the price of market lambs sold through lamb markets and in the retail price for lamb in retail stores.

Several methods for the American sheep industry to alleviate this short supply situation have been outlined in the national "Blueprint for Expansion." These include increasing ewe numbers, increasing percent lamb crop weaned and increasing market weight per lamb. The one alternative that would be the quickest and easiest, with the present supply of live lamb, is simply to increase the slaughter weight of lambs above the traditional 100 lb.

Even though increasing slaughter weight provides a quick way for increasing the supply of lamb, there are problems when lambs are fed to heavier weights. The two most influential problems are the increase in fat deposition and decrease in feed efficiency as slaughter weight increases.

Whether or not heavier lambs will be used to increase the supply of lamb will depend upon the amount of feed required per extra pound of edible meat and the effect on the desirability of retail cuts due to the increase in fat content in heavier lambs.

The objectives of this study were (1) to determine the amount of extra feed required per pound of extra live weight gain for ram and ewe lambs fed from 100 to 125 lb as compared to ram and ewe lambs fed from 70 to 100 lb, and (2) to determine how much of an effect slaughter weight has on the yield of percent closely trimmed major wholesale cuts of ram and ewe lambs.

Materials and Methods

Crossbred ram and ewe lambs, produced from the matings of Suffolk, Hampshire, Suffolk X Hampshire or Hampshire X Suffolk sires with dams of various levels of Rambouillet, Dorset and Finnsheep breeding were selected from an eight month lambing interval project in progress at the Southwest Livestock and Forage Research Station at El Reno, Oklahoma. Dams of those breed groups have previously been shown not to have an appreciable affect on differences in carcass composition of their lambs.

Twenty ram and 20 ewe lambs were selected from each of three lambing seasons - fall of 1975, summer of 1976 and spring of 1977. From each season there were two pens of 10 ram lambs each and two pens of 10 ewe lambs each. (One ewe lamb from the fall crop prolapsed and was eliminated from the study.)

Each pen of lambs was selected from the experimental flock when 10 rams or 10 ewes were found such that the average weight of the pen was approximately 70 lb and each lamb in the pen weighed as close to 70 lb as possible. As each group of 10 lambs was selected, that pen was placed in drylot and fed a ration consisting of 45 percent alfalfa, 50 percent milo and 5 percent molasses.

During the early part of the feeding period, individual weights were obtained on a weekly basis. When the average weight of the pen neared 100 lb, individual weights were obtained twice weekly in order to slaughter a group of five lambs at an average weight as close to 100 lb as possible. When the average weight of the pen of lambs reached 100 lb, five of the lambs that would represent the average weight of the pen (100 lb) were selected for shipment to the Oklahoma State University Meat Laboratory for slaughter. The remaining five lambs were sheared, then fed and weighed in the same manner as above to a slaughter weight of 125 lb minus their wool weight.

A total of six pens of rams and six pens of ewes were fed over three seasons. Feed efficiency values were calculated for each pen rather than for individual lambs. Thus, for the lower weight interval (70 to 100 lb) each sex calculation represents 60 lbs, and for the heavier weight interval (100 to 125), 30 lambs.

After slaughter, the carcasses were chilled for 24 hr at 34 F. Carcasses were then wrapped with two layers of beef shrouds to decrease dehydration of the lamb carcasses until the carcasses were cut. U.S.D.A. quality grade was determined prior to cutting each carcass. Other carcass data obtained were dressing percent, rib eye area and U.S.D.A. yield grade factors (12th rib fat thickness, percent kidney and pelvic fat, and leg conformation score) from which actual U.S.D.A. yield grades were estimated.

The right side of each carcass was broken into the major wholesale cuts of leg, loin, rack and shoulder. All external fat was removed from each cut. The leg and shoulder were then physically separated into their lean, fat and bone components. Yield of trimmed and boned leg and shoulder, trimmed rack and loin, and trimmed yield of these four cuts were calculated on both a carcass and a live weight basis.

Results and Discussion

Feed efficiency

The characteristic of greatest interest for determining the productive efficiency of light lambs *vs* heavy lambs is the amount of feed required per unit of live weight gain to take lambs to heavier weights. This measure is closely related to daily feed intake and average daily gain. Averages for daily feed

intake, average daily gain and pounds of feed per pound of gain per season and their averages for the three seasons are presented in Table 1 for ram and ewe lambs fed for two weight gain intervals.

Daily feed intake was about 0.4 greater for the rams than for the ewes from 70 to 100 lb. However, after reaching 100 lb, the increase in daily consumption by the rams was three times greater than the increase by the ewes (1.2 lb *vs* 0.4 lb). This phenomenon often occurs since, generally, as animals become fatter, they tend to decrease their feed intake, and the carcass data on these lambs (discussed later) clearly shows that the ewe lambs were, in fact, much fatter than the ram lambs at 100 lb.

Rams had about on 0.25 ADG advantage over ewes within both weight gain intervals, and the average daily gain decrease after reaching 100 lb was nearly the same (0.13 and 0.09 lb) for both ram and ewe lambs. Feed efficiency was much more favorable for the ram lambs than for the ewe lambs within each weight interval. Additionally, feed efficiency for ewes between 100 and 125 lb from season to season was extremely variable. Consequently, it becomes important to consider over-all averages when applying the data because of the relatively small numbers on test during each season.

The data in Table 1 indicates the relative daily gain and feed efficiency for typical crossbred market lambs in Oklahoma. Whether or not a producer wishes to feed to heavier market weights will depend, then, upon his feed costs. Obviously, since ram lambs are much better converters of feed into edible meat, they can be fed to heavier weights more economically than ewes.

Carcass characteristics

Typical carcass measurements and grade evaluations for ram and ewe lambs slaughtered at 100 and 125 lb are presented in Table 2. When comparing ram lambs to ewe lambs, rams were about two-thirds of a grade lower in quality grade at the lower market weights, but one and a quarter grades lower at the heavier market weight. Furthermore, ram lambs were consideraly lower (3.75 percent) in dressing percent, lower in all fat measurements and one to one and half grade lower in yield grade than ewe lambs. (A yield grade #1 is exceptionally lean and a yield grade #5 is quite fat.)

Lighter ram lambs were trimmer in all measurements, two-thirds of a grade lower in yield and quality grade, and three percent lower in dressing percent than heavier ram lambs. Lighter ewe lambs were lower by one quality grade and one yield grade, and three percent lower in dressing percent than heavier ewe lambs, but were trimmer in all fat measurements. Rib eye areas were virtually the same for both ram and ewe lambs but differed between weight groups within sex. Heavier lambs in both sexes had about the same (0.28 sq in and 0.29 sq in) increase in rib eye area over lighter lambs.

According to the dictates of the present day marketing system, the 125 lb ram lambs would actually be a more acceptable lamb in quality grade and fat cover than the 100 lb ram lambs to the packer. However, ewe lambs at the

Table 1. Feedlot performance of ram and ewe lambs from three different lambing seasons fed for two different weight gain intervals

Item	Sex	Season I[1] Wt. gain interval (lb) 70-100	100-125	Season II[2] Wt. gain interval (lb) 70-100	100-125
Daily feed intake (lb)	R	4.47	6.08	4.14	5.24
	E	4.38	4.58	3.59	4.43
Avg. daily gain (lb)	R	0.88	0.80	0.75	0.61
	E	0.67	0.57	0.56	0.36
Lb feed/lb gain	R	5.14	7.61	5.52	8.59
	E	6.58	8.12	6.50	12.29

	Sex	Season III[3] Wt. gain interval (lb) 70-100	100-125	Average[4] Wt. gain interval (lb) 70-100	100-125
Daily feed intake (lb)	R	4.47	5.48	4.36	5.60
	E	3.79	3.89	3.92	4.30
Avg. daily gain (lb)	R	0.92	0.77	0.85	0.72
	E	0.53	0.56	0.58	0.49
Lb feed/lb gain	R	4.86	7.16	5.17	7.78
	E	7.37	8.28	6.82	9.56

[1]Lambs born in fall 1975
[2]Lambs born in summer 1976
[3]Lambs born in spring 1977
[4]Average over the three seasons

Table 2. Averages for fat measurements, yield grade, quality grade, rib eye area and dressing percent for ram and ewe lambs slaughtered at two live weights

Item	Ram Lambs Approx. live wt. (lb) 100	125	Ewe Lambs Approx. live wt. (lb) 100	125
12th rib fat th. (in)	0.18	0.26	0.30	0.43
% K&P fat	2.85	3.60	4.17	5.38
USDA yield grade	3.01	3.70	4.07	5.25
USDA quality grade[1]	11.30	11.90	12.00	13.13
Rib eye area (sq in)	2.12	2.40	2.08	2.37
Dressing percentage	48.70	51.64	52.44	55.53

[1]14 = Avg. Prime; 13 = Low Prime; 12 = High Choice; 11 = Avg. Choice

heavier market weight were definitely overfinished and undesirable to all segments of the American sheep industry, the producer, packer and consumer.

Table 3 presents the yields of trimmed and boned leg and shoulder, trimmed rack and loin and percent trimmed major cuts, which includes the leg, shoulder, rack and loin on a carcass weight basis. When expressed as a percentage of carcass weight, percent trimmed and boned shoulder and leg decreased for both ram and ewe lambs from a 100 lb slaughter weight to a 125 lb slaughter weight. Lighter ram lambs were higher in precent trimmed rack

Table 3. Trimmed major cuts as a percent of *carcass weight* of ram and ewe lambs slaughtered at two live weights

Carcass cut	Ram Lambs Approx. live wt. (lb) 100	125	Ewe Lambs Approx. live wt. (lb) 100	125
Trimmed & boned shoulder[1]	15.18	14.57	13.45	12.78
Trimmed rack[2]	8.09	7.82	7.51	7.48
Trimmed loin[2]	13.13	12.92	13.19	12.35
Trimmed & boned leg[1]	18.56	17.48	17.67	15.83
Trimmed major cuts[3]	66.91	65.19	63.70	59.68

[1]Completely lean, fat and bone separated
[2]Closely trimmed and bone in
[3]Closely trimmed and bone in of the four listed cuts

Table 4. Trimmed major cuts as a percent of live weight for ram and ewe lambs slaughtered at two live weights

Carcass cut	Ram Lambs Approx. live wt. (lb) 100	125	Ewe Lambs Approx. live wt. (lb) 100	125
Trimmed & boned shoulder[1]	6.82	6.77	6.37	6.51
Trimmed rack[2]	3.56	3.64	3.56	3.79
Trimmed loin[2]	6.09	6.02	6.25	6.29
Trimmed & boned leg[1]	8.34	8.08	8.37	8.08
Trimmed major cuts[3]	30.05	30.17	30.20	30.46

[1]Completely lean, fat and bone separated
[2]Closely trimmed and bone in
[3]Closely trimmed and bone in of the four listed cuts

and loin (about 0.25 percent) than heavier lambs; whereas, lighter ewe lambs were about the same in trimmed rack, but higher in percent trimmed loin (0.74 percent) than heavier ewe lambs. Ram lambs yielded considerably more of their carcass weight in trimmed major cuts than ewe lambs, although the rams had less of an advantage at the lower market weight (2.2 percent at 100 lb slaughter weight and 5.5 percent at 125 lb slaughter weight). Lighter ram lambs were 1.7 percent higher in trimmed major cuts than heavier rams; whereas, lighter ewes were 4 percent higher in percent trimmed major cuts than heavier ewes.

Table 4 represents the same carcass traits as Table 3, but they are expressed as a percent of live weight rather than carcass weight. These data indicate that when percentages of closely trimmed carcass cuts were calculated on a live weight basis, little or no differences were observed for these carcass traits between ram and ewe lambs, or between slaughter weight groups within or between sexes. This was true even though a much higher degree of fatness was attained by both rams and ewes (particularly the ewes) at the higher slaughter weight.

This data further substantiates our expectations that the cut (leg) which has very little intramuscular fat (marbling) or seam fat will decrease slightly as

a percent of live weight at heavier market weights; whereas, cuts (especially shoulder and rack) which tend to deposit more fat within and between the muscles as fattening progresses, will have a slightly increased percent of live weight at the heavier weight. Nevertheless, this data convincingly suggests that ram and ewe lambs can be slaughtered at heavier weights without decreasing the percent closely trimmed major wholesale cuts of live weight. Consequently, this fact implies that the live weight price of the heavier and lighter rams and ewes should be similar since the percent of their live weight going through the retail meat counter is nearly equal.

Corn Silage Additives

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Story in Brief

Six commercial silage additives and ammonium hydroxide were added to whole plant corn silage and fed to lambs. Feed intakes and gains were slightly greater with addition of most additives or with unfermented frozen chopped corn than untreated silage. Some additives show promise in increasing dry matter digestibility. Laboratory analysis of the treated silages indicated that fermentation increased nutritive value of chopped corn at the expense of available carbohydrates, energy and weight. Ammonium hydroxide increased the crude protein content. Fermentation decreased the time before the onset of mold spoilage. Certain silage additives reduced wet matter loss slightly.

Introduction

The addition of additives to alter the fermentation of ensiled chopped corn plants and to increase its nutritive value has been widely practiced with many different commercial products. Some prolong fermentation, some inhibit fermentation and others add nutrients to improve digestion by the animal. Past research has been inconclusive as to the benefit of additives due to different conditions of ensilage and corn moisture in the treated and untreated materials. The objective of this study was to examine the benefit of several commercially available additives on the nutritive value of ensiled whole plant