Feeding trials with cows grazing the dry winter forage supplemented with natural protein indicate no advantage in adding trace minerals. In more critical trials, cottonseed meal did not greatly affect gains but greatly improved the general appearance of the animals; the cattle receiving trace minerals had glossy haircoats in comparison to a dull, dry haircoat in the control cattle.

When urea is substituted for some of the oil meals in protein supplements for winter feeding, trace minerals must be added.

Fattening rations containing high levels of corn or barley are improved by additions of the trace minerals. Milo apparently contains higher levels of the trace minerals than corn or barley; however, changes in production procedures are affecting the mineral composition of the milo grains, and there is some evidence that those produced on alkaline soils are deficient in zinc.

Relationship of Some Growth Factors With Carcass Composition in Milk Fat Wether Lambs

A. W. Munson, L. E. Walters and J. V. Whiteman

This study was designed to determine the relationship between excellence in the carcass and the pattern of growth and development of the lamb from birth to market weight. Breed and type of rearing were of particular interest with respect to their association with carcass composition.

Figure 1, drawn from classical works, illustrates the increase in weight of fat, lean and bone in the lamb carcass. It can be seen from the figure that bone growth is rather constant while the increase in the other two components, fat and lean, varies with the age of the lamb. During early life, muscle growth is relatively faster than fat deposition. However, during some period, probably between the tenth and fifteenth weeks, the growth rate of lean begins to decrease and the rate of deposition of fat increases. Restriction of feed intake during early life should reduce lean development during the period prior to the onset of heavy fat deposition. Will an increased lean growth rate follow such restriction or will the gain be the result of the fat deposition that is more normal at this age? Twin lambs, while nursing a ewe, have the naturally occuring environmental effect of restricted diet when compared to single lambs.

If the foregoing reasoning is correct, a comparison of the carcasses of single reared vs twin reared lambs should indicate whether early growth restriction will have a permanent influence on carcass composition.

Prior to weaning, much of a lamb's genetic potential for gaining ability is masked by the milk production of the dam. After weaning, on the other hand, the growth of lambs on an adequate ration is more influenced by their genes for growth. In Figure 1, period A refers to the period in growth at which the lamb starts rapid deposition of fat relative to the growth of lean. The time at which lean growth decreases and fat deposition increases varies between breeds and between animals within breeds. In general, breeds that have a smaller mature size are referred to as earlier maturing because this time occurs earlier in life and at lighter weights than breeds that have a larger mature size. If all lambs are slaughtered at a given weight (such as 100 pounds), lambs that matured at light weights will have had the opportunity to deposit more fat than those that matured at later times and heavier weights. The Dorset breed is earlier maturing than either the Hampshire or Suffolk breeds and therefore, it would be expected that the Dorset crossbred lambs would be somewhat fatter than Hampshire or Suffolk crossbreeds if all lambs were slaughtered at the same weights.

This preliminary report presents the results that have been obtained thus far in answer to the following questions:

1. Is there a difference in the carcass composition of single as compared to twin reared lambs?

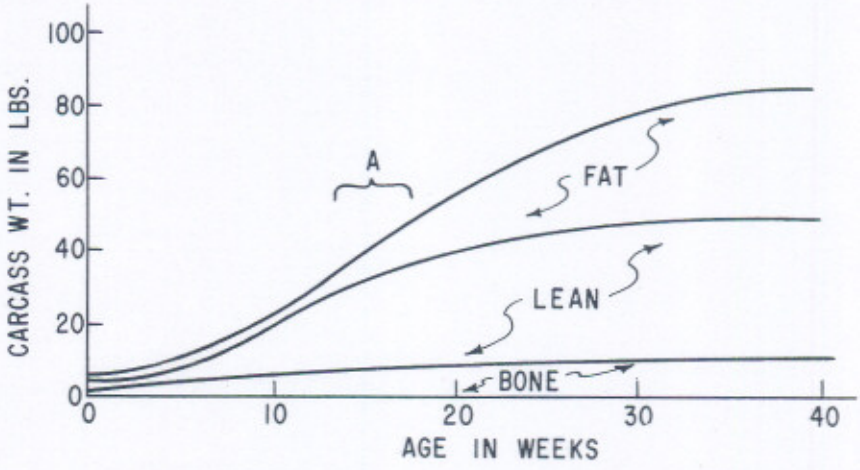

Figure 1—Schematic Diagram of Classical Work Showing Carcass Composition of Lamb by Age.

2. What, if any, are the differences in the carcass composition of crossbred lambs due to breed of sire when comparing early maturing (Dorset) rams with later maturing (Hampshire and Suffolk) rams?

PROCEDURE

The lambs used in this study were from the experimental flock at the Ft. Reno Livestock Research Station. All lambs were out of Dorset X Western crossbred ewes or Western[1] ewes. Half of the sires were Dorset (whiteface) while the other half were Hampshire or Suffolk (blackface) rams. An equal number of single and twin reared lambs was obtained and studied from each sire.

The lambs were born between October 10th and November 25th, 1962. Ten days to 2 weeks after birth, the lambs were placed on wheat pasture with their dams. The lambs had access to a creep containing a mixture of about 32 percent ground alfalfa hay, 63 percent grain sorghum and 5 percent molasses. The lambs were weaned when they weighed a minimum of 46 pounds and were at least 66 days of age.

Biweekly weights were taken on alternate Mondays until the lambs approached 95 pounds and then they were weighed weekly. On the first Monday that the lambs reached a minimum full weight of 100 pounds they were taken off feed and hauled to Stillwater immediately. The lambs were sheared during the evening and were slaughtered the following morning after being off feed approximately 18 hours. The weight of the lambs just before slaughter was recorded as shrunk live weight. After chilling for 48 hours the carcasses were weighed and cut into closely trimmed wholesale cuts (external fat removed). The percent trimmed wholesale cuts was the combined weights of the closely trimmed shoulder, rack, loin and leg expressed as a percent of shrunk live weight.

To determine loin eye area and fat cover at the 12th rib the carcass was ribbed between the 12th and 13th ribs. Tracings were made of the cross section of the *longissimus dorsi* (loin eye muscle) and the areas of these tracings were measured using a compensating polar planimeter. The areas were recorded in square inches. An average of 3 measurements of the fat over the *longissimus dorsi* was used as the fat cover at the 12th rib.

The entire carcass was boned out and the boneless portion ground twice in preparation for chemical analysis. Grinding was first done through a 3/16 inch plate and then through a 1/8 inch plate. After grinding, the ground lamb was mixed and 8 random samples were drawn. The 8 samples were then combined into 2 composite samples of 4 subsamples each for use in chemical determination of percent of fat (ether extract). The weight of the bone in the carcass was recorded and ex-

[1] These ewes were of predominantly Rambouillet breeding.

pressed as a percent of the chilled carcass weight. Percent lean in the carcass was determined by difference, i.e., 100 percent minus percent fat —and percent bone equals percent lean.

RESULTS AND DISCUSSION

Table 1 presents a summary of the growth data of the lambs and Figure 2 illustrates the growth pattern from birth to slaughter. Single lambs were about 1.5 pounds heavier at birth than twins and increased their advantage to 10 pounds or more at 70 days of age. Twins and singles grew at approximately the same rate after 70 days, but twin reared lambs required 23 days more to reach slaughter weight. Table 1 indicates that blackface and whiteface lambs grew at about the same rate before 70 days when the maternal environment was nearly the same for both types of lambs. However, when the lambs were allowed to grow on their own ability, after about 70 days of age, later maturing blackface lambs gained faster than whiteface lambs by about 0.1 pounds per day and therefore reached slaughter weight 23 days before the whiteface lambs.

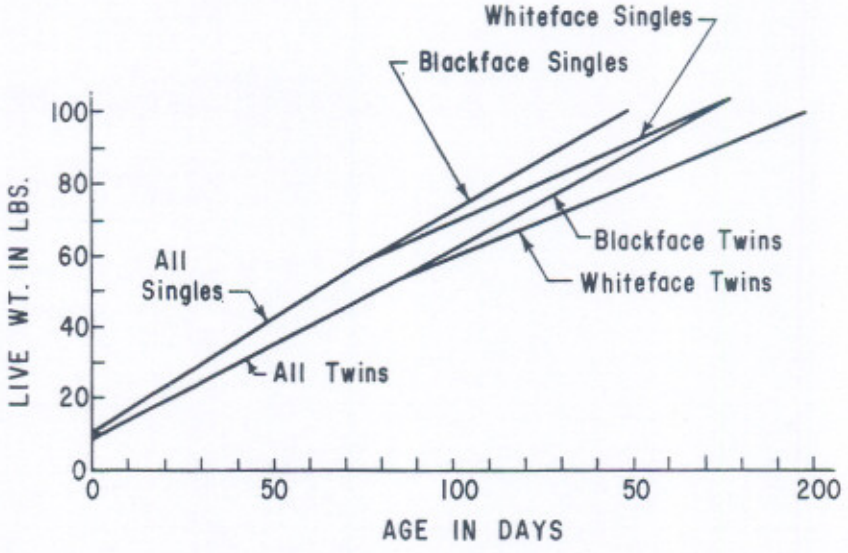

Figure 2.—Growth Pattern of Lambs from Birth to Slaughter Illustrating the Effects of Single vs. Twin Rearing and Early Maturity vs. Late Maturity.

Table 1.—Effect of Breed and Type of Rearing on Various Measures of Growth.

	Blackface		Whiteface	
	Singles	Twins	Singles	Twins
Number of lambs	15.	15.	15.	15.
Birth Weight, lb.	10.6	9.1	10.5	8.7
Adjusted 70 day weight, lb.	58.2	47.5	56.1	46.2
Slaughter weight, lb.	101.7	101.6	101.1	100.8
Age at slaughter, days	144.8	168.1	167.6	194.4
Carcass wt. (chilled), lb.	49.2	48.7	49.8	50.5
Average daily gain birth to slaughter, lb.	.70	.61	.60	.52
Average daily gain 70 days to slaughter, lb.	.59	.57	.49	.45

The carcass data in Table 2 indicate that neither the single-twins nor the time of maturity effects were large. The average carcass grade in each group was choice and the carcasses measured about 0.25 inches of fat cover at the 12th rib. Loin eye area averaged approximately 2.23 square inches. In addition, it should be noted that the percent closely trimmed wholesale cuts was nearly the same for all groups.

Table 3 presents a comparison of the carcass data for blackface and whiteface lambs. Percent of fat in the carcass indicated that whiteface lambs were fatter than blackface lambs, 29 percent and 25.6, respectively. Differences in fat cover at the 12th rib were small.

The percent trimmed wholesale cuts and loin eye area were studied as measures of carcass leanness. Percent trimmed wholesale cuts was slightly higher for whiteface lambs which by most standards would indicate they were leaner than the blackface lamb. This apparent discrepency, however, may be explained on the basis of dressing percent and

Table 2.—Means of Carcass Data for Single and Twin Lambs of Blackface and Whiteface Breeding.

	Blackface		Whiteface	
	Singles	Twins	Singles	Twins
Slaughter grade	Choice	Choice	Choice	Choice
Loin eye area, sq. in.	2.17	2.25	2.26	2.25
Fat cover at 12th rib, in.	.22	.25	.24	.27
% trimmed wholesale cuts	37.6	37.4	38.1	37.9
% lean in the carcass	57.5	57.1	55.5	54.3
% fat in the carcass	25.1	26.1	27.9	30.0
% bone in the carcass	17.4	16.8	16.6	15.7
Dressing %	55.0	55.0	56.0	57.5

Table 3.—Average Loin Eye Area, Fat Cover over 12th Rib, Percent Wholesale Cuts and Composition of Blackface and Whiteface Lamb Carcasses.

	Blackface	Whiteface
Slaughter grade	Choice	Choice
Loin eye area, sq. in.	2 21	2.26
Fat cover at 12th rib, in.	.24	.26
% trimmed wholesale cuts	37.5	38.0
% lean in the carcass	57.3	54.9
% fat in the carcass	25.6	29.0
% bone in the carcass	17.1	16.1
Dressing %	55.0	56.8

distribution of fat. It is well known that dressing percentages increase with an increase in total fat in the carcass. Increased fat in the carcass may occur as external or internal fat (i.e., fat between muscle systems and within muscle systems) and under the procedures of this study, no attempt was made to prepare wholesale cuts of comparable internal fat content. This would suggest that the value of percent trimmed wholesale cuts as a measure of carcass leanness is questionable where internal fat content is not standardized. The loin eye area of the whiteface lambs was slightly larger than the blackface. Blackface lamb carcasses were found to contain 1 percent more bone in the carcass than whiteface lambs. There was 2.4 percent more lean in the blackface carcasses as determined by chemical analysis.

A comparison of carcass data from single and twin reared lambs is shown in Table 4. The faster growing single lambs had 26.5 percent fat in the carcass as compared to 28.1 percent for the slower growing twin lambs. Also, single lambs had slightly less fat cover at the 12th rib than twins.

Table 4.—Average Loin Eye Area, Fat Cover over 12th Rib, Percent Wholesale Cuts and Composition of Single and Twin Lamb Carcasses.

	Singles	Twins
Slaughter grade	Choice	Choice
Loin eye area, sq. in.	2.22	2.25
Fat cover at 12th rib, in.	.23	.26
% trimmed wholesale cuts	37.9	37.6
% lean in the carctss	56.5	55.7
% fat in the carcass	26.5	28.1
% bone in the carcass	17.0	16.2
Dressing %	55.5	56.2

The loin eye area of the slower gaining twin lambs was only slightly larger than that of the single lambs; however, single lambs yielded a slightly higher percent of trimmed wholesale cuts. The carcasses of the single lambs contained 0.8 percent more bone and 0.8 percent more lean than twin reared lambs. Dressing percentages were similar for the two groups with a slight advantage for twins. There was no difference in average carcass grade between the two groups.

From these data it would appear that rate of growth during early life in lambs results in relatively small differences in carcass composition with a slight advantage of more lean and less fat for the singles.

SUMMARY

Sixty crossbred milk fat wether lambs were used in this trial to study some relationships between growth factors and carcass composition. The lambs were out of Dorset X Western and Western ewes and sired by Dorset, Hampshire and Suffolk rams, and thus, afforded an opportunity for studying the influence of different growth rates on carcass composition.

The results indicate that the earlier maturing, slower gaining whiteface lambs produced fatter carcasses than the later maturing blackface lambs. The whiteface carcasses were fatter than blackface carcasses by an average of 3.4 percent. Blackface carcasses had 1 percent more bone and 2.4 percent more lean than whiteface carcasses. In addition, the whiteface lambs required a longer feeding period (by 23 days) to reach the slaughter weight of 100 pounds.

Differences in measures of carcass composition between twins and singles were not as great as between blackface and whiteface lambs. Twin reared lamb carcasses contained on the average, 1.6 percent more fat, 0.8 percent less lean and 0.8 percent less bone than singles.

Creep-Feeding Fall Calves

J. E. McCroskey, W. D. Campbell, and A. B. Nelson

The economic feasibility of creep-feeding fall calves has been the subject of a great deal of consideration in the past few years. A four-year study (Oklahoma. Agr. Exp. Sta. MP-55:72) of creep-feeding fall calves has shown that creep-fed calves gained more rapidly than non-creep-fed calves, but the increased weight gain did not off-set the cost of the creep-ration.