

# Some Relationships Between Measures of Growth and Carcass Composition in Lambs

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## Story in Brief

Growth and carcass data from four groups of lambs, totalling 244 head born and raised between 1963 and 1966 were used to study the relationships between some measures of growth and carcass composition. All the lambs were from grade Dorset x Rambouillet or grade Rambouillet ewes and were sired by blackface (Hampshire and Suffolk) or whiteface (Dorset) rams and were slaughtered upon reaching 100 pounds.

Lambs sired by blackface rams gained faster after weaning and produced leaner carcasses with more bone than lambs sired by Dorset rams. The carcass composition of single lambs was similar to that of twins except that the percent of bone was slightly higher in single lamb carcasses than in twins. Ram lambs grew faster, were leaner, had more bone and a lower dressing percentage compared with either wether or ewe lambs.

All relationships between measures of growth and carcass composition were weak when considered on a within breed and sex basis. On the average, the heavier lambs at birth produced leaner carcasses with less fat and more bone. Weaning weight was positively associated with the percent of bone and dressing percent of the carcass. There was essentially no relation between post-weaning average daily gain and carcass composition. Generally, the faster gaining lambs after weaning had a lower dressing percentage.

## Introduction

There is a growing demand for leaner lamb carcasses by consumers. Many people believe that faster gaining lambs are leaner, and therefore more acceptable. These observers see lambs of different breeds, sexes and types of rearing, and these effects may cause different growth rates and different levels of fat and lean in their carcasses.

Information on the relationships between growth rate and carcass composition in lambs is quite limited.

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The purpose of this study was to determine the relationships of some measures of growth and certain lamb carcass characteristics among lambs slaughtered at about 100 pounds.

## Materials and Methods

The records from 244 lambs involving four groups were used in this study. All the lambs were from grade Dorset x Rambouillet or grade Rambouillet ewes of the experimental flock at the Southwest Livestock and Forage Research Station. The lambs were sired by Suffolk or Hampshire (blackface) and Dorset (whiteface) rams. In the 1963 and 1964 data equal numbers of single and twin reared wether lambs were obtained and studied. In the 1965 and 1966 data only twin lambs were utilized but there were equal numbers of ram, wether and ewe lambs each year.

All lambs were born between Oct. 10 and Nov. 25 each year. Ten days to two weeks after birth, they were placed on wheat pasture with their dams with access to a creep ration containing 32 percent ground alfalfa hay, 63 percent ground grain sorghum and 5 percent molasses. The lambs were weaned at about 70 days of age when they weighed a minimum of 46 pounds.

Biweekly weights were taken on the lambs until they approached 95 pounds after which they were weighed weekly. As they reached a full weight of 100 pounds or more they were taken off feed, sheared and transported to Stillwater. The lambs were slaughtered the following morning after being off-feed and water for approximately 18 hours.

All the lambs were slaughtered according to the accepted procedures. The subcutaneous fat was removed from the shoulder, rack, loin and leg and the weight of the fat from each cut was recorded as fat trim. The four major wholesale cuts were boned completely. The neck, foreshank, breast and flank were also boned. The boneless portions were mixed and sampled for chemical analysis. The kidney and pelvic fat were also considered as part of the fat trim.

Fat content of the carcass was the fat trim plus the ether extract of the lean. Bone content was determined by separation techniques and the lean portion was calculated by difference. This method gives a very accurate measure of fat, lean and bone.

In the 1963 and 1964 data, there were equal numbers of single and twin lambs from equal numbers of blackfaced (considered growthier) and whitefaced (considered earlier maturing) sires. This permitted the evaluation of the relationships of genetic differences in growth pattern to the measures of carcass composition. The 1965 and 1966 data involved equal numbers of ram, wether and ewe lambs from the two kinds of sires (not in equal numbers) permitting a study of the relationship of those variables to the measures of growth and carcass composition.

After these relationships were evaluated, the data were adjusted to remove the effects of single *vs* twins, breeds of sire and sex. The relationships

(correlations) of the measures of growth to the measures of carcass composition were then evaluated, giving an estimate of what these relationships would

## Results and Discussion

The 1963 and 1964 data were used to evaluate effects of breed or sire and single vs twin rearing on measures of growth and carcass composition (Table 1). Breed of sire had little relationship to birth or weaning weights but had considerable effect on postweaning average daily gain in favor of blackfaced sires. This was expected as Dorsets tend to mature at lighter weights as compared with Suffolks and Hampshires. Breed of sire had considerable influence on carcass composition. Carcasses from the faster-gaining lambs sired by blackfaced rams were generally leaner and had a higher percentage of bone than the lambs sired by Dorset rams.

Single lambs were about 1.7 pounds heavier than twin lambs at birth and about 11 pounds heavier at weaning but this did not have an appreciable effect on carcass composition, except that single lamb carcasses had 0.6 percent more bone. Percent wholesale cuts were similar for breed or sire groups and for single and twin lamb carcasses.

The 1965 and 1966 data were used to evaluate the effects of breed of sire and sex on measures of growth and carcass composition (Table 2). For this set of data, the effect of breed of sire on growth measurements was somewhat greater, compared with the results of the 1963 and 1964 experiment. In both groups the lambs by blackfaced sires were generally heavier at birth and weaning and the Suffolk lambs gained considerably faster after weaning. All differences in measures of carcass composition could have been due to chance.

**Table 1. Averages of some growth and carcass measurements as affected by breed of sire and rearing type<sup>+</sup>**

	Breed of sire			Rearing type	
	Dorset	Hampshire	Suffolk	Single	Twins
Birth weight, lb.	9.2	9.2	9.6	10.2 <sup>1</sup>	8.5 <sup>2</sup>
Weaning weight, lb.	53.1	52.4	54.8	59.0 <sup>1</sup>	47.9 <sup>2</sup>
Post weaning avg. daily gain, lb.	0.54 <sup>1</sup>	0.60 <sup>2</sup>	0.62 <sup>2</sup>	0.60	0.57
Dressing percent	50.5 <sup>1</sup>	49.9 <sup>2</sup>	49.0 <sup>3</sup>	49.6	50.0
Percent wholesale cuts	37.9	37.7	37.5	37.8	37.6
Percent lean	54.0 <sup>1</sup>	54.3 <sup>1</sup>	57.0 <sup>2</sup>	55.2	55.0
Percent fat	30.1 <sup>1</sup>	29.5 <sup>1</sup>	25.4 <sup>2</sup>	28.0	28.7
Percent bone	15.8 <sup>1</sup>	16.3 <sup>2</sup>	17.7 <sup>3</sup>	16.9 <sup>1</sup>	16.3 <sup>2</sup>

<sup>+</sup>1963 and 1964 data.

<sup>1,2,3</sup>Averages in the same row, for each factor, with different superscripts are significantly different at 0.05 probability level or less. (Significantly different means that the differences are probably real — not due to chance.)

**Table 2. Averages of some growth and carcass measurements as affected by breed of sire, and sex+**

	Breed of sire			Sex		
	Dorset	Hampshire	Suffolk	Ram	Wether	Ewe
Birth weight, lb.	8.0 <sup>1</sup>	9.1 <sup>2</sup>	8.6 <sup>3</sup>	9.2 <sup>1</sup>	8.5 <sup>2</sup>	8.1 <sup>3</sup>
Weaning weight, lb.	48.3 <sup>1</sup>	55.5 <sup>2</sup>	55.6 <sup>2</sup>	55.8 <sup>1</sup>	52.1 <sup>2</sup>	51.5 <sup>2</sup>
Post weaning avg. daily gain, lb.	0.60 <sup>1</sup>	0.62 <sup>1</sup>	0.70 <sup>2</sup>	0.73 <sup>1</sup>	0.61 <sup>2</sup>	0.58 <sup>2</sup>
Dressing percent	48.6	49.1	48.5	47.2 <sup>1</sup>	49.5 <sup>2</sup>	49.5 <sup>2</sup>
Percent wholesale cuts	35.9	35.6	35.9	35.6	35.9	35.9
Percent lean	51.1	51.3	52.5	54.9 <sup>1</sup>	50.4 <sup>2</sup>	49.6 <sup>2</sup>
Percent fat	33.3	32.5	30.9	27.4 <sup>1</sup>	33.8 <sup>2</sup>	35.6 <sup>2</sup>
Percent bone	15.6	16.2	16.6	17.8 <sup>1</sup>	15.8 <sup>2</sup>	14.8 <sup>3</sup>

+1965 and 1966 data.

<sup>1-2-3</sup>Averages in the same row, for each factor, with different superscripts are significantly different at 0.05 probability level or less.

Sex had considerable influence on measures of growth and carcass composition. Male lambs were heavier than ewe lambs at birth. Ram lambs were heavier than either wether or ewe lambs at weaning and had a much faster rate of gain than the other two sex groups after weaning. Ram lambs had a lower dressing percentage and their carcasses were leaner and had more bone as compared to the wether and ewe lamb carcasses. Thus, the faster gain after weaning of ram lambs results in leaner carcasses. These results are generally in agreement with the results reported by other investigators.

After adjusting the data to remove the effects of type of birth and rearing (single vs twins), breed of sire, sex and year of production, the relationships between growth measurements and carcass composition were estimated (Table 3).

Birth weight was related to the percent of lean, percent of fat and percent of bone in the carcass, indicating that generally, lambs that were heavier at birth produced leaner carcasses with more bone and less fat than lambs that were lighter at birth. Birth weight showed a strong relationship with weaning weight, indicating that generally heavier lambs at birth tended to grow faster during the nursing period. There was a very weak relationship between birth weight and postweaning average daily gain.

Weaning weight appeared to have little, if any, relationship with the percent of wholesale cuts, percent of lean and percent of fat in the carcass. However, there was a weak positive association with the percent of bone and dressing percentage.

Postweaning average daily gain can be considered as the best indicator of the animal's genetic potential for growth compared with other growth measurements. Postweaning average daily gain had little, if any, relationship with

**Table 3. Correlation coefficients between growth and carcass measurements in lambs of the same breed, sex, and rearing type slaughtered at about 100 pounds**

	Weaning weight	Post weaning avg. daily gain	Percent wholesale cuts	Percent lean	Percent fat	Percent bone	Dressing percent
Birth weight, lb.	0.52*	0.13*	0.10	0.30*	-0.37*	0.34*	-0.06
Weaning weight, lb.	—	0.21*	0.04	0.04	-0.10	0.19*	0.26
Post weaning avg. daily gain, lb.	—	—	-0.04	0.10	-0.12	0.10	-0.21*
Percent wholesale cuts	—	—	—	0.39*	-0.28*	-0.13*	0.30
Percent lean	—	—	—	—	-0.94*	0.28*	-0.26*
Percent fat	—	—	—	—	—	0.59*	0.33
Percent bone	—	—	—	—	—	—	-0.33*

\*Significant at 0.05 probability level or less. (Correlations are probably not due to chance.)

the measures of carcass composition. There was weak negative correlation with dressing percentage, indicating that generally the faster-growing lambs (after weaning) had a somewhat lower dressing percentage.

These results suggest several things: (1) The big difference in rate of gain of single and twin lambs is not associated with any differences of any great consequence in carcass composition; (2) When later maturing, larger rams sire the lambs, the rate of gain after weaning is increased and the lamb carcasses may be leaner as a result; (3) If male lambs are not castrated they will gain faster after weaning and the resultant carcass will be leaner but the dressing percentage of the lambs will be less and (4) If lambs are sired by rams of the same breed, are of the same sex and are either twins or singles, birth weight is the measure of growth most closely related to percent fat, lean or bone, and that relationship is not strong. In other words, in a group of lambs like these slaughtered at about 100 pounds, there is little or no relationship between rate of gain after birth and carcass leanness.

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