THE RELATIONSHIP OF PHENOTYPE TO GAINING ABILITY OF LAMBS IN THE FEED LOT

by

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INTRODUCTION

The sheep industry in Kansas may be divided into three distinct systems of production: (1) commercial farm breeding flocks; (2) purebred flocks; and (3) western lamb feeding.

The fattening of range lambs for market has been practiced in Eastern and Northeastern Kansas for many years and is still an industry of considerable importance in that section of the state; however, extensive feeding of range lambs has gained a foothold in Western Kansas since systems of feeding grain sorghums and utilizing of wheat pasture for fat lamb production have been developed in recent years. Kansas has ranked at the top or near the top of the states in the number of lambs fed during the past several years.

The problem of feeder lamb selection on the basis of size, quality, and breed type has always been important and should receive proper consideration prior to the time lambs are actually obtained. A feeder's decision in regard to feeder lamb selection is usually based upon the relative availability and cost of the different weight classes of lambs, the type of feeding program to be used, and the accessibility of breed types as influenced by the location of the feeding operation.

Regardless of the nature of the feeding program, good gaining ability of individual animals is an important fundamental factor in the determination of the success of any lamb fattening enterprise. The purpose of this study was to determine the

relationship of several phenotypic factors with the gaining ability of feeder lambs. Similar tests have been conducted at other experiment stations and the results of these studies have been summarized in the review of literature.

Before proceeding with a review of previous investigations, it is advisable to discuss some general considerations of feeder lamb production and fattening programs or systems.

Most range feeder lambs weigh between 40 and 75 pounds upon arrival at the feed lot from the range areas and are commonly classified into one of three weight groups: (1) light weight feeders, 40 to 55 pounds; (2) medium weight feeders, 55 to 65 pounds; and (3) heavy feeder lambs, weighing over 65 pounds.

Light weight feeder lambs are generally used where relatively large quantities of forage and limited amounts of grain are available. This system of feeding requires from 150 to 180 days and permits adequate growth and fattening of smaller lambs.

Medium weight feeder lambs are desired by most feeders because they can be placed on full feed with less danger of death losses due to digestive disorders than light weight lambs and are generally assumed to make more economical gains than heavy lambs.

Heavy weight lambs are usually fed for a short period on a ration relatively high in concentrates.

Three primary breed types of feeder lambs are available to Kansas feeders. These are commonly referred to as (a) fine-wool, (b) blackface and whiteface crossbreds, and (c) long-wool types.

The fine-wool feeder lambs originate primarily in Texas,

New Mexico, Southern Colorado or the southwestern range areas and, as the name implies, are mostly high-grade Rambouillets. These lambs are uniform and hardy but somewhat lacking in conformation. They are usually slower feeders than blackfaces, however they feed out economically and produce surprisingly good carcasses as compared to those of mutton breeding.

Blackface and whiteface crossbred feeder lambs are produced in the range states of the northwest. They possess better mutton conformation than fine-wool lambs and are in high demand by many feeders. These crossbreds are the result of one or more crosses of Hampshire, Suffolk, Columbia, or Panama rams on grade Rambouillet ewes. Packers generally prefer these as fat lambs because of carcass superiority.

Long-wool lambs are produced on the northwestern ranges. These are limited in number, and their chief advantage is their ability to consume a ration relatively high in concentrates. They are often heavier than the desired packer slaughter weight when fat.

It has become apparent that phenotypic variations in feeder lambs are associated with their adaptability for different systems of fat lamb production. It has not been possible to study this problem under all production systems, but this study of the problem was conducted under typical Western Kansas conditions.

The phenotypic factors studied as related to gaining ability were breed types, initial weights, body type scores, and scoring data on gaining ability. Considerations are also given to carcass

data on the experimental lambs used in the experiment.

REVIEW OF LITERATURE

Studies have been made at several experiment stations in recent years to determine the relationship of phenotypic or external physical characteristics of feeder lambs with gaining ability, carcass quality, and general feeding qualities. Although limited conclusive information is available on this subject at present, some interesting observations have been made.

Neale and Bell (3) studied the influences of breed type, initial weight, initial condition, pelt smoothness, body type, and chest measurements on feed lot gains and market valuations of feeder lambs over a six year period at the New Mexico Station.

They found that Hampshire-Rambouillet crossbreds outgained straight Rambouillet by a small margin. A similar advantage was shown by the Suffolk-Merino crossbred over the straight Merino. Corriedale-Rambouillet crossbreds made relatively poor gains in the years they were included in the experiments. The Romney-Rambouillet crossbreds gained about the same as straight Rambouillets.

The larger lambs of both the Merino and Suffolk-Merino crosses tended to make the larger gains in the feed lot. It was concluded that those lambs which gain well before going into the feed lot continue to make good gains when placed on feed. The unthrifty or thin lambs made comparatively slow gains while on feed.

Neale and Bell concluded that if lambs have been raised under identical conditions and are about the same age, the lighter, thinner individuals are likely to continue to be poor gainers in the feed lot, whereas the larger, fatter lambs usually continue to do well.

The lambs were classified as compact, medium, and rangy in reference to body type at the start of the feeding periods. No consistent advantage in gains was found for any of these type classes.

It was noted that extremely heavily wrinkled lambs gained less in the feed lot than either smooth or medium fleeced lambs of the fine-wool breeds. No distinct advantage was observed between either the smooth or medium classes.

Measurements of depth and width of chest were made; however, it was not possible to obtain exact measurements, so conclusions were not made regarding the relationship of these measurements to the rate of gain in the feed lot.

Neale and Bell stated that considerable variation in rate of gain was found within groups of lambs of the same breeding and of nearly identical conformation and finish and observed that some lambs do well and some poorly, regardless of breed, body type, and initial weight.

The packers preferred the blackface crossbred lambs produced in these experiments. This preference was only partially substantiated by the slaughter data and killing records because the smooth-bodied fine wool lambs killed out well and in some cases

rated above the crossbreds.

, Keith and Henning (2) compared the feeding qualities of different breed types of feeder lambs at the Pennsylvania station. Six hundred and sixty-nine lambs were fed in this four year study. Native fine wool, native mutton, choice western, and medium western lambs were used.

It was found that the native fine wool lambs required more feed per 100 pounds gain in live weight than did the native mutton and western lambs. The average daily gain of the choice western lambs was approximately 38.6 per cent higher than the native fine wool lambs and 23.6 per cent higher than the native mutton lambs.

The native fine wool lambs consumed less feed and made less economical gains than the native mutton and western bred lambs. It was believed that the heavier and denser fleeces of the native fine wool lambs may have been a contributing factor to their poorer feeding qualities.

The native fine wool lambs graded 14 per cent culls, the native mutton 9.9 per cent culls, and the choice western 1.5 per cent. The native fine wool lambs had the lowest dressing percentages whereas the native mutton and choice western lambs were about the same.

Branaman (1) studied some factors in lamb production associated with size and type in mutton sheep at the Illinois station. Although this investigation concerned spring lamb production instead of lamb feeding, there are some observations worthy of mentioning at this time.

Branaman stated that market finish is a major factor in determining slaughter and carcass grades, and is important along with market weight and time of marketing in determining the value of a lamb. There was little difference between the values of lambs produced by fine wool and crossbred type western whiteface ewes, either in weight or value of lamb produced when the ewes were mated with mutton type rams. No differences in efficiency of digestion were found among groups of grade lambs sired by different breeds of mutton type rams; however the lambs of the larger breeds tended to be most efficient in the purebred groups at an age of about one year.

EXPERIMENTAL PROCEDURE

The 480 lambs used in this study were obtained directly from the mountain range of Southern Utah and included Columbia-Rambouillet crosses. This group of lambs was used in the feeding experiments at the Garden City Branch Kansas Agricultural Experiment Station.

The lambs averaged 76 pounds at the range shipping point and 68 pounds upon arrival at Garden City. The lambs were lotted and placed on experimental tests at an average weight of 78 pounds which was obtained after 50 days of pasture and roughage feeding as a preliminary adjustment period.

The lambs were separated into breed type and weight class groups and then lotted into eight groups of sixty lambs each

according to breed type and initial weight. Individual weights were obtained on all lambs.

One-half of each experimental group was vaccinated for over-eating disease, and one-half was drenched for stomach worms so that these treatments could be evaluated or studied as part of the regular feeding tests.

The lambs were vaccinated and drenched so that one-fourth of the experimental group received both treatments, one-fourth were vaccinated only, one-fourth were drenched only, and one-fourth received no treatment.

The individual lambs were ear tagged so that records could be maintained on each animal.

All lambs were classified by the author for body type into one of three classes which are designated as A, B, and C in the experimental data. The A body type classification included the low set, wide, deep, well balanced, smooth, thrifty, high quality lambs. These also possessed strong constitutions and displayed growthiness and a rather large quantity of bone.

Lambs classified as possessing B body type were in general thrifty, but intermediate in respect to those external characteristics previously described.

The C body type group consisted of unthrifty lambs which were upstanding, shallow, narrow, and generally in poor condition. They were also rather plain and poor quality animals with fine bone.

Each of the experimental lambs were rated for gaining ability

by Dr. T. D. Bell who is in charge of the sheep feeding and breeding investigations at the Kansas Experiment Station. Three ratings were used for this phase of the study.

The lambs rated as number I gainers were alert, thrifty, good bodied individuals with strong constitutions and showing outward signs of growthiness as indicated by rather large frames and rugged bone. The number II gainers were lambs which were thrifty but generally smaller and lacking in conformation in comparison with the number I group. The number III gainers consisted of small unthrifty lambs that possessed outward signs of physical disorders such as scouring, humped backs, and watering eyes. Most of these lambs were thin and lacking in scale and quantity of bone.

As previously mentioned, the group of lambs used for this study were used in the regular feeding trials at the Garden City Branch Station. The rations provided to each of the eight lots are summarized in Table 1. The lot differences in daily gains due to these various treatments were significant and considered as such in the analysis of the data.

Biweekly weights were taken on all experimental lots during the test period. One lamb died in lot number 7 from overeating disease. One lamb also died in each of lot numbers 2 and 8. The cause of these two death losses was unknown. One lamb was removed from lot number 4 because of illness during the experiment. The feeding period was 94 days for all lots.

Carcass grades were obtained on 464 lambs after shipment for

Table 1. Daily ration.

Feed per lamb daily	Lot I	Lot II	Lot III	Lot IV	Lot V	Lot VI	Lot VII	Lot VIII
		ground milo						
Milo grain	1.26	1.26	1.15	1.26	2.07	2.04	.11	.11
Axtell stover	2.40	2.40	.53	2.29	1.76	1.76	.29	.29
Axtell silage			5.56					
Alfalfa hay							.56	
Soybean pellets	.20	.20	.20	.20	.20	.20	.02	.22
Ground limestone	.019	.019	.019	.019	.019	.019	.019	.019
Salt	.022	.027	.017		.027	.019 + soda .020	.018	.018

slaughter. Three lambs died and one lamb was removed from test during the course of the experiment. Twelve additional lambs were retained for more detailed nutritional studies at the conclusion of the regular feeding tests. The carcass grade data have been analyzed to determine whether or not significant differences existed between the breed types used in this study.

ANALYSIS OF DATA

The data which were collected and analyzed in this study are presented in Table A, Appendix.

Statistical methods used in the analysis of data were block within block form of analysis of variance and correlation as described by Snedecor (4).

Lot means for average daily gain showed a wide range as shown in Table 2. The differences among these means were highly significant in Table 4.

Since there were real differences among the lots, the effects of the lots were held constant in a block within block form of analysis of variance while comparing differences in average daily gains between lambs of dissimilar breeding. The blackface crossbreds consistently outgained the whiteface crossbreds as may be seen in Table 3. The analysis of variance, Table 4, showed that these consistent differences were significant.

As may be seen in Table 4, sex of lambs did not significantly affect average daily gain of lambs.

Table 2. Average initial weight and average daily gains of lambs in each of eight lots.

Lots	Number of lambs	Average initial weight	Average daily gains
I	60	79.7	.294
II	59	77.9	.339
III	60	78.5	.346
IV	59	77.5	.267
V	60	77.8	.391
VI	60	77.3	.379
VII	59	77.9	.328
VIII	59	77.0	.317

*Difference required for significance at .05 level between any two lot means for average daily gain is 0.058 pounds. Difference required at .01 level is 0.103.

Table 3. Average daily gains of lambs by sexes within breeding within lots.

Lot	Breeding	Sex	Number	Average daily gains	Combined average
I	Whiteface	Male	42	.291	
		Female	none	none	
		Total	42		.291
	Blackface	Male	11	.333	
		Female	7	.281	
		Total	18		.313
II	Whiteface	Male	37	.340	
		Female	3	.262	
		Total	40		.334
	Blackface	Male	9	.344	
		Female	10	.355	
		Total	19		.350
III	Whiteface	Male	39	.335	
		Female	2	.252	
		Total	41		.330
	Blackface	Male	8	.385	
		Female	11	.379	
		Total	19		.381
IV	Whiteface	Male	37	.265	
		Female	2	.273	
		Total	39		.266
	Blackface	Male	12	.284	
		Female	8	.248	
		Total	20		.270

Table 3. (concl.).

Lot	Breeding	Sex	Number	Average daily gains	Combined average
V	Whiteface	Male	37	.375	
		Female	4	.331	
		Total	41		.371
	Blackface	Male	15	.446	
		Female	4	.396	
		Total	19		.436
VI	Whiteface	Male	37	.379	
		Female	5	.343	
		Total	42		.375
	Blackface	Male	15	.401	
		Female	3	.341	
		Total	18		.391
VII	Whiteface	Male	39	.333	
		Female	2	.208	
		Total	41		.327
	Blackface	Male	13	.322	
		Female	5	.356	
		Total	18		.332
VIII	Whiteface	Male	39	.312	
		Female	1	.198	
		Total	40		.309
	Blackface	Male	16	.335	
		Female	3	.324	
		Total	19		.333

Table 4. Analysis of variance of average daily gains of 476 lambs in eight lots of two different breedings and two sexes.

Source of variation	Degrees of freedom	Sum of squares	Mean square	F
Total	475	3.64513		
Among lots	7	.69755	.09965	15.82**
Within lots	468	2.94758	.00630	
Between breedings within lots	8	.10950	.01369	2.22*
Within breedings within lots	460	2.83808	.00617	
Between sexes within breeds within lots	15	.12452	.00830	1.36
Within sexes within breeds within lots	445	2.71356	.00610	

* = significance at .05 level
** = significance at .01 level

The 70 ewe lambs were not used in the study of the relationship of type and gain scores to gaining ability in the feed lot. The analysis of the effects of lots and breeding within lots is shown in Table 5. Considering only the wether lambs, lot differences were still highly significant and breeding differences remained significant. As may be seen in Table 9, these differences were not due to differences in initial weights of the lambs.

The relationship of type scores to subsequent average daily gains was studied within lots and within breeding since lots and breeding had been shown to have significant effects on average daily gains. The means of the A, B, and C body types are shown in Table 6. The relative rankings of these body types in relation to daily gains within the eight lots are shown in Table 7. There appears to be a tendency for the average daily gains to be associated with body type among the blackfaced wethers, A type lambs outgaining B type which in turn outgained the C type. However, the whitefaced A type wethers tended to perform more poorly than did the C type wethers. Classification of the lambs into the three types appeared to be governed greatly by initial weight as shown in Table 8. Within both the whitefaced and blackfaced wethers the heavier lambs usually were graded higher. These differences between initial weights of the three body types within lots were highly significant as shown in Table 9.

Table 5. Analysis of variance of average daily gains of 406 wether lambs of two different breedings and in eight lots.

Source of variation	Degrees of freedom	Sum of squares	Mean square	F
Total	405	3.0943		
Between lots	7	.6176	.08823	13.85**
Within lots	398	2.4767	.00637	
Between breeds within lots	8	.1021	.01276	2.09*
Within breeds within lots	390	2.3746	.00609	

* = significance at .05 level
** = significance at .01 level

Table 6. Average daily gains of blackface and whiteface wether lambs of three body type scores, A, B, and C, in each of eight lots.

Type scores	Breed	Lots average daily gain															
		I		II		III		IV		V		VI		VII		VIII	
		No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$
A	B	2	.220	2	.414	1	.493	3	.362	9	.464	4	.345	7	.307	4	.333
	W	5	.233	5	.344	3	.269	10	.272	5	.359	4	.287	5	.263	7	.315
B	B	6	.356	5	.338	5	.373	7	.272	6	.420	10	.422	6	.339	12	.353
	W	28	.294	24	.341	28	.350	21	.271	27	.379	30	.401	28	.340	25	.304
C	B	3	.361	2	.291	2	.358	2	.211			1	.424				
	W	9	.314	8	.332	8	.306	6	.232	5	.370	3	.288	6	.358	7	.334

Table 7. Conclusions of Table 6.

Rank	Whitefaced wethers			Blackfaced wethers		
	Body types			Body types		
	A	B	C	A	B	C
First	2	1	5	4	2	2
Second	1	4	1	2	6	0
Third	5	3	2	2	0	6

Table 8. Mean initial weights of wether lambs according to body type, breeding and lots.

Body type	Breed	Lots															
		I		II		III		IV		V		VI		VII		VIII	
		No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$
A	B	2	84.4	2	76.2	1	106.1	3	97.2	9	84.8	4	86.4	7	79.4	4	90.7
	W	5	82.4	5	85.2	3	79.7	10	83.4	5	85.8	4	84.9	5	87.4	7	87.0
B	B	6	87.2	5	81.5	5	80.7	7	72.4	6	76.7	10	75.9	6	73.5	12	74.1
	W	28	82.2	24	81.2	28	79.4	21	78.5	27	79.1	30	78.2	28	79.7	25	79.0
C	B	3	62.1	2	56.6	2	74.5	2	73.9	none		1	52.5	none			
	W	9	69.4	8	70.8	8	74.8	6	71.0	5	68.3	3	71.4	6	64.5	7	69.5

Table 9. Analysis of variance of initial weights of blackface and whiteface wether lambs of three body type scores within each of eight lots.

Source of variation	Degrees of freedom	Sum of square	Mean square	f
Total	405	50,799.23		
Among lots	7	276.36	39.480	
				< 1
Within lots	398	50,522.87	126.942	
Among breeds within lots	8	442.40	55.300	
				< 1
Within breeds within lots	390	50,080.47	128.411	
Between type scores within breeds within lots	29	23,742.275	818.70	11.22**
Within type scores within breeds within lots	361	26,338.19	72.96	

** = significance at .01 level

The relationship of gain scores to subsequent daily gains was studied within lots and within breeding. Average daily gains of each of the three gain scores within each breed and lots are presented in Table 10. The relative rank of the three gain scores in regards to daily gain are presented in Table 11. Among the whitefaced wethers there was a tendency for those given the higher gain scores to perform less well than those given lower gain scores. As shown in Table 12 gain scores were governed greatly by initial weight of the wethers. The lambs grading III weighing less than those graded II which, in turn, weighed more than those grading I. These differences in initial weight were highly significant as shown in Table 13.

There was a tendency for the lighter whiteface wethers to gain more than the heavier whiteface wethers, the correlation (Table 15) between initial weights and subsequent average daily gains being -.48. However the lighter blackface lambs did not gain more than the heavier blackface lambs, the correlation (Table 14) between initial weight and subsequent daily gains being $\neq$ .60.

Carcass grades were obtained on 464 lambs included in the experiment and are summarized in Tables 16 and 17.

The carcass grade data have been analyzed by a chi square analysis, according to the method described by Snedecor (4), and it was found that there was no significant difference in the carcass grades of the two breed types used in the experiment.

Table 10. Average daily gains of blackface and whiteface wether lambs of three gain scores in each of eight lots.

Gain scores	Breed	Lots (average daily gain)															
		I		II		III		IV		V		VI		VII		VIII	
		No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$
I	B	3	.256	1	.364	2	.406	3	.362	8	.484	6	.382	5	.304	6	.337
	W	15	.281	11	.359	10	.313	15	.270	10	.409	11	.371	10	.325	14	.310
II	B	6	.360	4	.394	4	.410	7	.270	5	.407	6	.425	5	.365	7	.308
	W	17	.295	18	.322	18	.360	18	.274	23	.364	23	.382	19	.332	17	.308
III	B	2	.368	4	.290	2	.312	2	.218	2	.394	3	.393	3	.282	3	.397
	W	10	.301	8	.352	11	.314	4	.209	4	.353	3	.387	10	.342	8	.323

Table 11. Relative rank of lambs of each of the three gain scores, I, II, III, in regards to subsequent average daily gains.

Rank	Whitefaced wethers			blackfaced wethers		
	Gain scores			Gain scores		
	I	II	III	I	II	III
First	2	2	4	2	4	2
Second	2	4	2	4	3	1
Third	4	2	2	2	1	5

Table 12. Average initial weights of blackface and whiteface wether lambs of three gain scores in each of eight lots.

Gain scores	Breed	I		II		III		IV		V		VI		VII		VIII	
		No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$	No.	$\bar{x}$
I	B	3	89.7	1	80.3	2	98.7	3	97.2	8	87.9	6	85.4	5	84.3	6	87.8
	W	15	86.5	11	86.9	10	82.9	15	82.7	10	86.2	11	85.2	10	86.8	14	85.4
II	B	6	81.7	4	85.4	4	82.8	7	76.3	5	76.0	6	74.1	5	78.0	7	75.6
	W	17	79.7	18	79.3	18	79.7	18	78.1	23	78.1	23	77.1	19	80.7	17	77.5
III	B	2	64.6	4	62.8	2	65.2	2	60.4	2	69.9	3	66.5	3	61.6	3	65.5
	W	10	68.6	8	69.7	11	72.5	4	65.6	4	62.1	3	62.1	10	65.6	8	69.9

Table 13. Analysis of variance of initial weights of blackface and whiteface wether lambs of three gain scores within each of eight lots.

Source of variation	Degrees of freedom	Sum of squares	Mean square	f
Total	405	50,799.23		
Among lots	7	276.36	39.480	
				<1
Within lots	398	50,522.87	126.942	
Between breeds within lots	8	442.40	55.300	
				<1
Within breeds within lots	390	50,080.47	128.411	
Among gain scores within breeds within lots	32	32,369.17	1011.537	20.45**
Within gain scores within breeds within lots	358	17,711.30	49.473	

**denotes significance at .01 level.

Table 14. Correlation coefficient between initial weight and subsequent daily gain of the 99 blackface wethers.

Source of variation	d.f.	Sx^2	Sxy	Sy^2	Mean square for x	Mean square for y	Correlation between initial wt. & daily gain
Total	98	13,557.63	64.0544	1.00301			
Between lots	7	509.59	4.378	.24932	72.7986	.03562**	
Within lots	91	13,048.04	59.6764	.75369	143.3851	.00828	+.60

** = significance at .01 level.

Table 15. Correlation coefficient between initial weight and subsequent daily gain of the 307 whiteface wethers.

Source of variation	d.f.	Sx^2	Sxy	Sy^2	Mean square for x	Mean square for y	Correlation between initial wt. & av.daily gain
Total	306	37,236.64	-118.1128	2.020505			
Between lots	7	204.21	- .434	.40016	29.172	.05717**	
Within lots	299	37,032.43	-117.6788	1.620345	123.854	.00542	-.48

** = significance at .01 level.

Table 16. Carcass grades by lots according to breed type.

Lot	Blackface			Whiteface			Total lambs
	Grade	No.	Percent	Grade	No.	Percent	
I	Prime	0	0	Prime	1	.04	1
	Choice	14	.78	Choice	27	.68	41
	Good	4	.22	Good	11	.28	15
	Total	18			39		57
II	Prime	7	.37	Prime	8	.20	15
	Choice	5	.26	Choice	20	.50	25
	Good	7	.37	Good	10	.25	17
				Utility	2	.05	2
	Total	19			40		59
III	Prime	7	.37	Prime	7	.18	14
	Choice	10	.53	Choice	28	.70	38
	Good	2	.10	Good	5	.12	12
	Total	19			40		59
IV	Prime	1	.05	Prime	2	.05	3
	Choice	14	.67	Choice	18	.50	32
	Good	5	.23	Good	13	.36	18
	Utility	1	.05	Utility	2	.05	3
	Total	21			36		56
V	Prime	12	.63	Prime	9	.22	21
	Choice	7	.37	Choice	27	.66	34
	Good	0	0	Good	4	.10	4
	Utility	0	0	Utility	1	.02	1
	Total	19			41		60
VI	Prime	9	.50	Prime	16	.43	25
	Choice	8	.44	Choice	20	.54	28
	Good	1	.06	Good	1	.03	2
	Total	18			37		55

Table 16. (concl.).

Lot	Blackface			Whiteface			Total lambs
	Grade	No.	Percent	Grade	No.	Percent	
VII	Prime	0	0	Prime	1	.03	1
	Choice	12	.70	Choice	18	.45	30
	Good	4	.24	Good	16	.40	20
	Utility	1	.06	Utility	5	.12	6
	Total	17			40		57
VIII	Prime	1	.05	Prime	0	0	0
	Choice	10	.53	Choice	21	.53	31
	Good	7	.37	Good	15	.38	22
	Utility	1	.05	Utility	3	.07	4
	Cull	0	0	Cull	1	.02	1
	Total	19			40		59

Table 17. Carcass grades according to breed types.

Whiteface			Blackface		
Grade	Total lambs	Total percent	Grade	Total lambs	Total percent
Prime	44	.14	Prime	37	.24
Choice	179	.57	Choice	80	.53
Good	75	.24	Good	31	.20
Utility	13	.04	Utility	3	.03
Cull	2	.01	Cull	0	0
Total	313	100		151	100

Table 18. Chi-square analysis of carcass grades of 464 lambs of two breed types.

Grade	Total no.	Blackface crossbreds		Whiteface crossbreds	
		Observed	Expected	Observed	Expected
Prime	81	37	26	44	55
Choice	259	80	84	179	175
Good	106	31	34	75	72
Utility	16	3	5	13	11
Cull	2	0	.6	2	

Chi-square value - 8.93; not significant at .05 level

OBSERVATIONS

The analysis of the data indicated that the differences in the lot means for average daily gain due to experimental feeding treatments were highly significant. Because of these real differences among lots, the effect of the lots were held constant in block within block form of analysis of variance while comparing lambs of different breeding.

The average daily gain of all blackface lambs was .348 pound per day and that of all whiteface lambs was .326 pound per day. The analysis of variance showed that this difference was significant. The blackface lambs consistently outgained the whiteface lambs.

The average daily gain for all male lambs was .336 pound per day and that for all females was .318 pound per day. This difference was not significant in the analysis of average daily gains of the two sexes within lots.

Because of the unequal distribution of the ewe lambs within the experimental lots, they were not included in the study of the relationship of type ratings and gain scores to gaining ability in the feed lot.

The relationship of type ratings to subsequent average daily gains was studied within lots and within breed types, since both of these had significant effects on average daily gains.

The gains for lambs rated as A, B, and C types were .322, .342 and .316 pound per day, respectively. This relationship did

not remain consistent for the two breed types.

The A type outgained the B type which in turn outgained the C type in the blackface wethers. However, the A type whiteface wethers tended to make poorer gains than did the C type. The classification of the lambs into type classes appeared to be associated with initial weight. The heavier lambs within each breed type were usually graded higher and the differences between initial weights of the three body types within lots were highly significant.

In summary, the heavier blackface lambs receiving the higher body type ratings outgained the lower scoring, lighter lambs within that breed type. The reverse of this relationship appears to apply for the whiteface lambs included in the experiment.

The relationship of gain scores to subsequent daily gains was studied within lots and within breed types also. The average daily gains for lambs receiving I, II, and III gain scores were .332, .338, and .322 respectively. The gain scores appeared to be associated with initial weight also. The lambs which received the higher gain scores were heavier at the start of the experiment. The previously mentioned average daily gains for the three gain scores were not consistent for the two breed types.

The heavier blackface lambs receiving the high gain scores outgained the lower scoring, lighter lambs of that breed type; however, the lower scoring, lighter whiteface lambs tended to outgain the higher scoring, heavier lambs of that breed type.

The analysis of the carcass grades of the lambs slaughtered

at the conclusion of the experiment indicated that there was no significant difference in the carcass grades of the two breed types.

SUMMARY

The blackface lambs were better gainers in the feed lot than whiteface lambs in this study. Sex was not shown to influence gaining ability in the experiment although males usually are better gainers than females in sheep.

The association of initial weight to both the scoring for gaining ability and rating for body type as previously described suggests that gaining ability may be predicted on the basis of initial weight alone as well as using either of the other techniques separately or in conjunction with initial weights.

The differences in the relationships of initial weight, gain scores, and type ratings with gaining ability according to breed types cannot be explained; however, the relationship of initial weight to subsequent gains existing in the blackface group is in accord with the observations made by Neale and Bell (3). It is believed that future studies are necessary to verify or reject those observations made in the whiteface group before conclusions can be made for recommendation.

The two breed types included in the study are to be considered equally desirable in regard to carcass quality.

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APPENDIX

Table A. Collected data.

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
						Lot I							
1	F	B	B	2	76.8	.364	31	M	C	B	3	75.8	.305
2	F	B	A	1	79.8	.236	32	F	B	A	1	86.2	.317
3	M	C	C	2	70.0	.287	33	M	C	C	3	62.8	.374
4	M	C	B	1	100.0	.298	34	M	C	B	1	87.2	.194
5	M	C	A	2	77.1	.276	35	M	C	B	1	87.6	.424
6	M	C	B	1	82.6	.164	36	F	B	B	1	86.0	.271
7	M	C	B	2	83.0	.228	37	M	C	C	3	68.2	.306
8	M	C	B	1	82.6	.105	38	M	C	B	2	87.7	.332
9	M	B	B	1	100.2	.328	39	M	C	B	2	84.0	.317
10	M	B	C	3	58.8	.316	40	M	C	B	2	72.9	.352
11	M	B	A	1	77.7	.198	41	F	B	B	2	76.2	.212
12	M	C	B	2	69.9	.320	42	M	C	C	2	82.1	.358
13	M	C	B	1	83.9	.267	43	M	C	B	2	72.4	.336
14	M	B	B	2	78.0	.385	44	M	C	B	1	87.2	.514
15	M	C	B	1	75.0	.441	45	M	C	B	1	100.5	.271
16	M	C	C	3	77.0	.436	46	M	C	B	2	88.6	.344
17	M	C	A	2	81.3	.167	47	M	C	C	3	74.2	.255
18	M	B	A	1	91.2	.242	48	M	C	C	3	63.9	.330
19	M	C	B	2	80.2	.194	49	M	C	B	1	95.5	.250
20	M	C	C	3	65.6	.222	50	M	C	B	2	79.3	.262
21	M	C	B	2	81.8	.310	51	M	C	A	1	76.7	.242
22	M	C	B	2	79.9	.336	52	M	C	C	3	61.3	.257
23	M	C	B	3	61.0	.271	53	M	C	B	3	76.7	.258
24	M	C	B	2	81.4	.282	54	M	B	B	2	88.6	.272
25	M	C	A	1	98.8	.246	55	M	B	B	2	97.0	.382
26	M	C	A	1	78.3	.236	56	M	C	B	1	83.4	.261
27	M	C	B	1	77.6	.302	57	M	B	B	2	80.5	.430
28	M	C	B	2	82.7	.306	58	M	B	C	3	70.5	.420
29	M	B	B	2	79.2	.344	59	F	B	A	1	76.0	.292
30	F	B	C	2	77.4	.276	60	M	B	C	2	67.2	.348

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot II								
61	M	C	B	2	76.6	.321	91	M	C	C	3	59.2	.332
62	F	B	A	2	70.5	.316	92	M	B	B	2	84.3	.284
63	M	C	B	1	89.2	.091	93	M	C	A	1	90.9	.282
64	M	C	C	3	66.4	.272	94	M	C	B	1	90.2	.290
65	M	C	C	3	68.0	.221	95	M	C	B	2	88.0	.340
66	M	C	B	2	74.7	.328	96	M	C	B	2	79.7	.407
67	F	B	A	2	79.8	.396	97	M	B	B	2	83.0	.420
68	Died						98	F	B	B	2	75.5	.378
69	F	B	B	3	77.1	.350	99	F	C	B	1	90.4	.238
70	M	C	B	2	77.5	.308	100	M	C	B	1	105.7	.452
71	M	C	B	2	73.7	.420	101	M	C	B	2	80.1	.232
72	M	C	C	2	73.3	.236	102	M	C	B	1	84.9	.339
73	M	C	B	2	84.0	.344	103	F	B	B	3	72.3	.178
74	M	C	C	3	82.5	.340	104	M	C	B	3	70.5	.507
75	F	B	C	2	68.0	.340	105	M	C	B	2	83.9	.182
76	M	C	A	2	75.6	.253	106	M	B	C	3	57.6	.280
77	M	C	B	2	85.5	.120	107	M	C	B	2	69.7	.306
78	M	C	B	2	84.5	.378	108	M	B	B	2	91.6	.419
79	M	C	B	1	76.9	.560	109	F	B	A	1	77.1	.392
80	F	B	B	2	83.8	.480	110	M	B	A	3	69.6	.374
81	F	C	C	3	72.2	.285	111	M	C	A	1	92.1	.414
82	M	C	C	1	87.0	.428	112	M	B	C	3	55.6	.302
83	F	B	A	2	71.0	.394	113	F	B	A	2	72.5	.330
84	M	B	B	1	80.3	.364	114	F	C	A	2	76.2	.264
85	M	C	B	2	86.7	.450	115	M	C	A	1	84.2	.412
86	M	C	B	1	72.1	.323	116	M	C	B	2	76.5	.319
87	M	B	B	3	68.4	.203	117	M	C	C	3	71.6	.456
88	M	C	B	2	73.5	.410	118	M	C	A	1	83.0	.362
89	M	C	B	3	80.8	.310	119	M	C	C	3	58.8	.374
90	M	C	B	2	83.2	.444	120	M	B	A	2	82.8	.454

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot III								
121	M	B	C	3	60.6	.318	151	F	B	B	2	79.3	.264
122	M	C	C	3	57.3	.226	152	M	C	B	2	83.2	.540
123	M	B	B	2	85.7	.455	153	M	C	C	3	75.8	.310
124	F	B	A	2	73.7	.370	154	F	C	A	1	88.1	.334
125	M	C	B	2	71.4	.298	155	M	C	B	2	75.2	.412
126	M	B	B	2	79.7	.285	156	M	B	C	2	88.5	.398
127	M	C	B	2	78.2	.354	157	M	B	A	1	106.1	.493
128	M	C	B	3	72.5	.297	158	M	C	B	1	77.4	.187
129	M	C	A	1	75.7	.244	159	M	C	B	2	82.3	.264
130	M	C	A	1	76.3	.162	160	M	B	B	3	69.8	.305
131	M	C	B	2	79.0	.446	161	M	C	A	1	87.3	.401
132	F	B	A	2	67.8	.289	162	M	C	B	1	93.7	.271
133	M	B	B	1	91.4	.320	163	M	C	B	2	68.1	.276
134	M	C	C	3	76.5	.369	164	M	C	B	2	84.1	.312
135	M	C	B	2	88.8	.369	165	M	C	B	1	75.6	.328
136	M	B	B	2	77.2	.503	166	M	C	B	2	74.2	.322
137	M	C	C	3	76.0	.346	167	F	B	B	1	74.0	.324
138	M	C	B	3	74.0	.321	168	M	C	B	2	79.0	.364
139	M	C	B	2	77.5	.367	169	M	C	B	1	86.5	.441
140	M	C	B	3	70.3	.364	170	M	C	C	3	70.2	.338
141	M	C	B	1	83.7	.292	171	M	C	B	2	86.0	.398
142	F	B	B	1	78.7	.280	172	M	C	C	3	87.9	.288
143	F	B	B	3	64.2	.463	173	M	C	B	1	83.7	.402
144	M	C	C	2	79.1	.280	174	M	C	B	3	66.5	.239
145	M	C	C	2	75.4	.296	175	M	C	B	1	89.1	.398
146	F	C	B	1	74.5	.170	176	F	B	B	1	63.5	.426
147	M	C	B	2	82.1	.360	177	F	B	A	1	83.1	.350
148	M	C	B	3	70.9	.354	178	F	B	A	1	92.5	.404
149	M	C	B	2	77.7	.466	179	M	C	B	2	93.3	.353
150	F	B	B	2	77.3	.390	180	F	B	B	2	75.5	.611

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot IV								
181	M	C	B	2	74.4	.256	211	M	C	A	1	90.8	.374
182	M	B	A	1	112.0	.455	212	F	B	A	2	77.7	.284
183	M	B	C	2	77.8	.188	213	M	B	B	3	50.9	.203
184	F	B	A	3	68.0	.248	214	M	C	B	2	86.3	.316
185	M	B	C	3	70.0	.234	215	M	C	B	2	72.6	.382
186	F	B	B	2	62.7	.248	216	M	C	C	3	62.3	.284
187	M	C	B	1	69.0	.269	217	M	C	A	2	74.2	.301
188	M	C	B	1	79.4	.230	218	M	C	B	1	92.6	Died
189	M	C	B	2	76.9	.150	219	F	B	A	1	72.7	.210
190	M	C	C	2	85.5	.234	220	F	C	C	3	59.3	.326
191	M	C	B	2	84.4	.334	221	M	C	B	1	81.2	.237
192	M	B	A	1	92.6	.334	222	M	C	C	3	67.2	.280
193	M	C	C	2	78.0	.324	223	M	C	A	1	78.6	.280
194	M	C	B	2	67.3	.254	224	M	B	B	2	66.1	.241
195	M	C	A	1	84.1	.196	225	M	B	B	2	65.0	.362
196	M	C	C	3	67.9	.094	226	M	B	B	2	89.5	.258
197	M	C	C	3	65.1	.178	227	M	C	B	1	80.2	.268
198	M	C	B	2	76.6	.264	228	M	C	B	2	84.6	.244
199	M	C	A	1	86.5	.292	229	M	B	A	1	87.5	.298
200	M	C	A	1	97.3	.310	230	F	B	A	1	69.0	.276
201	M	C	B	1	87.3	.396	231	M	C	B	2	62.8	.305
202	M	C	B	2	70.9	.162	232	M	B	A	1	85.7	.285
203	M	C	A	1	79.0	.244	233	M	C	B	2	74.8	.355
204	M	C	B	2	87.3	.228	234	M	B	B	2	72.3	.278
205	F	C	B	2	74.8	.220	235	F	B	A	1	80.2	.232
206	M	C	B	1	78.6	.227	236	M	B	B	2	75.6	.264
207	M	C	B	2	80.2	.312	237	M	B	B	2	87.8	.298
208	F	B	A	1	73.7	.267	238	M	C	A	1	81.4	.264
209	F	B	B	2	75.1	.222	239	M	C	B	2	92.0	.330
210	M	C	A	2	76.5	.178	240	M	C	B	1	81.9	.176

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot V								
241	F	B	A	1	76.5	.364	271	M	C	B	2	80.8	.438
242	M	C	B	2	80.6	.366	272	M	C	C	2	80.5	.441
243	M	C	B	2	77.2	.428	273	F	C	C	3	52.4	.256
244	F	C	C	3	58.8	.376	274	M	C	B	2	71.8	.528
245	M	C	A	1	82.2	.253	275	M	B	B	2	85.4	.373
246	M	B	A	1	83.3	.448	276	M	C	B	2	68.3	.516
247	M	C	C	2	77.5	.414	277	M	C	B	2	71.9	.410
248	M	C	B	2	77.0	.260	278	M	B	B	1	92.0	.526
249	M	C	B	3	67.9	.373	279	F	C	A	1	95.5	.489
250	M	C	C	2	69.8	.206	280	M	C	B	2	83.5	.351
251	M	C	B	2	78.0	.266	281	M	C	B	2	86.3	.273
252	F	B	A	2	57.9	.330	282	M	B	A	3	71.6	.398
253	M	B	A	2	80.0	.430	283	M	C	B	2	81.1	.248
254	M	C	B	3	66.5	.250	284	M	B	A	1	93.2	.402
255	M	B	A	1	80.2	.470	285	F	B	B	2	68.8	.430
256	M	C	B	1	90.4	.458	286	M	B	A	1	85.5	.537
257	F	C	B	2	76.3	.401	287	M	C	B	2	79.5	.292
258	M	C	B	2	69.7	.455	288	M	B	B	2	70.8	.348
259	M	C	B	2	80.5	.364	289	M	C	A	1	86.2	.370
260	F	B	A	1	81.5	.462	290	M	C	B	2	77.0	.303
261	M	B	B	2	67.8	.438	291	M	C	B	2	73.6	.435
262	M	B	B	3	68.3	.390	292	M	B	A	1	89.0	.446
263	M	B	B	2	76.1	.446	293	M	C	C	3	55.8	.369
264	M	C	B	1	90.3	.396	294	M	C	A	2	76.3	.342
265	F	C	C	2	69.3	.290	295	M	C	B	2	86.8	.334
266	M	C	B	1	71.1	.387	296	M	C	B	1	85.0	.330
267	M	C	B	1	91.3	.592	297	M	B	A	1	91.0	.489
268	M	C	A	1	89.0	.342	298	M	C	B	2	83.5	.378
269	M	C	B	1	81.5	.420	299	M	C	C	3	58.1	.424
270	M	B	A	1	89.3	.555	300	M	C	B	1	84.7	.380

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot VI								
301	M	C	B	2	78.7	.298	331	M	C	B	2	74.6	.334
302	M	C	B	2	79.1	.440	332	M	C	B	1	76.2	.370
303	M	B	A	1	79.8	.332	333	M	C	B	2	93.0	.457
304	M	C	B	1	85.2	.357	334	M	B	B	1	86.6	.658
305	M	B	B	2	63.5	.478	335	M	C	B	2	79.5	.308
306	M	B	A	1	88.1	.307	336	M	C	A	2	75.9	.262
307	M	C	B	1	96.0	.519	337	M	C	A	1	94.2	.446
308	M	C	C	2	77.7	.274	338	M	C	B	2	74.4	.466
309	M	C	C	2	72.3	.190	339	M	C	B	3	63.1	.376
310	M	C	C	3	64.4	.400	340	F	B	B	3	57.7	.460
311	M	B	A	1	82.1	.318	341	M	C	B	1	75.3	.262
312	M	B	C	3	52.5	.424	342	M	B	B	2	85.1	.386
313	M	C	B	2	74.5	.526	343	M	C	B	1	82.6	.346
314	M	C	B	2	78.0	.468	344	M	B	B	1	80.4	.251
315	M	C	B	2	88.1	.501	345	M	B	A	1	95.7	.423
316	M	C	B	3	58.7	.386	346	M	B	B	3	77.7	.344
317	M	C	B	1	84.6	.455	347	M	B	B	2	83.7	.418
318	M	B	B	3	69.4	.412	348	M	B	B	2	73.7	.391
319	F	C	B	2	73.1	.403	349	M	B	B	2	77.2	.444
320	M	C	A	1	88.9	.187	350	M	C	B	2	78.1	.339
321	M	C	B	2	75.5	.378	351	M	C	B	2	74.2	.328
322	F	C	A	1	84.1	.139	352	F	B	A	1	73.0	.308
323	M	C	B	2	70.7	.312	353	M	C	B	2	73.2	.487
324	M	C	B	2	71.8	.332	354	M	C	A	1	80.5	.255
325	M	C	B	2	74.2	.317	355	M	C	B	2	79.0	.389
326	M	C	B	1	81.2	.534	356	M	C	B	2	76.2	.417
327	F	B	A	2	79.6	.254	357	F	C	B	2	67.7	.354
328	M	C	B	1	93.3	.348	358	M	C	B	2	69.0	.473
329	F	C	B	1	73.1	.296	359	M	B	B	2	61.4	.434
330	M	C	B	2	86.5	.500	360	F	C	A	1	78.2	.524

Table A. (cont.)

Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain	Lamb no.	Sex	Breed	Body type	Gaining ability	Initial weight	Daily gain
					Lot VII								
361	M	B	A	2	77.5	.441	391	F	B	B	2	66.7	.388
362	M	C	C	3	58.8	.300	392	M	C	B	2	73.5	.330
363	F	C	A	1	89.6	.169	393	M	B	A	1	83.6	.291
364	M	C	B	1	95.4	.341	394	M	C	C	3	73.0	.372
365	M	C	C	3	53.2	.242	395	M	C	B	2	75.0	.351
366	M	C	B	2	81.5	.372	396	M	C	B	1	78.8	.266
367	M	C	B	2	78.4	.338	397	M	C	B	2	83.3	.428
368	M	C	B	2	69.6	.240	398	M	C	B	2	77.5	.324
369	M	C	B	2	97.5	.348	399	M	B	B	1	86.8	.334
370	M	C	B	2	76.5	.316	400	M	C	B	2	83.3	.294
371	M	C	B	2	85.7	.386	401	M	B	B	2	76.2	.334
372	M	C	B	2	92.3	.316	402	M	C	B	2	85.1	.344
373	M	C	B	3	60.1	.403	403	M	B	B	2	89.4	.378
374	F	B	A	1	74.3	.305	404	M	C	B	1	84.6	.376
375	M	C	A	2	87.6	.169	405	F	B	B	2	73.8	.353
376	M	C	A	1	87.0	.234	406	M	B	A	1	82.4	.310
377	M	C	B	3	62.4	.271	407	M	B	B	3	66.7	.380
378	M	C	B	2	69.3	Died	408	F	B	A	2	83.0	.404
379	M	C	B	1	91.0	.404	409	F	B	B	1	84.9	.330
380	M	B	A	3	63.7	.110	410	F	C	C	3	71.5	.248
381	M	C	B	2	76.8	.380	411	M	C	C	3	79.2	.338
382	M	C	A	1	81.0	.340	412	M	C	A	1	98.2	.328
383	M	C	B	2	85.6	.387	413	M	C	C	3	65.4	.424
384	M	B	B	2	67.6	.257	414	M	B	A	2	79.4	.414
385	M	C	B	1	85.0	.330	415	M	B	A	1	86.7	.226
386	M	C	C	3	57.5	.473	416	M	C	B	2	69.6	.451
387	M	C	B	3	80.6	.339	417	M	C	A	1	83.3	.246
388	M	C	B	2	82.0	.212	418	M	C	B	2	71.8	.323
389	M	B	B	3	54.6	.355	419	M	C	B	1	84.1	.382
390	M	C	B	3	65.3	.262	420	M	B	A	1	82.4	.357

Table A. (concl.)

Lamb: no.	Sex	Breed	Body: type	Gaining: ability	Initial: weight	Daily gain	Lamb: no.	Sex	Breed	Body: type	Gaining: ability	Initial: weight	Daily gain
					Lot VIII								
421	M	B	B	3	56.2	.380	451	M	C	B	2	84.6	.396
422	M	C	A	1	91.2	.332	452	M	C	B	1	80.6	.222
423	F	B	B	2	73.6	.323	453	M	C	B	2	81.6	.382
424	F	C	C	3	65.3	.198	454	M	C	B	2	69.0	.308
425	M	B	B	1	88.4	.362	455	M	B	B	2	79.4	.314
426	M	B	B	3	64.2	.460	456	M	B	B	1	75.5	.324
427	M	C	A	1	86.0	.298	457	M	C	B	1	92.4	.230
428	M	C	B	2	83.2	.264	458	M	C	C	2	80.2	.301
429	M	C	C	3	73.3	.267	459	M	C	A	1	90.6	.300
430	M	B	A	1	87.1	.312	460	M	B	B	2	66.8	.364
431	F	B	A	1	82.5	.398	461	M	C	B	2	66.8	.266
432	M	C	B	3	72.7	.301	462	M	B	B	2	71.8	.292
433	M	C	B	2	69.9	.426	463	M	C	B	2	71.7	.216
434	M	B	B	2	79.8	.374	464	M	C	B	1	89.5	.372
435	M	B	B	2	80.2	.332	465	M	C	B	1	76.7	.258
436	M	B	A	1	99.5	.362	466	M	B	A	1	90.5	.439
437	M	C	B	2	92.7	Died	467	M	C	A	1	78.5	.367
438	M	C	B	1	77.1	.360	468	M	C	B	2	78.6	.403
439	M	C	A	1	85.0	.276	469	M	B	A	1	86.0	.221
440	M	C	C	3	56.4	.256	470	M	B	B	3	76.0	.351
441	M	C	A	1	91.6	.362	471	M	C	B	2	82.6	.408
442	M	B	B	2	79.4	.219	472	M	C	B	2	81.9	.144
443	M	B	B	2	71.6	.260	473	M	C	A	1	86.2	.274
444	M	C	C	3	77.8	.486	474	M	C	C	3	69.6	.260
445	M	C	B	1	88.4	.378	475	M	C	B	2	86.8	.253
446	M	C	B	2	72.0	.212	476	M	C	C	3	62.5	.367
447	M	C	B	2	70.7	.344	477	M	C	B	3	79.8	.241
448	M	C	B	1	81.3	.305	478	M	C	B	2	87.7	.258
449	F	C	C	3	66.9	.405	479	F	B	A	1	79.0	.262
450	M	C	B	2	68.2	.296	480	M	C	B	2	81.7	.364

Table B. Average daily gains for all lots according to gain scores and body type.

Gaining ability	No. of lambs	Grand total	Grand average
I	159	52.868	.332
II	228	77.178	.338
III	90	29.030	.322
Type score			
A	109	35.136	.322
B	297	101.484	.342
C	71	22.447	.316

Table C. Average daily gains for all lots according to breed type and sex.

	No. of lambs	Grand totals	Grand average
All blackface	151	52.624	.348
All whiteface	326	106.440	.326
All males	406	136.452	.336
All females	70	22.618	.318

THE RELATIONSHIP OF PHENOTYPE TO GAINING ABILITY OF LAMBS IN THE FEED LOT

by

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Regardless of the nature of the feeding program, good gaining ability of individual animals is an important fundamental factor in the determination of the success of any lamb fattening enterprise.

The purpose of this study was to determine the relationship of several phenotypic factors with the gaining ability of feeder lambs.

It has become apparent that phenotypic variations in feeder lambs are associated with their adaptability for different systems of fat lamb production. It was not possible to study this problem under all production systems, but a study of the problem was conducted under typical Western Kansas conditions.

The phenotypic factors studied as related to gaining ability were breed types, initial weights, body type scores, and scoring data on the experimental lambs used in the experiment.

The 480 crossbred lambs used in this study were obtained directly from the mountain range of Southern Utah. The breeding of these lambs included Columbia-Rambouillet and Suffolk-Rambouillet crosses. This group of lambs was used in the feeding experiments at the Garden City Branch of the Kansas Agricultural Experiment Station.

The lambs averaged 76 pounds at the range shipping point and 68 pounds upon arrival at Garden City. The lambs were lotted and placed on experimental tests at an average weight of 78 pounds which was obtained after 50 days of pasture and roughage feeding as a preliminary adjustment period.

The lambs were separated into breed type and weight class groups and then lotted into eight groups of sixty lambs each according to breed type and initial weight. These lambs were also rated for gaining ability and body type.

The analysis of the data indicated that the differences in the lot means for average daily gain due to experimental feeding treatments were highly significant. Because of these real differences among lots, the effect of the lots were held constant in block within block form of analysis of variance while comparing lambs of different breeding.

The average daily gain of all blackface lambs was .348 pound per day and that of all whiteface lambs was .326 pound per day. The analysis of variance showed that this difference was significant. The blackface lambs consistently outgained the whiteface lambs.

The average daily gain of all male lambs was .336 pound per day and that for all females was .318 pound per day. This difference was not significant in the analysis of average daily gains of the two sexes within lots.

The relationship of type ratings to subsequent average daily gains was studied within lots and within breed types, since both of these had significant effects on average daily gains.

The heavier blackface lambs receiving the higher body type ratings outgained the lower scoring, lighter lambs within that breed type. The reverse of this relationship appears to apply for the whiteface lambs.

The heavier blackface lambs receiving the high gain scores outgained the lower scoring, lighter lambs of that breed type; however, the lower scoring, lighter whiteface lambs tended to outgain the higher scoring, heavier lambs of that breed.

The blackface lambs were better gainers in the feed lot than whiteface lambs in this study. Sex was not shown to influence gaining ability in the study although generally males usually are better gainers than females in sheep.

The association of initial weight to both the scoring for gaining ability and rating for body type suggests that gaining ability may be predicted on the basis of initial weight alone as well as using either of the other techniques separately or in conjunction with initial weights.

The differences in the relationships of initial weight, gain scores, and type ratings with gaining ability according to breed types cannot be explained; however, the relationship of initial weight to subsequent gains existing in the blackface group is in accord with the observations made by Neale and Bell.

The two breed types included in the study are to be considered equally desirable in regard to carcass quality.