

## Comparison of Feedlot Performance and Carcass Traits of Charolais and Limousin Sired Three-Breed Cross Calves

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### Story in Brief

Feedlot performance and carcass traits were compared on 272 steer and heifer three-breed cross calves sired by Charolais and Limousin bulls. All calves were placed on a self-fed finishing ration at weaning and slaughtered as each animal attained an estimated low choice carcass grade. Charolais cross calves were 47.8 lb heavier at the start of the feeding period and 52 lb heavier at slaughter than Limousin cross calves. Daily gains over the entire feeding period were similar for both sire breeds. Limousin cross calves required .39 fewer pounds of feed per pound of gain than Charolais cross calves.

At slaughter, Charolais cross calves were 16 days older and had 28.9 lb heavier carcasses than Limousin cross calves. However, carcass weight per day of age was similar for both sire breeds. Limousin cross calves had .64 percent higher dressing percentage and had a slightly higher carcass grade. Other carcass traits were similar for both sire breeds. Based on actual performance, Limousin sired steers returned \$11.16 more per head above feedlot costs than Charolais sired steers. Conversely, Charolais cross heifers returned \$36.98 more per head above feedlot costs than Limousin cross heifers.

### Introduction

Previous research has clearly and consistently shown that planned crossbreeding systems can substantially increase efficiency of producing beef. Over half of the improvement in production efficiency results from utilizing crossbred cows. Consequently, an extensive research program is currently in progress to evaluate the productivity of various two-breed cross cows when mated to bulls of a third breed. It is important to the overall efficiency of beef production that the three-breed cross calves produced in such a system have adequate feedlot performance and carcass merit. The purpose of this study was to compare three-breed cross calves sired by Charolais and Limousin bulls with regard to feedlot performance and carcass traits.

## Experimental Procedure

Eight different two-breed cross cow-groups (Hereford x Angus, Angus x Hereford, Simmental x Angus, Simmental x Hereford, Brown Swiss x Angus, Brown Swiss x Hereford, Jersey x Angus and Jersey x Hereford) were mated to purebred Charolais and Limousin bulls to produce calves February-April of 1978. The cow herd consisted of approximately equal numbers of 3-, 4- and 5-year-old cows at the time of calving. Eight bulls were used of each sire breed. Calves remained with their dams on native and bermuda grass pastures at the Lake Carl Blackwell Research Range west of Stillwater until weaned at an average age of 205 days.

On the day of weaning, all calves were trucked to the Southwestern Livestock and Forage Research Station at El Reno and placed immediately in the feedlot. The steers were placed in one feeding barn consisting of 14 pens and heifers were placed in another feeding barn consisting of 14 pens. Hereford x Angus reciprocal crosses were combined into a single pen. Thus, all calves of a specific three-breed cross of the same sex were fed together in a pen assigned at random. Cattle were fed *ad lib* the finishing ration shown in Table 1. Each animal was removed from the feedlot and sent to slaughter when an estimated low choice carcass grade was attained. Feedlot performance and carcass traits were evaluated on 138 Charolais cross calves and 134 Limousin cross calves. A random sample of 35 steer carcasses (five from each crossbred cow group) from each sire breed were taken to the OSU Meat Laboratory for detailed carcass evaluation. Tenderness was determined by subjecting 1-inch core samples from oven broiled steaks to Warner-Bratzler shear procedures.

## Results and Discussion

Feedlot performance for steers and heifers sired by Charolais and Limousin sires are presented in Table 2. The initial weight is the actual weaning weight rather than the shrunk weight after trucking. Charolais sired calves were on the average 47.8 lb heavier than Limousin sired calves. This was mostly due to heavier birth weights and preweaning growth rates for Charolais sired calves. In addition, Charolais sired steer calves were 4 days and heifer calves 10 days older than the respective Limousin sired calves at weaning and placement in the feedlot. This age difference was primarily due to the fact that Limousin cross calves were produced by artificial insemination whereas Charolais cross calves were mostly by natural service.

Table 1. Finishing ration.

Ingredient	Percent in ration
Corn	39
Milo	39
Alfalfa	8
Cottonseed hulls	4
Molasses	5
Supplemental pellets <sup>1</sup>	5
Total	100

<sup>1</sup>Supplemental pellets consisted of 67.6% soybean oil meal (44%), 12% urea, 10% calcium carbonate, 8% salt plus Aurofac, vitamin A and trace minerals.

**Table 2. Feedlot performance of three-breed cross calves sired by Charolais and Limousin bulls.**

Traits	Steers		Heifers		Difference averaged over both sexes	
	Charolais	Limousin	Charolais	Limousin	Charolais	Limousin
Number of animals	79	64	59	70	—	
Initial wt, lb	472	433	452	395	47.8**	
Days in feedlot	270	275	267	275	-6.8	
Average daily gain, lb/day:						
first 120 days	2.94	2.88	2.74	2.49	.153*	
after 120 days	2.10	2.16	1.94	1.83	.025	
total feeding period	2.46	2.46	2.28	2.10	.091	
Final wt, lb	1121	1103	1052	966	52.0**	
Feed efficiency,						
lb feed per lb gain	7.55	7.03	7.95	7.68	.392**	

\*\* Differences are significant at the .01 probability level.

\* Differences are significant at the .05 probability level.

**Table 3. Carcass traits of three-breed cross calves sired by Charolais and Limousin bulls.**

Traits	Steers		Helpers		Difference averaged over both sexes	
	Charolais	Limousin	Charolais	Limousin	Charolais	Limousin
Number of animals	79	64	59	70	—	
Slaughter age, days	485	475	494	472	16.0**	
Carcass wt, lb	720	715	682	630	28.9**	
Carcass wt/day of age, lb	1.50	1.51	1.42	1.34	.03	
Dressing %	63.9	64.8	64.5	64.9	-.64*	
Single fat thickness, in	.38	.36	.39	.43	-.013	
KHP fat, %	2.91	3.18	3.16	3.16	-.14	
Marbling score <sup>1</sup>	4.7	5.0	4.9	5.0	-.20	
Carcass grade <sup>2</sup>	9.3	9.9	9.7	9.8	-.32*	
Rib eye area, sq in	13.2	13.7	13.3	12.7	.06	
Cutability, %	50.9	51.3	51.2	50.9	-.09	
Warner-Brazler shear force, lb <sup>3</sup>	13.9	13.2	—	—	.7	

<sup>1</sup>Marbling score equivalents: 4=slight, 5=small.

<sup>2</sup>Carcass grade equivalents: 9=high good, 10=low choice.

<sup>3</sup>Tenderness determined on only 35 steer carcasses of each sire breed.

\*\*Differences are significant at the .01 probability level.

\*Differences are significant at the .05 probability level.

On the average, cattle were in the feedlot 272 days and differences between sire breeds or sexes were not significant. Most of the cattle attained the desired carcass grade of low choice (Table 3); however, some of the Charolais cross calves particularly should have remained in the feedlot for an additional period of time. The winter and spring of 1979 in Oklahoma were characterized by colder temperatures and more snow than normal, which may have depressed the rate of gain to some extent. Charolais cross calves outgained Limousin cross calves by .15 lb/day for the first 120 days. However, after 120 days Limousin cross steers slightly outgained Charolais cross steers and resulted in the steers from both sire breeds gaining 2.46 lb/day for the entire feeding period. Charolais cross heifers outgained Limousin cross heifers during both periods for an advantage of .18 lb/day over the entire feeding period. Averaged over both sexes, average daily gain for the entire feeding period was similar for both sire breeds. Thus, the 52 lb heavier slaughter weight of Charolais cross calves was mostly due to their heavier weight at the start of the feeding period. Consistently over all crossbred cow groups, Limousin cross calves gained weight more efficiently than Charolais cross calves. On the average, Limousin cross calves required .39 fewer pounds feed per pound of gain than Charolais cross calves.

Carcass traits for steers and heifers sired by Charolais and Limousin bulls are presented in Table 3. Charolais cross calves were 16 days older at slaughter, and since they were 52 lb heavier at slaughter had carcasses that were 28.9 lb heavier. Other carcass traits were similar for both sire breeds except dressing percentage and carcass grade. Dressing percentage favored Limousin cross calves by .64 percent. The lower average carcass grade for Charolais cross steers represents a failure of personnel to adequately predict carcass grade of the live animal for this group of cattle. On the average, Charolais cross steers would require additional time in the feedlot to attain the low choice carcass that was desired for these cattle.

As a group, these cattle produced very desirable carcasses as evidenced by an average dressing percentage of 64.5, .39 inches fat thickness, 13.2 square inches rib eye

**Table 4. Economic analysis of feedlot performance of Charolais and Limousin sired three-breed cross calves on a per head basis.**

Item	Charolais		Limousin	
	Steers	Heifers	Steers	Heifers
Feed cost, \$ <sup>1</sup>	238.63	232.30	229.38	213.56
Overhead, \$ <sup>2</sup>	135.00	133.50	137.50	137.50
Total feedlot cost, \$	373.63	365.80	366.88	351.06
Carcass value/cwt, \$ <sup>3</sup>	104.68	103.28	106.03	103.60
Total carcass value, \$	753.70	704.40	758.11	652.68
Return above feedlot costs, \$	380.07	338.60	391.23	301.62
Break-even feeder price, \$ per cwt.	80.52	78.20	86.56	76.36

<sup>1</sup>Mixed ration cost was \$4.87 cwt based on January 7, 1980 feed prices.

<sup>2</sup>Includes \$.25 per day yardage and \$.25 per day interest.

<sup>3</sup>Average carcass value based on price quotation on January 7, 1980, for yield grade 2 carcass beef of \$106.25 and \$104.00 per cwt of low choice and high good steer carcasses, respectively, and \$104.25 and \$101.00 per cwt of low choice and high good heifer carcasses, respectively.

area and cutability of 51.1 percent. The average Warner-Brazler shear force value of 13.5 lb indicated a very desirable level of tenderness. A high level of consumer acceptability would be anticipated for meat from these carcasses.

An economic evaluation of feedlot performance of Charolais and Limousin sired steers and heifers is presented in Table 4. Feed costs, overhead costs and carcass sale value were based on prevailing prices for January 7, 1980. Limousin sired steers returned \$11.16 more per head above feedlot expense than Charolais sired steers. Conversely, Charolais cross heifers returned \$36.98 more per head than Limousin cross heifers.

There is no apparent reason for the relatively large differences in feedlot performance and carcass traits between Limousin cross steers and heifers as compared to the Charolais cross steers and heifers. Additional data will be required to clarify these sex differences.

Although these Charolais and Limousin bulls were mated to a diverse group of crossbred cows, calves produced were quite uniform in muscling and conformation, performed adequately in the feedlot and yielded very desirable carcasses. These data would suggest that either sire breed could be successfully utilized in a terminal cross mating system. The choice of available bulls within each of these breeds may be as important as the selection of breed to sire the calves.

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## Comparison of Machine Milkout and Calf Nursing Techniques for Estimating Milk Yields of Various Two-Breed Cross Range Cows

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### Story in Brief

Milk yields were estimated monthly from April through September by machine milkout and calf nursing techniques for 71 4-year-old, two-breed cross cows. Overall, average milk yield estimates were 16.18 lb/day by machine milkout and 12.79 lb/day by calf nursing with a difference of 3.38 lb/day. The two methods were similar for comparing cow group differences; however, machine milkout estimates averaged 27 percent more milk than calf nursing estimates. The correlation between estimates of milk yield by machine milkout and by calf nursing averaged over crossbred cow groups was .47. Correlations between machine milkout and calf average daily gain (ADG) or weaning weight were .29 and .20, respectively, while correlations between calf nursing and ADG or weaning weight were .16 and .09, respectively.