BREED AND MANAGEMENT SYSTEM EFFECTS ON FEEDLOT PERFORMANCE AND CARCASS TRAITS

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Summary

Eighty nine steers with different proportions of Angus, Hereford, Charolais, Brahman, and Gelbvieh breeding from rotational and terminal crossbreeding systems were produced in Louisiana and finished at KSU. Half of each breed group was placed in the feedlot at weaning (calves) and the other half as yearlings. Half of the each group was slaughtered at a low (0.3-0.4 in.), and the other half at high (0.5 - 0.6 in.) fat thickness. As percentage of Charolais and Gelbvieh breeding increased, feedlot performance improved. As percentage of Charolais, Gelbvieh, and Angus increased, carcass desirability improved. Steers started on feed at weaning were more efficient in feed conversion and were more profitable than those started as yearlings. Age did not affect carcass marbling or quality grade.

(Key Words: Cattle, Breeds, Management, Performance, Carcass, Returns.)

Introduction

With the availability of cattle with high growth rates and with current economic and consumer diet-health concerns, interest has increased in feeding weaned calves as opposed to the traditional method of backgrounding and then feeding yearlings. Although consumers prefer leaner beef, producers are still paid by the pound on a quality grading system that favors marbling. Under traditional production systems, fast growing cattle are too large at slaughter to meet market specifications. Beef producers need information that will allow them to optimize the relationship between customer preference and profit. This experiment was designed to: 1) compare feedlot performance and carcass characteristics of steers produced from 2-, 3- and 4-breed rotational and terminal crossbreeding systems involving British, Continental, and Brahman breeds and 2) to compare the performance, carcass traits, and economic returns of calves and yearlings.

Experimental Procedures

Steer calves were produced in the spring of 1989 at Louisiana State University (LSU) as part of an ongoing rotational crossbreeding study. The F_1 and 2-, 3-, and 4-breed rotational crossbred progeny were produced using Angus (AN), Hereford (HH), Charolais (CH) and Brahman (BR). Half of the cows of each breed group were bred to Gelbvieh (GV) bulls as a terminal cross. Each of the 18 breed groups was divided in half, with one half (n = 45) shipped to KSU at weaning (fall, 1989) and the remainder (n = 44) grazed on rye grass pasture at LSU and shipped to KSU as yearlings (May, 1990). Upon arrival at KSU, breed groups were randomly assigned to pens of 5 or 6 head and started on a ration of sorghum silage, cracked corn, and a soybean meal-urea protein supplement. The percent silage was decreased from 75% to 15% over a 4-wk period. Cattle were weighed prior to shipping, after arrival at KSU, and every 28 d until slaughter. A random half of each breed-age management group was slaughtered when ultrasound backfat measurements were between 0.3 and 0.4 in., and the other half was slaughtered when measurements were between 0.5 and 0.6 in.

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For statistical analysis, the 18 breed groups were consolidated into seven breed groups, so that at least 50% of one breed occurred in each group (Table 1). Data were analyzed using Least Squares procedures to evaluate breed groups, with the effects of calves vs. yearlings and backfat endpoint removed. Regression analysis also was performed to substantiate the analysis of variance.

Results and Discussion

The seven groups used in the analysis were high percentage AN, high percentage HH, high percentage CH, half GV with a high percentage AN, half GV with a high percentage HH, half GV with a high percentage CH, and half GV with a high percentage BR.

Table 1. Percentage of breed in each breed group

	Breed Group						
Breed	1	2	3	4	5	6	7
Angus	64	18	0	26	0	0	0
Hereford	8	64	0	1	25	3	0
Charolais	11	4	62	1	0	26	17
Brahman	17	14	38	22	25	21	33
Gelbvieh	0	0	0	50	50	50	50
No. Calves	26	27	13	8	7	5	3

Least Square analysis for the 12 production and carcass traits by breed group are shown in Table 2. Slaughter and carcass weights increased as the percentage CH, GV, and AN increased and decreased as percentage HH increased. Increased percentage HH decreased slaughter age and number of days on feed, whereas increased percentage of CH and GV increased those parameters. ADG was increased most by CH and decreased most by BR. Total gain was increased by CH, GV, and AN and decreased by BR and HH.

As the percentage of BR increased, marbling and quality grade tended to decrease. Even though ultrasound was used to estimate fat thickness slaughter endpoint, adjusted carcass backfat thickness varied among breed groups. Increased percentage CH and GV breeding decreased the adjusted backfat, whereas increased percentage of HH increased adjusted backfat. An increase in percentage HH increased numerical yield grade, and an increase in percentage CH decreased (improved) numerical yield grade. Ribeye area was increased by CH and GV blood and decreased by HH.

The second part of the analysis compared calves vs. yearlings for the same 12 production and carcass traits plus total TDN and feed/gain ratio (Table 3). There were significant differences between calves and yearlings in almost all traits measured. The two exceptions were average marbling score and quality grade. However, 67% of the calves and 54% of the yearlings graded Choice, with the average of each group being very close to Choice^0 grade.

Cattle were slaughtered at an endpoint determined by an ultrasound measurement of backfat over a 120 d period. This differs from other production systems where all cattle in a group are generally slaughtered at one time. Calves reached the fat thickness endpoint at lighter slaughter and carcass weights than the yearlings. However, both groups produced acceptable weight carcasses on the average. Although calves were slaughtered at a younger age, they required 85 more days on feed than the yearlings. They also consumed an average of 362 lb more TDN, gained an average of 156 lb more, and converted feed to gain more efficiently than the yearlings. Average daily gains from the shipping weight in Louisiana to slaughter weight in Kansas were less for the calves than for the yearlings. ADGs for both calves and yearlings were lower than expected in commercial production. Because slower gaining cattle were required to reach the same fat thickness endpoints as faster gaining cattle, greatly extending the average feeding period. Although, under commercial production, these slower gaining cattle would have been slaughtered earlier, the difference between ADG of the two groups should be a valid comparison of relative performance.

The yearlings had larger ribeyes and higher numerical yield grades because they had heavier carcasses with more fat thickness; however, both groups were within acceptable ranges. The greater fat thickness on yearlings was probably due to inaccuracy of ultrasound estimation of fat thickness.

A cost and return analysis of calves vs. yearlings is presented in Table 4. Trucking costs, which include shipping the cattle from LSU to KSU, are higher than normal because trucks were not full; however, the per head cost was about equal for both groups. Feed cost per lb of TDN was about the same for both groups ($0.068 for the calves and $0.074 for the yearlings), so differences in feed costs reflect consumption differences. Even with higher calf cost per lb, it was more profitable to feed calves than yearlings. The single most important factor affecting the profit advantage of the calves was their superior feed efficiency.

Table 2. Least Squares Means for Performance and Carcass Characteristics by Breed Group

	Breed Group[c]						
Trait	1	2	3	4	5	6	7
Shipping Wt.,lb	690[a]	672[a]	710[ab]	751[b]	708[ab]	700[ab]	779[b]
Slaughter Wt,lb	1195[b]	1091[a]	1245[b]	1198[b]	1186[b]	1179[ab]	1322[b]
Slaughter Age,d	492[a]	489[a]	515[b]	534[b]	526[b]	533[b]	535[b]
Days Fed	179[a]	173[a]	208[b]	211[b]	215[b]	217[b]	207[ab]
Total Gain,lb	500[a]	418[b]	536[a]	446a[ab]	477[ab]	478[ab]	545[a]
ADG,lb	2.76[a]	2.52[a]	2.62[a]	2.14[b]	2.25[b]	2.30[ab]	2.78[a]
Carcass wt.,lb	738[a]	6668[b]	764[a]	731[a]	733[a]	719[ab]	797[b]
Marbling	Sm61[a]	Sm23[a]	Sm04[a]	Sl88[a]	Sm08[a]	Sm18[a]	Sm23[a]
[d]Quality Grade	Ch13[a]	Se91[a]	Se91[a]	Se81[a]	Se91[a]	Se99[a]	Se98[a]
[e]Adjusted BF,in.	.54[a]	.54[a]	.36[b]	.42[b]	.49[a]	.29[b]	.47[ab]
Yield Grade	3.1[a]	2.9[a]	2.6[ab]	2.7[ab]	3.0[a]	2.2[b]	3.1[a]
Ribeye Area,in^2	12.7[ab]	12.2[a]	13.6[b]	13.3[b]	13.5[b]	13.3[ab]	13.1[ab]

[ab]Values in the same row with different superscript letters are different ($P < .05$).
[c]Breed groups are the same as described in Table 1.
[d]Quality grade Select(Se) and Choice(Ch) are followed by a numeric value, which is the % within the grade.

Table 3. Performance during the Finishing Phase of Crossbred Cattle Finished as Calves or Yearlings

Trait[c]	Calves	Yearlings
Shipping Wt., lb	534[a]	881[b]
Slaughter Wt., lb	1069[a]	1260[b]
Slaughter Age, d	448[a]	571[b]
Days Fed	236[a]	151[b]
Total TDN[d], lb	2898[a]	2536[b]
ADG,lb	2.24[a]	2.58[b]
Feed/Gain	5.65[a]	6.76[b]
Total Gain, lb	535[a]	379[b]
Carcass Wt., lb	663[a]	771[b]
[e]Quality Grade	Sel 88[a]	Sel 89[a]
Yield Grade	2.6[a]	2.9[b]
Ribeye Area, in^2	12.6[a]	13.4[b]
[f]Marbling	Sm 06[a]	Sm 08[a]
Adj. Carcass Fat, in	0.40[a]	0.49[b]

[ab]Values in a row with different superscripts are different($P < .05$).
[c]All values are expressed on a per head basis.
[d]TDN is Total Digestible Nutrients fed during the feeding period.
[e]Quality grade Select(Sel) is followed by a numeric value, which is the % within the grade.
[f]Marbling score Small(Sm) is followed by a numeric value, which is the % within the score.

Table 4. Economics of Feeding Crossbred Cattle as Calves or Yearlings

Item	Calves (n = 46)	Yearlings (n = 44)
Expenses		
Feeder Cost[a]	$ 476	$ 674
Trucking	43	46
Yardage($.15/head/day)	32	23
Feed[b]	198	187
Interest(11%)	45	37
Total Expenses	$ 794	$ 967
Income		
Cattle Sales[c]	$ 824	$ 960
Profit or (Loss)/head	$ 29	($ 6)

[a]Feeder cost = $ .92/lb for calves and $ .765/lb for yearlings with a 4% shrink on the shipping weight.
[b]Consisted of corn, silage and soybean-urea protein supplement with Rumensin at costs of $0.068 for calves and $0.074 per lb for yearlings.
[c]Avg prices received were $1.23 for calves and $1.236 for yearlings per lb of hot carcass.