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Abstract

Feedlot performance of 207 steers with various percentages of Angus, Hereford, Charolais, Brahman, and Gelbvieh breeding were compared at a constant 1) days fed, 2) adjusted carcass backfat, and 3) slaughter weight. As the percentage of Angus, Hereford, or Brahman increased, growth rate decreased, whereas increasing the percentage of Charolais increased growth rate. Increasing the percentage of Gelbvieh increased weaning weight but had little effect on post-weaning gains. Increasing percentage of Charolais increased feed conversion efficiency, whereas the other breeds were similar, except that at a constant slaughter weight, greater percentage of Hereford improved feed conversion efficiency. Increasing the percentage of Charolais increased carcass weight and ribeye area and decreased yield grade, but marbling was not different from that of Angus. An increase in percentage of Hereford caused a decrease in carcass weight, ribeye area, marbling, and quality grade. Increasing percentage of Angus decreased carcass weight and ribeye area but increased marbling and quality grade. Increasing percentage of Brahman caused the greatest reduction of marbling and quality grade of any breed. Increasing the percentage Gelbvieh breeding resulted in increased ribeye area and decreased marbling at constant days fed and slaughter weight.

Keywords

Cattlemen's Day, 1992; Kansas Agricultural Experiment Station contribution; no. 92-407-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 651; Beef; Cattle; Breeds; Performance; Carcass

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COMPARISON OF FEEDLOT AND CARCASS CHARACTERISTICS OF ANGUS, HEREFORD, BRAHMAN, CHAROLAIS, AND GELBVIEH CROSSBRED STEERS

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Summary

Feedlot performance of 207 steers with various percentages of Angus, Hereford, Charolais, Brahman, and Gelbvieh breeding were compared at a constant 1) days fed, 2) adjusted carcass backfat, and 3) slaughter weight. As the percentage of Angus, Hereford, or Brahman increased, growth rate decreased, whereas increasing the percentage of Charolais increased growth rate. Increasing the percentage of Gelbvieh increased weaning weight but had little effect on post-weaning gains. Increasing percentage of Charolais increased feed conversion efficiency, whereas the other breeds were similar, except that at a constant slaughter weight, greater percentage of Hereford improved feed conversion efficiency.

Increasing the percentage of Charolais increased carcass weight and ribeye area and decreased yield grade, but marbling was not different from that of Angus. An increase in percentage of Hereford caused a decrease in carcass weight, ribeye area, marbling, and quality grade. Increasing percentage of Angus decreased carcass weight and ribeye area but increased marbling and quality grade. Increasing percentage of Brahman caused the greatest reduction of marbling and quality grade of any breed. Increasing the percentage Gelbvieh breeding resulted in increased ribeye area and decreased marbling at constant days fed and slaughter weight.

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

Introduction

Crossbreeding is well accepted in the beef industry. With over 60 breeds available to choose from, information is necessary to make sound selections. This study was designed to compare feedlot and carcass characteristics of steers produced from 2-, 3-, and 4-breed rotational and terminal crossbreeding systems involving British, Continental, and Zebu breeds of cattle.

Experimental Procedures

Crossbred steers were produced from 2-, 3-, and 4-breed rotational crossbreeding systems involving Angus (AN), Hereford (HH), Charolais (CH), Gelbvieh (GV), and Brahman (BR) breeds at Louisiana State University, Baton Rouge. Half of each cow breed group were bred to GV bulls as a terminal cross. The remaining cows were mated to the least related breed of bulls within the rotation. Calves were born between Jan. 31 and April 14 and weaned at an average age of 185 days. At weaning, steer calves were randomly assigned, within breed groups, to either a calf feeding or yearling feeding management group. After an approximate 3 wk conditioning period, 45 calves were shipped to KSU in 1989 and 64 in 1990 to constitute the calf management group. The 44 steers in 1989 and 54 in 1990 assigned to the yearling management group were grazed during the winter at Baton Rouge on rye grass pasture and shipped to KSU in early May. Steers in both management groups were group fed for 18 to 21 days, while the energy density of the ration was increased

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to 75% concentrate of the total dry matter. Steers were then sorted into pens of 5 or 6 head, and the ration was increased over the next 3 wk to 90% concentrate of total dry matter. Cattle remained on that ration until slaughter. The ration consisted of cracked corn, soybean meal, vitamin and mineral supplement, and sorghum silage. Half of each breed group in each management system was slaughtered when ultrasound-measured backfat was between .3 and .4 in., and the other half was slaughtered with backfat between .5 and .6 in. Carcass data were collected after 24 hr in the cooler.

Three alternative slaughter points within management systems were evaluated: 1) constant days on feed, 2) constant adjusted carcass backfat, and 3) constant slaughter weight. Data were analyzed using least squares analysis of variance. The model included the fixed effects of year and management group. In addition, the regressions of weaning age; the alternative slaughter point within management; and percentage of HH, BR, CH, and GV were included. This produced regression coefficients that express the amount of change in a trait, as a deviation from AN, for each percentage change of a breed in the crossbred steers.

Results and Discussion

At a constant adjusted backfat or days on feed (Table 1), slaughter weight increased the most with increasing percentage of CH, with GV and BR being intermediate; increasing percentage of HH decreased slaughter weight compared to AN. At all end points, an increase in CH increased total feedlot gain and feedlot ADG the most. At constant days on feed, increasing percentage of GV and HH decreased total gain the most. However, at a constant slaughter weight or backfat end point, BR and GV had the greatest depression on total gain. At a constant BF, increased percentage of HH had the greatest depression on gain. At a constant slaughter weight or backfat end point, age at slaughter was greatest for BR, CH, and GV and least for AN and HH. Increased percentage of BR, CH, or GV increased the number of days on feed to reach constant slaughter weight or backfat. At all three end points, increasing the percentage of GV and BR reduced feed conversion efficiency, whereas increasing percentage of CH improved feed conversion efficiency. At a constant backfat and days on feed, increasing percentage of CH and GV increased lifetime ADG. However, at a constant slaughter weight, increased percentage of AN and HH produced the greatest lifetime ADG.

At a constant backfat or days on feed, increasing percentage of HH decreased and increasing percentage of CH increased slaughter weight (Table 2.). At a constant backfat, GV was similar to CH in slaughter weight, but at a constant days on feed, GV was similar to AN and BR. Increasing percentage of HH decreased and increasing percentage of BR increased dressing percentage at all end points. As percentage of AN and HH increased, ribeye area decreased, whereas CH and GV increased it. At a constant backfat, BR decreased marbling and quality grade, with no differences among the other breeds. At constant days on feed or slaughter weight, an increase in percentage of BR and GV decreased marbling and quality grade. At constant days on feed or slaughter weight, increasing percentage of CH and GV decreased backfat thickness and improved yield grade.

Table 1. Regressions and Standard Error for Feedlot Traits by Breed[a]

Trait[e]	Angus	Hereford	Brahman	Charolais	Gelbvieh
ADJUSTED BACKFAT WITHIN MANAGEMENT GROUP[b] HELD CONSTANT					
Sl. wt,lb	0^{yz}	-.692^{z}	.730^{xy}	2.44^{w}	1.419^{x}
Gain, lb	0^{yz}	-.466^{z}	-.049^{yz}	2.000^{x}	.605^{y}
Age, d	0^{z}	-.022^{z}	.402^{y}	.533^{y}	.524^{y}
Fed, d	0^{z}	-.047^{z}	.229^{yz}	.488^{y}	.466y
ADG_f, lb/d	0^{yz}	-.002^{z}	-.003^{z}	.004^{y}	-.003^{z}
TDN, lb	0^{z}	-2.158^{z}	2.551^{yz}	7.716^{y}	6.992^{y}
F/G	0^{y}	-.000^{y}	.009^{y}	-.018^{z}	.004^{y}
ADG_l,lb/d	0^{z}	-.001^{z}	-.000^{z}	.002^{y}	.000^{y}
DAYS ON FEED WITHIN MANAGEMENT GROUP[c] HELD CONSTANT					
Sl. Wt., lb	0^{yz}	-.702^{z}	.813^{xy}	1.488^{x}	.444^{y}
Gain, lb	0^{z}	-.462^{z}	.113^{z}	.829^{y}	-.528^{z}
ADG_f, lb/d	0^{yz}	-.002^{z}	-.002^{z}	.004^{y}	-.003^{z}
TDN, lb	0^{z}	-1.787^{y}	-.012^{yz}	-.205^{yz}	-.230^{yz}
F/G	0^{y}	.001^{y}	.003^{y}	-.016^{z}	.006^{y}
ADG_l,lb/d	0^{yz}	-.003^{z}	-.001^{yz}	.002^{y}	.001^{yz}
SLAUGHTER WEIGHT WITHIN MANAGEMENT GROUP[d] HELD CONSTANT					
Gain, lb	0^{y}	-.113^{yz}	-.629^{z}	.223^{y}	-.554^{z}
Age, d	0^{z}	.025^{z}	.343^{y}	.310^{y}	.386^{y}
Fed, d	0^{z}	-.001^{z}	.172^{y}	.257^{y}	.320^{y}
ADG_f, lb/d	0^{y}	-.000^{y}	-.005^{z}	-.002^{y}	-.007^{z}
TDN, lb	0^{yz}	-1.036^{z}	1.019^{yz}	1.308^{yz}	3.108^{y}
F/G	0^{z}	-.004^{z}	.012^{y}	-.002^{z}	.015^{y}
ADG_l,lb/d	0^{y}	-.000^{y}	-.002^{z}	-.001^{yz}	-.002^{z}

[a]For each 1% change of a breed in a crossbreeding system, the trait is expected to change by the given amount, expressed as a deviation from Angus.
[b]Adjusted backfat means were 1.11 cm for the calf and 1.15 cm for the yearling management groups.
[c]Days fed means were 222 days for the calf and 131 days for the yearling management groups.
[d]Slaughter weight means were 489 kg for the calf and 570 kg for the yearling management groups.
[e]Feedlot performance traits; Sl. Wt. = live weight at slaughter; Gain = Total feedlot gain, Age = Days of age at slaughter, Fed = Days fed, ADG_f = Feedlot ADG, TDN = TDN fed during the finishing period, F/G = kg of TDN / kg of gain, ADG_l = Lifetime ADG.
[w,x,y,z] Means in the same row with different superscripts are different ($P < .05$).

Table 2. Regressions and Standard Error for Carcass Traits by Breed[a]

Trait[e]	Angus	Hereford	Brahman	Charolais	Gelbvieh
ADJUSTED BACKFAT WITHIN MANAGEMENT GROUP[b] HELD CONSTANT					
CARWT,lb	0[y]	-.556[z]	.634[xy]	1.591[x]	.893[x]
Dress, %	0[yz]	-.012[z]	.018[y]	.009[y]	.003[y]
REA, in²	0[z]	-.006[z]	.008[yz]	.022[y]	.013[y]
Marb[f]	0[y]	-.349[y]	-1.317[z]	.019[y]	-.515[y]
ACTBF,in	0[z]	-.000[z]	-.001[y]	-.001[y]	.000[z]
Q. Grade[g]	0[y]	-.193[y]	-.698[z]	.102[y]	-.206[yz]
KPH, %	0[z]	-.005[z]	.002[yz]	.009[y]	.005[y]
Y. Grade	0[z]	-.001[z]	.000[z]	.001[z]	.000[z]
DAYS ON FEED WITHIN MANAGEMENT GROUP[c] HELD CONSTANT					
CARWT,lb	0[y]	-.547[z]	.681[xy]	.783[x]	.180[y]
Dress, %	0[yz]	-.011[z]	.017[y]	-.005[yz]	.010[yz]
REA, in²	0[z]	-.005 [z]	.008[yz]	.022[y]	.012[y]
Marb[d]	0[z]	-.370[z]	-1.292[y]	-.608[yz]	-1.078[y]
ACTBF,in	0[z]	-.001[z]	-.001[z]	-.004[y]	-.003[y]
Q. Grade[e]	0[z]	-.216[yz]	-.662[y]	-.275[yz]	-.539[y]
ADJBF,in	0[z]	-.000[z]	.000[z]	-.004[y]	-.003[y]
KPH, %	0[yz]	-.004[z]	.006[y]	.001[yz]	-.001[yz]
Y. Grade	0[y]	-.002[y]	.002[y]	-.013[z]	-.012[z]
SLAUGHTER WEIGHT WITHIN MANAGEMENT GROUP[d] HELD CONSTANT					
CARWT,lb	0[yz]	-.133[z]	.169[y]	-.000[yz]	-.056[yz]
Dress, %	0[yz]	-.012[z]	.017[y]	.000[yz]	-.004[yz]
REA, in²	0[z]	-.002[z]	.003[yz]	.017[y]	.011[y]
Marb[d]	0[z]	-.248[z]	-1.430[y]	-.787[yz]	-1.077[y]
ACTBF,in	0[z]	-.000[z]	.001[z]	-.004[y]	-.003[y]
Q. Grade[e]	0[z]	-.145[z]	-.764[y]	-.392[y]	-.565[y]
ADJBF,in	0[y]	-.000[y]	.000[y]	-.004[z]	-.003[z]
KPH, %	0[z]	-.004[z]	.001[z]	.000[z]	-.001[z]
Y. Grade	0[y]	-.001[y]	.000[y]	-.016[z]	-.012[z]

[a]For each 1% change of a breed in a crossbreeding system, the trait is expected to change by the given amount, expressed as a deviation from Angus.
[b]Adjusted backfat means were 1.11 cm for the calf and 1.15 cm for the yearling management groups.
[c]Days on fed means were 222 days for the calf and 131 days for the yearling management groups
[d]Slaughter weight means were 489 kg for the calf and 570 kg for the yearling management groups.
[e]Carcass traits; CARWT = Carcass weight; Dress = Dressing percent; REA = Ribeye area; ACTBF = Actual carcass backfat; ADJBF = Adjusted carcass backfat; KPH = Kidney, Pelvic and Heart fat; Y. Grade = yield grade.
[f]Marbling (Slight = 200, Small = 300, Modest = 400, etc.).
[g]Quality Grade (Select = 100, Choice = 200, and Prime = 300).
[x,y,z] Means in the same row with different superscripts are different ($P < .05$).