Effect of Sire Breed of Steers on Grazing and Feedlot Performance and Carcass Characteristics

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Story in Brief

One hundred eighty steers grazing mixed native range from April 27 through July 7, 2001 near Arnett, OK were designated to treatments based upon sire breed and cow age. Treatments included Hereford sired calves from Angus x Hereford cows, Angus sired calves from Angus x Hereford cows, Charolais sired calves from Angus x Hereford cows, Hereford sired calves from primiparous Angus x Hereford heifers, and Angus sired calves from primiparous Angus x Hereford heifers. Upon completion of the grazing season steers were transported (~ 250 km) to the Willard Sparks Beef Research Center near Stillwater, OK. Steers were weighed upon arrival, implanted, and vaccinated with IBR-PI_3-BVD-BRSV, seven-way clostridial preparation, and treated for external parasites. There were no differences in daily gain attributable to breed during grazing or in the feedlot; however, steers from Charolais sires gained 6.3% faster than Angus or Hereford sired calves during the feeding period. In addition, steers sired by Charolais bulls had the greatest numerical ribeye areas, lowest degree of marbling, lowest mean quality grade, and the lowest numerical percent grading choice. This study suggests that progeny from the Hereford and Angus sires used in this operation are similar in performance and carcass characteristics. However, the progeny from Charolais sires used had increased ribeye area and carcass leanness, but a lower quality grade.

Keywords: Angus, Hereford, Charolais, Feedlot, Steers

Introduction

It is common commercial production practice to use two to three breeds in a crossbreeding program for cow calf producers. In areas with limited rainfall and hence forage availability, Hereford influence is often included in the breed rotation in combination with Angus sires. The incorporation of terminal (generally Continental) breeds can be utilized to increase the growth performance and lean tissue deposition of terminal calves. Gardner et al. (1996) reported that Continental steers fed in the OK Steer Feedout from 1990 to 1995 had greater feed intake and ribeye areas and lower marbling scores than Angus, British, or Brahman influenced steers. However the same study reported that net value was the least for Continental steers primarily due to medical costs. Our objective was to evaluate the effects of sire breed on feedlot performance and carcass characteristics of steers.

Materials and Methods

Crossbred steers (n=180; BW=280 ± 17 kg) were designated to treatments based upon sire breed and cow age. All steers were received from one ranch in which purebred Hereford, Angus and Charolais sires are purchased from outside sources and used in a commercial crossbreeding program. Treatments were Hereford sired calves from Angus x Hereford cows (H), Angus sired

calves from Angus x Hereford cows (A), Charolais sired calves from Angus x Hereford cows (C), Hereford sired calves from primiparous Angus x Hereford heifers (FCH), and Angus sired calves from primiparous Angus x Hereford heifers (FCA). Steers were grazed in a common pasture on mixed native range near Arnett, OK from April 27 to July 9, 2001. At the beginning of the grazing period steers were weighed, dewormed with Ivomec® Plus (Merial Animal Health, Duluth, GA), and vaccinated for IBR-PI_3-BVD-BRSV with BRSV-Vac 4 (Bayer Animal Health, Shawne Mission, KS). Steers were transported (~ 250 km) to the Willard Sparks Beef Research Center near Stillwater, OK on July 10, 2001 and allowed to settle overnight. At processing, steers were individually weighed, ear tagged, implanted with Revalor S (McBeth et al., 2002), horn tipped as needed, vaccinated with IBR-PI_3-BVD-BRSV (F3Lp, Bayer Animal Health, Shawnee Mission, KS), and treated for control of external and internal parasites (Ivomec®, Merial Animal Health Duluth, GA). Steers were harvested by respective weight block with the heavy block being fed for 131 d and the light block being fed for 148 d. All steers were harvested by Excel Corp., Dodge City, KS.

Basal diets were formulated to meet or exceed NRC (1996) nutrient requirements (Table 1). Monensin (33 mg/kg of the diet) and tylosin (11 mg/kg of the diet) were fed. Cattle were gradually adapted to the final diet by offering 65, 75 and 85% concentrate diets for 7, 7 and 7 d, respectively. Steers were fed twice daily at 0800 and 1400. Cattle were weighed individually before feeding once every 28 d throughout the trial. Initial weight was analyzed as taken, whereas all interim weights were analyzed with a 4% pencil shrink. Final live weight was calculated by dividing hot carcass weight by a common dressing percentage (63%). Hot carcass weight was determined following harvest, and carcasses were evaluated after a 24-h chill for subcutaneous fat depth at the twelfth rib, longissimus muscle area, percentage kidney, pelvic, and heart fat, yield grade, marbling score, and quality grade (USDA, 1997).

Cumulative feedlot performance and carcass data were analyzed as a randomized complete block design using the GLM procedure of SAS (1999). Breed designation and weight group were included in the model as class variables. Individual animal served as the experimental unit for all cattle performance and carcass data. Carcass quality and yield grades as assigned by USDA were examined on an individual animal basis using the Chi-square analysis technique (SAS, 1999).

Results and Discussion

There were no differences (P<.10) in initial weight during grazing, weight at the end of grazing, or ADG during grazing (Table 1). During transport steers with cows as dams had a greater (P=.02) transport shrink and similar effects are present in initial weight upon entry to the feedlot (Table 1). At the end of the finishing period there were no differences (P<.01) in BW and no differences were observed in ADG in the feedlot (Table 1). However, C steers had the greater numerical ADG throughout the feeding period than A (6%) or H (7%).

Table 1. Effect of sire breed during the pasture and feedlot phase on daily gain

	Sire Breed Types						
				First-Calf Heifers			
Item	Angus	Hereford	Charolais	Angus	Hereford	SEM	P < F

Number of steers	72	68	13	21	5		
Grass init wt, kg	281	281	280	277	281	6	.80
Grass final wt, kg	374	373	371	374	381	6	.49
Grass daily gain, kg	1.22	1.20	1.19	1.27	1.30	.07	.47
Transport shrink, %	8.81[a]	9.06[a]	8.01[a]	7.60[b]	7.59[ab]	.92	.02
Initial wt., kg	341[c]	339[c]	341[bc]	346[ab]	352[a]	5	.03
End wt, kg	586	582	600	591	619	23	.44
Daily gain, kg							
d 0 - 28	1.82	1.81	2.02	1.88	2.19	.23	.65
d 29 - 56	1.85	1.83	2.07	1.93	2.18	.24	.33
d 0 - 56	1.83	1.82	2.05	1.91	2.19	.15	.06
d 57 - 84	1.85	1.83	1.66	1.89	1.79	.30	.43
d 0 - 84	1.84	1.83	1.90	1.90	2.05	.16	.87
d 85 - 112	1.88	1.95	1.99	1.87	2.05	.25	.97
d 0 - 112	1.85	1.86	1.92	1.90	2.05	.14	.83
d 112 - end	1.35	1.29	1.67	1.14	1.18	.37	.58
d 0 - end	1.75	1.74	1.86	1.75	1.90	.15	.50

[abc]Means in a row with different differ P<.05

Dressing percentage, 12th rib fat, kidney pelvic and heart fat, and yield grade was not different (P<.10) across breed designations. Charolais sired steers had greater (P<.01) ribeye areas than either H or A and lower marbling scores and average quality grades (Table 2). Steers from Charolais sires were the only group not from primiparous heifers to average below the choice quality grade. Lobley et al. (2000) reported that Charolais steers had greater total lean in their carcasses than that of Angus steers (35% vs 32% of live weight respectively). The leaner carcasses harvested from C steers was evident in the percent of cattle grading choice (Table 3). Charolais sired steers had a numerically lower percentage reaching the choice grade than H or A. Percentage of cattle reaching 4 was numerically greater for both A and H than for C suggesting the potential for less carcass discount.

Table 2. Effect of sire breed during the pasture and feedlot phase on carcass characteristics

	Sire Breed Types						
				First-Calf Heifers			
Item	Angus	Hereford	Charolais	Angus	Hereford	SEM	P < F
HCW, kg	362	357	370	358	379	16	.53
Dressing %	62.57	62.32	63.51	61.58	62.89	1.03	.18
Ribeye area, cm^2	79.40[d]	79.41[d]	89.35[c]	77.30[d]	81.31[cd]	4.02	< .01
12th Rib fat, cm	2.14	1.75	1.58	1.93	1.99	.51	.20
KPH	2.52	2.18	2.35	2.41	2.26	.33	.34
Marbling	478[c]	450[c]	360[d]	476[c]	440[cd]	47	< .01
Quality grade[a]	324[c]	304[c]	260[e]	313[cd]	293[cd]	23	< .01
Yield grade[b]	3.62	3.61	3.33	3.77	3.76	.36	.13

[a]Practically devoid = 100; traces = 200; slight = 300; small = 400; modest = 500; moderate = 600; slightly abundant = 700

[b]Standard = 100; select = 200; choice = 300; prime = 400

[cde]Means in a row with different superscripts differ P<.05

Table 3. Frequency distribution for various individual carcass measurements by breed in steers (Trial 1)

	Breed				
				First Calf Heifers	
	Angus	Hereford	Charolais	Angus	Hereford
N	68	67	12	21	5
USDA Quality Grade[a]					
Prime	0	0	0	0	0
Choice	54	38	4	14	4
Select	14	28	8	7	1
Standard	0	1	0	0	0
USDA Yield Grade[b]					
One	0	0	0	0	0
Two	2	2	0	0	0
Three	30	27	8	10	2
Four	30	31	4	7	3
Five	6	7	0	4	0

[a]Chi square value = 15.37; Probability = .05

[b]Chi square value = 7.60; Probability = .82

Implications

Sire breed is an important factor in management decisions such as days on feed and marketing method. Although Continental sired cattle often yield more red meat in their carcasses, the potential for reductions in carcass quality exist. This study suggests that progeny from the Hereford and Angus sires used in this operation are similar in performance and carcass characteristics. However, the progeny from Charolais sires used had increased ribeye area and carcass leanness, and reduced quality grade.

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