Carcass Evaluation of Certain Two-Breed Cross Steers

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Story in Brief

Slaughter and carcass data were analyzed on 269 crossbred steers obtained by mating Hereford (H), Angus (A), Simmental (S), Brown Swiss (B) and Jersey(J) bulls to Hereford and Angus cows. The steers were individually slaughtered as an anticipated low choice carcass grade had been attained. Brown Swiss and Simmental cross steers required 17 more days in the feedlot and were heaviest at slaughter (1110 lb). HA steers weighed 1034 lb and Jersey cross steers weighed 915 lb at slaughter. Jersey cross steers had a 1.5 percent lower dressing percentage than the other crossbred groups. All crossbred groups had sufficient marbling to grade choice, however Jersey cross steers received 1/6 of a carcass grade lower because of conformation (old grading standards). Simmental cross steers had the largest ribeye area (12.95 sq in) and Jersey cross steers the smallest (11.0 sq in). HA steers had the most fat cover (.93 in) and JH steers the least (.67 in).

Carcass composition was determined by detailed separation of the right side from a sample of 159 steers. Actual kidney, heart and pelvic fat was highest for Jersey crosses (5.7 percent) and lowest for Simmental crosses (3.9 percent). SH steers had the highest actual cutability (51.9 percent), whereas the other crossbred groups ranged between 49 and 50 percent. Jersey cross and HA steers had the most carcass fat (26.3 percent) and the least carcass lean minus the short loin (54.6 percent). SH and BH steers had the least carcass fat (22.1 percent) and SH had the most carcass lean minus shortloin (57.4 percent). Percent bone was lowest for HA steers (11.4 percent). Crosses from Hereford dams had more bone than those from Angus dams (12.4 *vs* 11.9 percent). All crossbred steer groups had acceptable tenderness as determined by Warner-Bratzler shear.

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Introduction

During the past several years there has been a continued increase in the use of crossbreeding to improve productivity of commercial beef herds. This shift to crossbreeding systems has resulted primarily from: 1) research that demonstrates productivity per cow in the herd can be substantially increased through a planned crossbreeding system and 2) economic conditions in the cattle industry that have forced cattlemen to strive for maximum production efficiency. Planned crossbreeding systems can increase herd productivity because of the opportunity to combine desirable characteristics of two or more breeds and by increased performance due to heterosis. Research has indicated that the majority of the increased production efficiency from crossbreeding resulted from increased fertility and maternal ability of the crossbred cow and liveability and early growth of the crossbred calf. Use of crossbred cows accounts for over half of the increased productivity from a crossbreeding system.

Research studies are needed to more clearly evaluate the biological characteristics of breeds available for beef production in the U.S. and how they will complement each other in planned crossbreeding systems to maximize production efficiency under various climatic and management conditions. Even though carcass traits generally exhibit little heterosis, it is important to evaluate carcass traits of crossbred animals to examine how well the breeds complement each other for these economically important traits. The objective of this study was to characterize carcass traits of crossbred steers of differing biological types produced by mating Hereford, Angus, Simmental, Brown Swiss and Jersey bulls to Hereford and Angus cows.

Experimental Procedures

Data analyzed in this study were the carcass measurements on 269 crossbred steers produced by mating Hereford (H), Angus (A), Simmental (S), Brown Swiss (B) and Jersey (J) bulls to Hereford and Angus cows. Thus, there were eight crossbred groups: HA, AH, SA, SH, BA, BH, JA and JH. Reciprocal Hereford x Angus crosses were combined into a single crossbred group for feeding and carcass evaluation and will be referred to as HA in this report.

The steers were born mostly during February-April of 1975 and 1977 at the Lake Carl Blackwell Research Range west of Stillwater. Calves remained with their dams on native range without creep feed until they were weaned in September at an average age of 205 days. All steers were trucked to the Southwestern Livestock and Forage Research Station at El Reno, Oklahoma the same day they were weaned.

Following weaning, one-half of the steers were placed immediately into the feedlot and the other half were allowed to graze wheat pasture and placed

in the feedlot as yearlings. During the finishing phase for both management groups, the steers from each crossbred group were separated into two finishing pens. Thus, during the finishing phase for each management group each year the seven crossbred steer groups were separated into 14 finishing pens and self fed a milo and corn based finishing ration. Steers were individually slaughtered as they reached an estimated choice slaughter grade as determined by visual appraisal. Each steer selected to be slaughtered was removed from feed and water 12 hr prior to obtaining the final slaughter weight.

The steers were slaughtered in a commercial packing plant. Carcasses were allowed to cool for 48 hr before obtaining standard carcass data with the assistance of a federal grader. In each of the four slaughter groups (two management systems and two years) six carcasses from each crossbred group were randomly designiated and the right side shipped to the OSU Meat Lab for detailed carcass evaluation.

Results and Discussion

Comparisons between crossbred groups for feedlot performance under the two management systems (placed on feed at weaning *vs* yearling ages) were reported in the 1975 Animal Science Research Report (Okla. Agr. Exp. Sta. Res. Report MP-94:51). Preliminary analysis indicated that differences between crossbred groups did not have any important interactions with either years or management systems. Thus, data have been averaged over years and management systems to make comparisons between crossbred groups relative to slaughter and carcass traits.

Table 1 presents means for slaughter and carcass traits measured on all steers. Brown Swiss cross and SH steers were the oldest at slaughter (518 days) whereas, SA, JH and HA steers were intermediate in slaughter age (averaged 501 days) and JA steers were slaughtered at the youngest age (492 days).

Simmental crosses and Brown Swiss crosses were the heaviest steers at slaughter, averaging 1110 lb, followed by HA steers at 1035 lb and Jersey cross steers at 924 lb. Dressing percents were very similar for HA, Simmental crosses and Brown Swiss crosses and ranged from 60.9 to 61.4 percent. Jersey cross steers had the lowest dressing percent at 59.6 percent.

Carcass weight per day of age, an important trait to consider when selecting for a meat type animal, was significantly heavier for SA steers (1.39 lb/day) than for any other crossbred group. Brown Swiss cross, HA and SH steers had intermediate carcass weights per day of age ranging from 1.28 to 1.32 lb/day. Jersey cross steers gained carcass weight at the rate of 1.12 lb/day.

Since each steer was slaughtered when a choice carcass grade was anticipated, carcass quality grade should have been similar among crossbred groups. However, Jersey crosses failed to grade (by the old grading standards) low choice by 1/6 of a grade. As can be seen in Table 1, this failure to grade was

Table 1. Average performance of each two-breed cross for certain slaughter and carcass traits measured oteers

Crossbred Group[1]	No. Steers	Slaughter Age, days	Slaughter Weight, lb	Dressing Percent	Car. Wt. Per Day of Age (lb/day)	Ribeye Area, in²	Avg Fat Thickness, in	Marbling Score[2]	Conformation[3]	ty[3]
HA	61	$498^{c,d}$	1035^{c}	61.1^{a}	1.29^{b}	12.0^{c}	$.93^{a}$	4.83^{a}	11.84^{a}	6^{a}
SA	35	$504^{b,c}$	1129^{a}	61.4^{a}	1.39^{a}	$12.9^{a,b}$	$.80^{b}$	4.80^{a}	12.23^{a}	5^{a}
SH	38	518^{a}	$1110^{a,b}$	60.9^{a}	1.30^{b}	13.0^{a}	$.74^{b,c}$	4.66^{a}	12.01^{a}	$5^{a,b}$
BA	43	$515^{a,b}$	1096^{b}	61.2^{a}	1.30^{b}	$12.4^{b,c}$	$.77^{b}$	4.94^{a}	11.32^{b}	$5^{a,b}$
BH	33	521^{a}	$1105^{a,b}$	61.3^{a}	1.32^{b}	$12.8^{a,b}$	$.79^{b}$	5.31^{a}	11.12^{b}	4^{a}
JA	35	492^{d}	938^{d}	59.5^{b}	1.15^{c}	10.9^{d}	$.77^{b,c}$	5.05^{a}	8.94^{c}	8^{b}
JH	27	$503^{b,c}$	910^{d}	59.7^{b}	1.10^{c}	11.0^{d}	$.67^{c}$	4.89^{a}	9.00^{c}	4^{b}

[a,b,c,d]Means in the same column that do not share at least one superscript differ significantly at the .05 probability level.

[1]A=Angus, H=Hereford, S=Simmental, B=Brown Swiss, J=Jersey.

[2]Marbling score equivalents: Modest=6, Small=5, Slight=4.

[3]Conformation and Quality Grade equivalents: Prime=13, Choice+=12, Choice=11, Choice−=10, Good+=9, Good=8, Good−=7.

Table 2. Carcass composition and tenderness evaluation for each two-breed cross

Crossbred[1] Group	No. Steers	Actual KPH Fat, %	Actual Cutability, %	Carcass Composition, % Fat	Lean[2]	Trimmed Shortloin[3]	Bone	)
HA	25	3.87^{c}	49.0^{d}	26.3^{a}	54.6^{c}	5.8^{a}	11.4^{d}	
SA	21	$4.10^{b,c}$	$50.0^{b,c,d}$	$23.8^{b,c}$	$55.8^{b,c}$	5.9^{a}	$11.8^{c,d}$	
SH	24	3.69^{c}	51.9^{a}	21.9^{d}	57.4^{a}	6.1^{a}	$12.4^{a,b}$	
BA	23	4.45^{b}	$50.2^{b,c}$	24.2^{b}	$55.7^{b,c}$	5.8^{a}	11.9^{c}	
BH	23	$4.16^{b,c}$	$50.8^{a,b}$	$22.3^{c,d}$	56.0^{b}	5.9^{a}	$12.4^{a,b}$	
JA	22	5.84^{a}	$49.4^{c,d}$	$25.3^{a,b}$	$54.7^{b,c}$	5.9^{a}	$12.0^{b,c}$	
JH	21	5.62^{a}	$49.4^{c,d}$	$25.0^{a,b}$	54.5^{c}	5.9^{a}	12.5^{a}	

[a,b,c,d]Means in the same column that do not share at least one superscript differ significantly at the .05 level.

[1]A=Angus, H=Hereford, S=Simmental, B=Brown Swiss, J=Jersey.

[2]Does not include the lean from the closely trimmed shortloin.

[3]Includes a small amount of fat and bone left on the closely trimmed shortloin.

due to conformation and not by an inability to marble. Marbling did not differ significantly among crossbred groups, whereas, conformation was significantly lower for Jersey crosses than for any other crossbred group.

Simmental cross steers had the largest ribeye area (12.95 sq in), followed by Brown Swiss cross steers (12.6 sq in), HA steers at 12.0 sq in and Jersey cross steers at 10.95 sq in. HA steers had the most fat cover (.93 in) and JH had the least (.67) while the other crossbred groups were similar and ranged from .74 to .80 in.

Table 2 presents carcass composition and tenderness traits that were obtained from detailed carcass evaluations conducted on a sample of steers from each crossbred group. Jersey cross steers had significantly more actual kidney, heart and pelvic fat (5.73 percent) than any other crossbred group, whereas, BA had 4.45 percent and the other crosses ranged from 3.69 to 4.10 percent. SH steers had the highest actual cutability (51.9 percent), whereas, the other crossbred groups were similar and ranged from 49.0 to 50.0 percent.

Jersey cross and HA steers had the highest percent carcass fat (25.5 percent), followed by BA and SA (24.0 percent), and SH and BH had the least carcass fat (22.1 percent). Trimmed shortloin did not significantly differ among crossbred groups. Percent carcass lean (minus the lean in the shortloin) was highest for SH steers (57.4 percent) followed by Brown Swiss cross and SA steers (55.8 percent). Jersey cross and HA steers had the least carcass lean (54.6 percent).

Percent bone was lowest for HA steers (11.4 percent) and the other sire breed group were similar and averaged 12.1 percent. However, crosses from Angus dams averaged 11.9 percent bone as compared to 12.4 percent bone for crosses from Hereford dams.

Tenderness, as mechanically determined by Warner-Bratzler shear force, ranged from 15.9 lb for Jersey cross steers to 19.3 lb for SH steers, but all were in an acceptable range for consumer acceptability.
