OVERALL PRODUCTIVITY OF YOUNG CROSSBRED COWS CONTAINING 0, 1/4 OR 1/2 BRAHMAN BREEDING IN SPRING VERSUS FALL CALVING SYSTEMS

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Story in Brief

Productivity of two- to six-year old crossbred cows with 0, 1/4 or 1/2 Brahman breeding was evaluated using 201 records on spring calving and 172 records on fall calving cows collected from 1983 to 1987. Significant genotype (crossbred cow group) x environment (season of calving) interactions were found for age at first calf, lifetime percentage weaned, average adjusted weaning weight and weight weaned per year. Angus x Hereford in both seasons and Hereford x Angus in the fall group tended to calve earlier than the other groups. All spring calving groups calved first at an earlier age than did their respective fall calving counterparts. Average calving interval was 389 days, with no differences attributable to effects included in model. All groups weaned higher percentages in the spring than in fall. Spring and fall calving cows within each crossbred group tended to have similar average adjusted weaning weights. Weight weaned per year tended to be greater for spring calving groups than for fall calving groups. Spring calving Angus x Hereford dams had the lowest average adjusted weaning weight (345 lb) and fall calving Brahman x Angus tended to have the highest (475 lb). Spring calving Brahman-Hereford x Angus tended to wean the most weight per year (438 lb), while fall calving Brahman x Hereford tended to wean the least weight per year (273 lb). These results show that spring calving has some advantages to fall calving and Brahman breeding can be used to increase some aspects of cow productivity.

(Key Words: Crossbreeding, Beef Cattle, Brahman, Lifetime Productivity, Genotype x Environment Interaction.)

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Introduction

Crossbreeding is used by commercial producers in an attempt to increase production efficiency. However, different environments may have varying effects on different genetic types (genotype x environment interactions). Evaluation of this genotype (crossbred cow group) x environment (season of calving) interaction is the purpose of a study currently being conducted by the Oklahoma Agricultural Experiment Station. This project was designed to evaluate the effects of crossbred cow group, season of calving and the interaction between the two using crossbred cows with different proportions of Brahman, Angus and Hereford breeding, managed in spring or fall calving systems. The objective of this portion of the study was to evaluate productivity of young (two- to six-year old) cows. The traits analyzed were age at first calf, average calving interval, lifetime weaning percentage, average adjusted weaning weight of calves weaned and weight weaned per year.

Materials and Methods

Cows for this project were produced by assigning Angus and Hereford dams at random to spring and fall calving groups. The cows were then mated to Angus, Hereford, Brahman, Brahman x Angus and Brahman x Hereford sires to produce calves with 0 Brahman (Hereford x Angus and Angus x Hereford), 1/4 Brahman (1/4 Brahman-1/4 Hereford-1/2 Angus and 1/4 Brahman-1/4 Angus-1/2 Hereford) and 1/2 Brahman (Brahman x Angus and Brahman x Hereford). The mating system, origin of foundation breeding stock and growth and performance of crossbred calves were presented by Bolton et al. (1986). Productivity and milk production of these cows was presented by McCarter et al. (1987a,b, 1988). Cows were maintained at the Southwestern Livestock and Forage Research Laboratory, El Reno, Oklahoma, for production of 1983 through 1986 calf crops on native tallgrass pastures. After weaning the 1986 calf crop, cows were moved to the range north of Lake Carl Blackwell in Stillwater, Oklahoma. Cows were exposed to Limousin bulls, in single sire pastures, for a 75 day breeding season to produce 1983 and 1984 calf crops. For 1985 and 1986 calf crops, cows were synchronized and bred once artificially to Limousin sires before being placed in single sire pastures with Limousin bulls for a total breeding season of 75 days. The calf crop in 1987 was produced by artificially breeding cows to Limousin and Salers bulls, then placing these in single sire pastures with Limousin bulls for a total breeding season of 75 days. Spring calving groups were bred to calve in February, March and April and fall calving cows

were bred to calve in September, October and November. Spring and fall born calves were weaned at an average age of 205 and 240 days, respectively. Fall-born calves were weaned at an older age, a common practice of Oklahoma producers.

Age at first calf was computed in days using dam's birth date and her first calving date. Calving interval was computed using first and last calving dates and the total number of calves produced. Lifetime weaning percentage was computed by dividing the parity of the dam by the total number of possible calvings. Average age adjusted weaning weight, adjusted to 205- and 240-day basis for spring and fall groups, respectively, was computed by dividing the total weight weaned by a dam by the total number of calves produced. Weight weaned per year was computed by dividing the total weight weaned by the age of dam (in years) minus one. The distribution of records used in this analysis are presented in Table 1 by crossbred cow group and season of calving. Data were analyzed using least squares procedures to determine the effect of crossbred cow group, season of calving and the interaction of crossbred cow group with season of calving.

Table 1. Distribution of records by crossbred group and season of calving.

Crossbred cow group[a]	Season of calving		Total
	Spring	Fall	
0 Brahman:			
HxA	24	25	49
AxH	12	13	25
1/4 Brahman:			
1/4 B-1/4 H-1/2 A	48	40	88
1/4 B-1/4 A-1/2 H	38	28	66
1/2 Brahman:			
BxA	42	38	80
BxH	37	28	65
Total	201	172	373

[a]H=Hereford, A=Angus and B=Brahman.

Results and Discussion

Age at first calf was significantly affected by the interaction between crossbred cow group and season of calving (Table 2). Within the spring calving group, Angus x Hereford calved earlier ($P<.01$) than all other spring calving groups. Within the fall calving group, the two groups of 0 Brahman cows tended to calve earlier than 1/4 or 1/2 Brahman cows. Cows out of

Table 2. Least squares means for age at first calf in days by crossbred cow group x season of calving interaction.

Crossbred cow group[a]	Season of calving	
	Spring	Fall
0 Brahman:		
HxA	815[b]	1123[de]
AxH	629[c]	1057[d]
1/4 Brahman:		
1/4 B-1/4 H-1/2A	769[b]	1173[ef]
1/4 B-1/4 A-1/2H	793[b]	1216[f]
1/2 Brahman:		
BxA	784[b]	1191[ef]
BxH	795[b]	1370[g]

[a]H=Hereford, A=Angus and B=Brahman.
b,c,d,e,f,g Means not sharing at least one common superscript differ (P<.05).

Angus dams tended to calve earlier than those out of Hereford dams. Due to the fact that no fall calving two-year old Brahman x Hereford cows weaned a calf, this group gave birth to their first calf later (P<.01) than all other groups. Spring calving cows in all breed groups calved first at an earlier (P<.05) age than their fall calving counterparts.

Average calving interval was 389 days. No factors included in the model significantly affected this trait.

Lifetime weaning percentage was significantly affected by the interaction between crossbred cow group and season of calving (Table 3). All crossbred groups, with the exception of Angus x Hereford, weaned a higher (P<.05) percentage of calves in the spring than in the fall. Within

Table 3. Least squares means for lifetime percentage weaned by crossbred cow group x season of calving interaction.

Crossbred cow group[a]	Season of calving	
	Spring	Fall
0 Brahman:		
HxA	90.2[bc]	78.3[de]
AxH	71.4[df]	76.4[cdf]
1/4 Brahman:		
1/4 B-1/4 H-1/2 A	92.8[b]	67.5[ef]
1/4 B-1/4 A-1/2 H	78.4[d]	64.0[f]
1/2 Brahman:		
BxA	80.5[cd]	67.7[ef]
BxH	73.6[df]	51.3[g]

[a]H=Hereford, A=Angus and B=Brahman.
b,c,d,e,f,g Means not sharing at least one common superscript differ (P<.05).

each proportion Brahman, cows out of Angus dams tended to wean higher percentages than those out of Hereford dams. Within the spring calving group, 1/4 Brahman-1/4 Hereford-1/2 Angus and Hereford x Angus cows were similar and were superior ($P<.05$) to Angus x Hereford, 1/4 Brahman-1/4 Angus-1/2 Hereford and Brahman x Hereford. Within the fall calving group, groups were similar with the exceptions that Hereford x Angus weaned a higher ($P<.05$) percentage than did 1/4 Brahman-1/4 Angus-1/2 Hereford and Brahman x Hereford weaned the lowest ($P<.05$) percentage.

The interaction between crossbred cow group and season of calving was significant for average adjusted weaning weight (Table 4). Within the spring group, Angus x Hereford and Brahman x Hereford tended to wean the lightest calves with the remaining four breed groups being similar. No differences existed between the breed groups in the fall calving herd. All breed groups produced calves of similar weights across seasons with the exception of Angus x Hereford which produced heavier ($P<.01$) calves in the fall than in the spring.

Weight weaned per year was significantly affected by the crossbred cow group x season of calving interaction (Table 5). Weight weaned per year combines reproductive performance with mothering ability of the dam to give a more precise estimate of a cow's total productivity. Within the spring group, 1/4 Brahman-1/4 Hereford-1/2 Angus, Brahman x Angus and Hereford x Angus were similar with only 1/4 Brahman-1/4 Hereford-1/2 Angus producing more ($P<.05$) weight per year than Angus x Hereford, 1/4 Brahman-1/4 Angus-1/2 Hereford and Brahman x Hereford. Angus x Hereford produced less ($P<.05$) weight per year than all breed groups except Brahman x Hereford. Within the fall calving group, 0 and 1/4 Brahman and

Table 4. Least squares means for average adjusted weaning weight for calves weaned[a] by crossbred cow group x season of calving interaction.

Crossbred cow group[b]	Season of calving	
	Spring	Fall
0 Brahman:		
HxA	207.3^{cd}	209.4^{cd}
AxH	156.4^{e}	211.1^{cd}
1/4 Brahman:		
1/4 B-1/4 H-1/2 A	211.1^{c}	206.1^{cd}
1/4 B-1/4 A-1/2 H	212.6^{c}	211.2^{cd}
1/2 Brahman:		
BxA	205.1^{cd}	215.5^{c}
BxH	190.7^{d}	212.4^{cd}

[a]Total weight weaned during lifetime divided by number of calves weaned, in lb.
[b]H=Hereford, A=Angus and B=Brahman.
c,d,e Means not sharing at least one common superscript differ ($P<.05$).

Table 5. Least squares means for weight weaned per year[a] by crossbred cow group x season of calving interaction.

Crossbred cow group[b]	Season of calving	
	Spring	Fall
0 Brahman:		
HxA	184.7^{cde}	163.1^{df}
AxH	141.6^{fg}	153.6^{dfg}
1/4 Brahman:		
1/4 B-1/4 H-1/2 A	198.5^{c}	143.5^{fg}
1/4 B-1/4 A-1/2 H	175.5^{de}	142.8^{fg}
1/2 Brahman:		
BxA	181.4^{cde}	160.5^{df}
BxH	166.8^{ef}	123.7^{g}

[a]Total adjusted weight weaned divided by age of dam in years minus one, in lb.
[b]H=Hereford, A=Angus and B=Brahman.
c,d,e,f,gMeans not sharing at least one common superscript differ (P<.05).

Brahman x Angus were similar and tended to be superior to Brahman x Hereford. Only Hereford x Angus and Brahman x Angus were significantly superior to Brahman x Hereford. Only the 1/4 Brahman groups differed across seasons as the spring calving 1/4 Brahman groups weaned more (P<.05) weight per year than their fall calving counterparts. As in lifetime weaning percentage, cows out of Angus dams tended to be superior to those out of Hereford dams within the same proportion Brahman.

In summary, spring calving was advantageous to fall calving for all crossbred groups except Angus x Hereford. Cows with Angus dams tended to be more productive than those out of Hereford dams within the same proportion Brahman group. Overall, spring calving 1/4 Brahman-1/4 Hereford-1/2 Angus tended to be the most productive indicating that Brahman breeding can be incorporated into a commercial crossbreeding system to increase production efficiency. Due to genotype x environment interactions, environment and management systems need to be considered when selecting breeds for use in a crossbreeding system.

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