PRODUCTIVITY OF THREE-, FOUR- AND FIVE-YEAR-OLD CROSSBRED COWS WITH 0, 1/4 AND 1/2 BRAHMAN BREEDING IN SPRING VERSUS FALL CALVING SYSTEMS

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Story in Brief

Productivity of three-, four- and five-year old crossbred cows with 0, 1/4 and 1/2 Brahman breeding was evaluated using 372 records on spring-calving cows and 372 records on fall-calving cows collected over a three year period. No significant interaction between crossbred cow group and season of calving was found for any calf trait examined. Season of calving had a stronger influence on the percentage of cows exposed that weaned a calf than did cow group, as values ranged from 78.2% for the Angus x Hereford cows to 89.6% for the Brahman x Angus cows and spring-calving cows averaged 98.1% compared with only 71.4% of the fall-calving cows. Adjusted weaning weight tended to increase as proportion Brahman increased, with cows out of Hereford dams tending to wean heavier calves than cows out of Angus dams with the same proportion Brahman breeding. The difference between preweaning growth was significant for the two seasons as spring calves outgained fall calves by .23 pounds per day; however, since the spring calves were weaned at an average of 205-days of age and the fall calves were weaned at an average of 240-days of age, adjusted weaning weights were not different for the two groups. These data indicate, based on reproductive rate, that spring calving is more advantagous than fall calving. In both seasons, productivity tended to increase as proportion Brahman increased.

(Key words: Crossbreeding, Beef Cattle, Brahman, Cow Productivity, Genotype x Environment Interaction).

Introduction

Crossbreeding is one of the major management techniques available for producers attempting to increase efficiency of commercial beef production. However, different environments may have varying effects on different crossbred types due to genotype by environment interactions. Evaluation of this genotype (crossbred cow group) by environment (season of calving) interaction is the purpose of a study currently being conducted by the Oklahoma Agricultural Experiment Station. In order to evaluate possible interactions between crossbred cow type and season of calving, this project was designed to use crossbred cows with different proportions of Brahman, Angus and Hereford breeding, managed in spring and fall calving systems. The objective of this portion of the study was to determine the effects of crossbred cow group, season of calving and the interaction between cow group and season of calving on the productivity of three-, four- and five-year-old females.

The traits analyzed were percentage of cows exposed weaning a calf, percentage of cows requiring assistance at birth, birth weight,

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preweaning average daily gain, weaning weight, weaning hip height, weaning conformation score and condition score, and average cow weight.

Experimental Procedure

Females for this project were produced by assigning Angus and Hereford cows at random to spring- and fall- calving groups. These cows were mated to Angus, Hereford, Brahman, Brahman x Angus and Brahman x Hereford sires to produce calves with 0 Brahman breeding (Hereford x Angus and Angus x Hereford), 1/4 Brahman breeding (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 same trio of bulls of each sire breed were used for both the spring and fall groups in the same year with a different set of bulls used each of the three foundation years of this project. The mating system, origin of foundation breeding stock and the growth performance of crossbred calves with 0, 1/4 and 1/2 Brahman breeding were reported by Bolton et al. (1986). Milk production results were presented by McCarter et al. (1987a) and productivity of these cows as two-year-olds was reported by McCarter et al. (1987b). Cows were maintained on native tallgrass and bermudagrass pastures at the Southwestern Livestock and Forage Reseach Laboratory, El Reno, OK. Cows were synchronized and bred to Limousin bulls by artificial insemination twice, if a second time was necessary. Following artificial insemination, cows were placed in breeding pastures with Limousin bulls for a total breeding period of 75 days. Spring-calving cows were bred to calve from February through April and fall-calving cows were bred to calve from September to November.

Calf birth weights were obtained within 24 hours of birth. Calving difficulty scores were assigned by the herdsman using a scale of 1 to 6 (1=no difficulty, 2=little difficulty, 3=moderate difficulty, 4=major difficulty, 5=caesarian section and 6=abnormal presentation). Calves remained with their dams on native tallgrass and bermudagrass pastures without creep feed. Spring-born 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 than spring-born calves, a practice typical of Oklahoma beef production. Calf weight, hip height, condition and conformation scores were determined at weaning. Cows were weighed at breeding and at weaning. These two weights were averaged to obtain average cow weight. Reproduction, birth and weaning data were collected over a three-year period on 372 spring-calving and 372 fall-calving cows. The breakdown of the number of records by cow type, season and age of dam used in this analysis is presented in Table 1. The data were analyzed by least-squares procedures to determine the effect of crossbred cow type, season of birth and the interaction between cow type and season of birth.

Results and Discussion

Effects of the age of the dam at calving were not found to be significant for any trait presented here.

The percentage of cows exposed to bulls that weaned a calf was significantly influenced by crossbred cow group and season of calving, however no evidence of an interaction between these two effects was found. Thus, the least-squares means for each cow type and for each season are presented in Table 2. The three groups of cows from Angus

Table 1. Number of records used in analysis.

Breed group[a]	Age and Season: Three Spring	Three Fall	Four Spring	Four Fall	Five Spring	Five Fall
0 Brahman:						
HA	24	23	17	17	8	11
AH	8	14	8	14	3	7
1/4 Brahman:						
1/4B:1/4H:1/2A	44	40	32	27	20	16
1/4B:1/4A:1/2H	34	27	23	20	14	12
1/2 Brahman:						
BA	40	39	23	26	9	17
BH	31	27	25	22	9	13

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

Table 2: Percentage of cows exposed to breeding that weaned a calf.

Comparison	Percentage weaned
Breed group[a]	
HA	86.4[bd]
AH	78.2[c]
1/4B:1/4H:1/2A	85.7[bd]
1/4B:1/4A:1/2H	82.0[cd]
BA	89.6[b]
BH	86.8[bd]
Season	
Spring	98.1[e]
Fall	71.4[f]

[a]H=Hereford, A=Angus and B=Brahman.
bcdef Values in same group not sharing a common superscript are different (P< .05).

dams and the Brahman x Hereford (BH) cows weaned significantly more calves than did the Angus x Hereford (AH) and Brahman-Angus x Hereford (BAH) cows. Of the Hereford x Angus (HA), Brahman-Hereford x Angus (BHA), Brahman x Angus (BA) and BH cows, approximately 85% of those cows exposed weaned a calf compared with 82% weaned by BAH and 78.2% weaned by AH cows. Of those cows exposed in the spring-calving group, 98.1% weaned a calf. This is significantly higher than that of the fall-calving group of which only 71.4% weaned a calf.

For all calf traits examined, there was no significant interaction between cow group and season of calving. Therefore, least-squares means were calculated for cow groups averaged over the two calving seasons and

for calving season averaged over cow groups. Calving difficulty was measured as the percentage of cows requiring assistance and receiving a calving difficulty score of 3, 4 or 5. Due to the small number requiring assistance (5%), no significant differences were found between the cow groups or between calving seasons.

Least-squares means for birth weight, preweaning average daily gain and adjusted weaning weight are presented in Table 3. Calves from BA cows were significantly lighter (73.9 lb) than those from all other breed groups which ranged from 78.9 to 82.4 lb. Spring-born calves (87.5 lb) were significantly heavier than fall-born calves (72.3 lb).

Preweaning average daily gain (ADG) and weaning weight (Table 3) for calves from the two groups of 0 Brahman cows was significantly ($P<.05$) less than for calves from the other cow groups. Preweaning average daily gain was similar for the two groups of 1/4 Brahman cows and for the two groups of 1/2 Brahman cows with calves from 1/2 Brahman cows significantly ($P<.05$) outgaining calves from 1/4 Brahman cows. Weaning weight results were similar to ADG results with the exception of no significant difference between calves from BAH and BA cows. Spring-born calves were significantly ($P<.05$) faster gaining (.23 lb/day) than fall-born calves; however, due to the different ages of the two groups at weaning no significant difference was found between the weaning weights of the two groups.

Least-squares means for conformation score, which reflects amount of muscling, condition score and weaning hip height are presented in Table 4. Calves from 0 Brahman cows, while not significantly different from calves out of BHA and BA dams, were lightest muscled receiving significantly lower scores than did calves from BAH and BH cows. No significant differences existed between calves from BHA, BAH and BA cows. Calves from BH dams received the highest conformation scores. No

Table 3: Least-squares means for birth weight, preweaning average daily gain and adjusted weaning weight.

Comparison	Birth weight lb	Preweaning ADG lb/day	Adjusted weaning weight, lb[a]
Breed group:			
HA	82.4[b]	1.71[b]	462.4[b]
AH	81.9[b]	1.73[b]	467.4[b]
1/4B:1/4H:1/2A	80.2[b]	1.87[c]	495.2[c]
1/4B:1/4A:1/2H	82.3[b]	1.92[c]	506.9[cd]
BA	73.9[c]	1.97[de]	511.7[de]
BH	78.9[b]	2.01[d]	525.9[e]
Season:.			
Spring	87.5[f]	1.981[f]	488.9[f]
Fall	72.3[f]	1.754[g]	500.9[f]

[a] 205-day and 240-day weights, respectively, for spring-born and fall-born calves. Weights are adjusted for sex of calf.

[bcde] Breed groups means for a trait not sharing a common superscript are different ($P<.05$).

[fg] Season means for a trait not sharing a common superscript are different ($P<.05$).

Table 4: Least-squares means for conformation score, condition score and adjusted hip height.

Comparison	Conformation score[a]	Condition score[b]	Hip height in.[c]
Breed group:			
HA	13.2[d]	5.46[e]	46.3[d]
AH	13.1[d]	5.40[e]	47.0[de]
1/4B:1/4H:1/2A	13.4[de]	5.62[d]	47.6[e]
1/4B:1/4A:1/2H	13.5[ef]	5.59[d]	47.1[de]
BA	13.4[de]	5.54[d]	47.6[e]
BH	13.7[f]	5.79[f]	48.6[f]
Season:			
Spring	13.3[g]	5.59[g]	44.1[g]
Fall	13.5[g]	5.54[g]	50.6[h]

[a]Conformation score: 12=low choice, 12=average choice and 14=high choice.
[b]Condition score: 1=thin, 5=average and 9=fat.
[c]Hip heights adjusted to 205 and 240 days of age, respectively, for spring- and fall-born calves.
[def]Breed group means for a trait not sharing a common superscript are different (P<.05).
[gh]Season means for a trait not sharing a common superscript are different (P<.05).

significant difference was found between spring-born and fall-born calves.

Condition scores (Table 4) were similar for calves out of 0 Brahman cows. Calves from AH cows received significantly (P<.05) lower scores than calves from 1/4 and 1/2 Brahman cows. Condition scores for spring and fall calves were not significantly different.

Adjusted weaning hip height of calves (Table 4) were similar for calves out of AH, HA and BA cow with calves out of HA dams being significantly (P<.05) shorter at weaning than calves out of BHA and BH cows. Spring-born calves were significantly (P<.05) shorter (6.49 in.) than fall-born calves; however, part of this difference may be attributed to the fall-calves being an average of 35 days older at weaning.

Average cow weight (Table 5) was not significantly influenced by the cow group by season interaction. All cow groups had similar average weights with the exception BH cows weighing significantly (P<.05) more (80.2 lb) than BHA cows. Fall-calving cows were significantly (P<.05) heavier (154 lb) than spring-calving cows. This difference in weights can probably be attributed to the times at which the cows were weighed and the relationship between time of weighing and the availability and quality of forage. Age of dam was a significant effect on average cow weight as five-year-old cows were signivficantly (P<.05) lighter than three- and four-year-old cows, 87.1 and 97.4 lb, respectively.

In summary, percentage of cows exposed weaning a calf indicated that it was more difficult to manage fall-calving cows than spring-

Table 5: Least-squares means for average cow weight[a].

Comparison	Average cow wt. (lb)
Breed group:	
HA	969.7[bc]
AH	960.0[bc]
1/4B:1/4H:1/2A	915.3[b]
1/4B:1/4A:1/2H	916.9[bc]
BA	980.4[bc]
BH	995.5[c]
Season:	
Spring	879.3[d]
Fall	1033.3[e]
Age of Dam:	
3	981.9[f]
4	992.2[f]
5	894.8[g]

[a]Average of weight at breeding and weight of weaning.
[bc]Breed group means not sharing a common superscript are different (P<.05).
[de]Season means not sharing a common superscript are different (P<.05).
[fg]Age of dam means not sharing a common superscript are different (P<.05).

calving cows to calve at regular intervals. Progeny performance, in general, tended to increase as proportion Brahman breeding increased. Within each of the three levels of Brahman breeding, those cows with Hereford dams tended to raise larger calves than did cows with Angus dams. However, these differences were seldom significant. Preweaning average daily gain was different for calves in the two seasons; however, weaning weight was not affected by season due to the longer preweaning period for fall calves. Calves in the fall group were also taller at weaning than spring-calves; however, this difference is again probably due to the different weaning ages of the two groups.

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