

PRODUCTIVITY OF TWO-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 two-year-old crossbred heifers with 0, 1/4 and 1/2 Brahman breeding was evaluated over a three year period on 200 spring-calving cows and 170 fall-calving cows. A significant proportion Brahman breeding x season of calving interaction was found for the percentage of cows exposed to breeding that weaned a calf. The percentage of cows weaning a calf was similar for all three crossbred cow groups in the spring-calving herd, however in the fall-calving herd the percentage of cows weaning a calf was lower for all crossbred groups with the reduction being more severe as proportion Brahman breeding increased. The average 205-day adjusted weaning weight of the spring-born calves was similar to the average 240-day adjusted weaning weight of fall-born calves. Calves from 1/4 and 1/2 Brahman cows were 48 and 53 lb heavier, respectively, than the calves from 0 Brahman cows which averaged 478 lb. These data indicated that spring calving is advantageous to fall calving. In the spring-calving herd, Brahman cross cows were more productive than 0 Brahman cows, however, the reverse was true in the fall-calving herd.

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

Introduction

Crossbreeding has long been used in beef cattle in efforts to increase efficiency of production. However, it has been found that different environments have varying effects on different crossbred types due to genotype x environment interactions. Evaluation of this genotype x environment interaction is the purpose of a study currently being conducted by the Oklahoma Agricultural Experiment Station. In order to evaluate possible interactions between crossbred type (genotype) and season of calving (environment), this project was designed to use crossbred cows with different proportions of Brahman breeding managed under spring and fall calving systems. The objective of this portion of the study was to determine the effects of proportion of Brahman breeding, season of calving and the interaction between proportion Brahman breeding and season of calving on productivity to weaning of two-year old females.

The traits analyzed were percentage of cows weaning a calf, percentage of cows requiring assistance at birth, birth weight, preweaning average daily gain, weaning weight, weaning hip height, and weaning conformation score and condition score.

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Experimental Procedure

The mating system utilized to produce the females for this project consisted of 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 containing 0 Brahman breeding (Angus-Hereford and Hereford-Angus), 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 breeding (1/2 Brahman-1/2 Hereford and 1/2 Brahman-1/2 Angus). 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 being used for 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).

The heifer calves remained at the Southwestern Livestock and Forage Research Laboratory, El Reno, OK after weaning and were managed to calve first as two-year-olds. The heifers were maintained on native tallgrass and bermudagrass pastures through their development and production of their first calf. Heifers from the first two years were exposed to Limousin bulls for a 75-day breeding season. Heifers from the third year were synchronized and bred to Limousin bulls by artificial insemination once. Following artificial insemination, the heifers 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.

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 being creep fed. 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 because fall-born calves in Oklahoma are typically weaned at an older age than spring-born calves. Calf weight, hip height, condition score and conformation score were determined at weaning. Reproduction, birth and weaning data were collected over a three-year period on 200 spring-calving cows and 170 fall-calving cows. The data were analyzed by least-squares procedures to determine the effect of proportion Brahman breeding, season of birth and the interaction between proportion Brahman breeding and season of birth.

Results and Discussion

Analyses showed that the percentage of cows exposed to breeding that weaned a calf was significantly influenced by the proportion Brahman breeding x season of calving interaction. Thus, the least-squares means are presented for each crossbred group separately for each calving season in Table 1. Within the spring-calving group, there were no differences between the 0, 1/4 and 1/2 Brahman cows. Within the fall-calving group, 1/4 and 1/2 Brahman cows weaned 33.1 and 46.4 percentage points fewer calves, respectively than 0 Brahman cows, of which 54.0% exposed weaned a calf. The percentage of cows in the fall-calving herd that weaned a calf was lower than for the spring-calving

Table 1: Percentage of cows exposed to breeding that weaned a calf.

Season of birth	Proportion Brahman breeding		
	0	1/4	1/2
Spring	81.1 ^a	89.4 ^a	80.8 ^a
Fall	54.0 ^a	20.9 ^b	7.6 ^c

a,b,c Means in the same row not sharing a common superscript are different (P<.05).

herd for each proportion Brahman breeding group and the magnitude of the decrease was greater as proportion Brahman breeding increased.

For all of the calf traits examined, there was no significant interaction between proportion Brahman breeding and season of calving. Therefore, it was appropriate to calculate least-squares means for proportion Brahman groups averaged over calving seasons and least-squares means for calving season averaged over proportion Brahman groups.

Least-squares means for calving difficulty, birth weight and preweaning average daily gain are presented in Table 2. Calving difficulty was measured as the percentage of cows calving that required assistance and received a calving difficulty score of 3, 4, or 5. The 1/2 Brahman cows had the least calving difficulty (9.6%), 1/4 Brahman cows had the most calving difficulty (29.5%) and 0 Brahman cows were intermediate (17.0%). Spring-calving cows had significantly more calving difficulty than the fall-calving cows as 21.4% of spring-calving cows received assistance compared with 15.9% of fall-calving cows. The 1/2 Brahman cows had calves that were lightest at birth (68.5 lb) as

Table 2: Least-squares means for calving difficulty, birth weight and preweaning average daily gain.

Comparison	Number of calves	Calving difficulty ^a %	Birth weight lb	Preweaning ADG lb/day
Proportion Brahman:				
0	73	17.0 ^b	71.8 ^{bc}	1.58 ^b
1/4	152	29.5 ^b	72.7 ^b	1.79 ^c
1/2	145	9.6 ^c	68.5 ^c	1.84 ^c
Season of calving:				
Spring	200	21.4 ^d	74.6 ^d	1.86 ^d
Fall	170	15.9 ^d	67.4 ^e	1.61 ^e

^aPercent requiring assistance calving (those with calving difficulty scores of 3, 4 or 5).

^{b,c}Proportion Brahman group means for a trait not sharing a common superscript are different (P<.05).

^{d,e}Season of birth means for a trait not sharing a common superscript are different (P<.05).

they were 3.3 lb lighter than calves from 0 Brahman cows and 4.2 lb lighter than calves from 1/4 Brahman cows. Birth weight of calves from 0 and 1/4 Brahman cows was similar. Calves from spring-calving cows were 7.2 lb heavier at birth than those from the fall-calving cows.

Preweaning ADG (Table 2) and weaning weight (Table 3) were similar for calves from 1/4 and 1/2 Brahman cows. Calves from 1/2 Brahman cows outgained calves from 0 Brahman cows by .26 lb/day and were consequently 53 lb heavier at weaning. Calves from 1/4 Brahman cows outgained the calves from 0 Brahman cows by .21 lb/day and were therefore 48 lb heavier at weaning. Fall-born calves gained weight .25 lb/day slower than spring-born calves but because of being weaned 35 days older, the fall-born calves had similar weaning weights to the spring-born calves.

Least-squares means for weaning weight, hip height, conformation score, and condition score are presented in Table 3. Calves from 1/4 and 1/2 Brahman cows were similar in hip height and were 3.1 and 3.7 in taller, respectively, than calves from 0 Brahman cows. Fall-born calves, which were 35 days older at weaning, were 4.6 in taller than spring-born calves.

Conformation scores, which reflect amount of muscling, were similar for calves from 0 and 1/2 Brahman cows and both were slightly lower than calves from 1/4 Brahman cows; however, these differences were not significant. Calves from 1/4 Brahman cows received significantly higher condition scores than did calves from 0 and 1/2 Brahman cows. Neither conformation nor condition scores were significantly affected by season of calving.

In summary, these data indicated that it was difficult to manage fall-born heifers to calve first at two years of age and this difficulty increased as proportion of Brahman breeding increased. Among the spring-calving cows there was increased productivity from the Brahman-cross cows.

Table 3. Least-squares means for weaning weight, hip height, conformation score and condition score.

Comparison	Weaning weight, lb ^a	Hip height in ^b	Conformation score ^c	Condition score ^d
Proportion Brahman:				
0	478 ^e	42.1 ^e	12.8 ^e	5.3 ^e
1/4	526 ^f	45.2 ^f	13.1 ^f	5.3 ^e
1/2	531 ^e	45.8 ^f	12.9 ^{ef}	5.1 ^e
Season of calving				
Spring	512 ^g	42.1 ^g	12.9 ^g	5.3 ^g
Fall	511 ^g	46.7 ^h	12.9 ^g	5.2 ^g

^a205-day and 240 day weights, respectively, for spring-born and fall-born calves. Weights are also adjusted for sex of calf.

^bHip heights adjusted to 205 and 240 days of age respectively, for spring- and fall-born calves. Heights also adjusted for sex of calf.

^cConformation score: 12=low choice and 13=average choice.

^dCondition score: 1=thin, 5=average and 9=fat.

^{e, f}Proportion Brahman group means for a trait not sharing a common superscript are different ($P < .05$).

^{g, h}Season of birth means for a trait not sharing a common superscript are different ($P < .05$).

Literature Cited

Bolton, R.C. et al. 1986. Performance of 0, 1/4 and 1/2 Brahman crossbred calves in spring and fall calving systems. Okla. Agr. Exp. Sta. MP-118:21.