MILK PRODUCTION OF CROSSBRED COWS WITH 0, 1/4, AND 1/2 BRAHMAN BREEDING IN SPRING AND FALL CALVING SYSTEMS

M.N. McCarter[1], R.R. Frahm[2], E.D. Tinker[1], J.W. Castree[1] and S.W. Coleman[3]

Story in Brief

Twelve-hour milk production was evaluated on 160 spring-calving and 153 fall-calving cows over a two-year period from five crossbred groups (1/2 Angus-1/2 Hereford, 1/4 Brahman-1/4 Hereford-1/2 Angus, 1/4 Brahman-1/2 Hereford-1/4 Angus, 1/2 Brahman-1/2 Angus and 1/2 Brahman-1/2 Hereford). Milk production was measured monthly using weigh-suckle-weigh procedures for the entire lactation period. Differences between crosses with the same proportion Brahman breeding were not significant. Thus, data were analyzed and reported by proportion Brahman breeding (0, 1/4 and 1/2 Brahman). Interactions between proportion Brahman breeding and season of calving were nonsignificant with the exception of the fifth month. Lactation curves were different for the two seasons. Spring calving cows were low the first month, peaked in the second month and declined monthly thereafter, whereas fall calving cows peaked in the first month and declined monthly thereafter. Average 12-hour milk production for the two seasons of calving wre similar (6.65 and 6.79 lb for spring and fall, respectively). Average 12-hour milk production for the 6-month period of 1/4 and 1/2 Brahman cows was .65 lb (10.6%) and .86 lb (13.8%) higher than 0 Brahman cows (6.22 lb). These results indicate that the use of Brahman breeding in a crossbred cow where the balance of the genetic composition is Angus and/or Hereford breeding will likely result in increased milk production which should lead to heavier calves at weaning.

(Key words: Crossbreeding, Brahman, Milk Production, 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 some crossbred types perform better in some environments than do other 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 cow 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 crossbred group or level of Brahman breeding, season of calving and the interaction between crossbred groups or level of Brahman breeding and season of calving.

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[1]Graduate Assistant, [2]Professor, [3]Research Scientist, USDA-ARS

Experimental Procedure

A description of the mating system to produce the crossbred females used in this study and the management of the cow herd is given by McCarter et al. (1987). Monthly measurements of 12-hour milk production were obtained using weigh-suckle-weigh procedures on 160 spring-calving and 153 fall-calving cows randomly selected from the five different crossbred groups (1/2 Angus-1/2 Hereford, 1/4 Brahman-1/2 Angus-1/4 Hereford, 1/4 Brahman-1/4 Angus-1/2 Hereford, 1/2 Brahman-1/2 Angus, 1/2 Brahman-1/2 Hereford). Cow-calf pairs from each crossbred group were randomly assigned to one of four milk production groups. The order in which the milk production groups were processed each month was randomly determined. The calves were separated from the cows as late as possible, normally 6:00 PM, the day prior to taking measurements. Calves were allowed to nurse starting at 5:45 AM on the day of milk production measurement. Calves were separated from their dams after they finished nursing. Calves were weighed beginning at 11:45 AM and placed with their dams. After nursing the calves were reweighed. The difference in calf weight after and before nursing estimates the milk consumed by the calf and also estimates the milk produced by that cow during the previous six-hour period. The calves remained separated from their dams for the next six hours and the 11:45 AM procedure was repeated at 5:45 PM. Calves were returned to their dams and the cow-calf pairs were returned to the pastures from which they came the day before. Cows had hay and water available at all times while in confinement the night before and the day of milk production measurement. At all other times the cow-calf pairs remained on native tallgrass and bermudagrass pastures.

Measurements on spring-calving cows were taken for six months (April to September) while fall-calving cows were evaluated for seven months (November to May). The discrepancy in the number of measurements taken was due to the fact that spring-born calves were weaned at approximately 205 days of age while the fall calves were weaned at approximately 240 days of age. Estimates of 12-hour milk production were obtained by adding the 11:45 AM measurement and the 5:45 PM measurement. Average 12-hour milk production was calculated as the mean of the measurements for the first six months of lactation. The 12-hour milk production data were then analyzed to determine the effects of crossbred group or proportion Brahman breeding, season of calving and crossbred group or proportion Brahman breeding x season of calving interactions.

Results and Discussion

The significance levels of the factors in the analyses of variance of the 12-hour milk production data for each of the first 6 months of lactation and the average over 6 months is presented in Table 1. Crossbred group and proportion Brahman breeding were found to be significant for only two of the months and the 6-month average milk production. Season of calving significantly affected milk production in three of the months. The interaction between crossbred group and season was a significant effect for only one month as was the interaction between proportion Brahman and season.

It was found that no significant differences existed between the two groups of 1/4 Brahman females or between the two groups of 1/2 Brahman females. Therefore, the five crossbred groups were combined

Table 1. Significance levels of factors in the analyses of variance.

Source	Month of lactation						
	1	2	3	4	5	6	6-month average
Crossbred group[a] (A)	NS	**	NS	*	NS	NS	**
Proportion Brahman(B)	NS	**	*	NS	NS	NS	**
Season of birth(C)	**	NS	NS	**	NS	**	NS
Interactions:							
A x C	NS	NS	NS	NS	NS	**	NS
B x C	NS	NS	NS	NS	*	NS	NS

[a]Two separate analyses were performed, the first divided the cows into five crossbred breed groups, the second divided the cows into three groups based on proportion Brahman breeding.
*Effect is significant at the .05 probability level.
**Effect is significant at the .01 probability level.
NS Effect is not significant (probability < .10).

into three groups based on proportion of Brahman breeding (0, 1/4, and 1/2) for the remainder of the analyses.

Graphs of mean 12-hour milk production levels of the spring-calving cows and fall-calving cows are presented in Figures 1 and 2, respectively. In general, milk production tended to increase as proportion of Brahman breeding increased with proportion Brahman

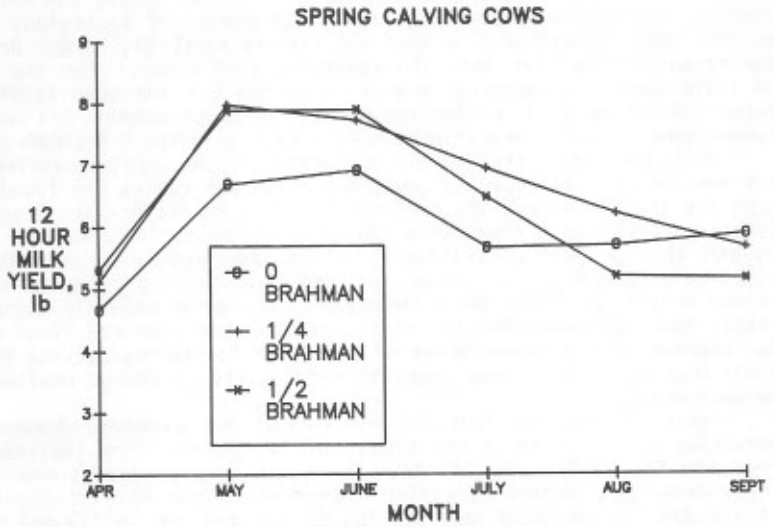

Figure 1: Average 12-hour milk production of 0 Brahman, 1/4 Brahman and 1/2 Brahman cows managed in a spring-calving system.

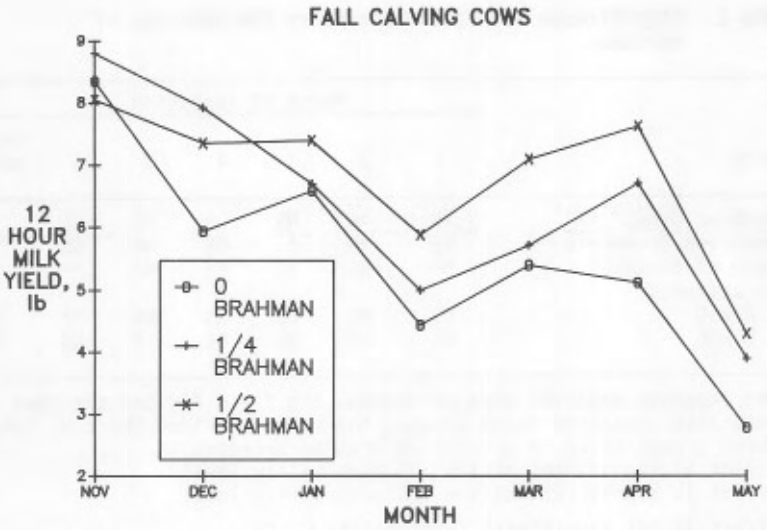

Figure 2: Average 12-hour milk production of 0 Brahman, 1/4 Brahman and 1/2 Brahman cows managed in a fall-calving system.

breeding being a significant effect on milk production for the second and third months only. Season of calving significantly influenced milk production in the first, fourth, and sixth months. The interaction between proportion Brahman breeding was a significant effect for the fifth month only, therefore it is appropriate to compare the 6-month average for 12-hour milk production among crossbred groups and season of calving. For the first, fourth, and sixth months of lactation, season was the only significant effect as the fall-calving group produced significantly more milk than the spring-calving group. For the second and third months, proportion Brahman breeding was the only significant factor affecting milk production. During these months 1/4 and 1/2 Brahman cows produced significantly more milk than the 0 Brahman cows.

When comparing the lactation curves of the spring-calving cows with that of the fall-calving cows, two different curves are found. The curve for the spring-calving cows has the more characteristic shape of a lactation curve as it starts low (April), increases for a month, levels out and then gradually declines. Unlike the lactation curve for the spring-calving cows, the curve for the fall-calving cows is at its maximum height the first month (November), decreases steadily during the winter, then increases for two months and declines for the final month. The increase in the second month of lactation for spring-calving cows is likely due to the increased quantity and quality of forage available in the pastures.

Table 2 contains least-squares means for average 12-hour milk production over the first six months of lactation. The least-squares means are for 0, 1/4 and 1/2 Brahman groups across seasons and season across proportion Brahman breeding. Average 12-hour milk production of 1/4 and 1/2 Brahman cows was .65 lb (10.6%) and .86 lb (13.8%) higher than 0 Brahman cows indicating an advantage in milk producing ability due to increased proportion Brahman breeding. Least-squares means for

Table 2. Least-squares means for average 12-hour milk production.

Comparison	Average 12-hour milk production
Proportion Brahman:	
0	6.22[a]
1/4	6.87[b]
1/2	7.08[b]
Season of calving:	
Spring	6.65[c]
Fall	6.79[c]

[a,b]Proportion Brahman group means for average 12-hour milk production not sharing a common superscript are different ($P<.05$).
[c]Season of birth means for average 12-hour milk production not sharing a common superscript are different ($P<.05$).

fall-calving and spring-calving groups were similar for 6-month average 12-hour milk production.

In summary, for average 12-hour milk production over the first six months of lactation, the proportion Brahman breeding x season of calving interaction was not significant. Average milk production increased as proportion Brahman breeding increased. The 1/4 and 1/2 Brahman cows produced 10.6% and 13.8% more milk than 0 Brahman cows. Average milk production of spring and fall calving cows was similar. These data indicate that use of Brahman breeding as part of the crossbred cow where the balance of the genetic composition is Angus and/or Hereford breeding will likely result in increased milk production and should also result in heavier calf weaning weight.

Literature Cited

McCarter, M.N. et al. 1987. Productivity of two year old crossbred cows that are 0, 1/4 and 1/2 Brahman in spring versus fall calving systems. Okla. Agr. Exp. Sta. MP-119:6.