

Effects of Two Milk Levels on Performance of Two Calf Types

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Story in Brief

The effect of two levels of milk intake on the performance of calves of two growth potentials on range was determined. This was accomplished by breeding Hereford x Holstein (crossbred) cows to Charolais x Angus bulls and Holstein cows to Charolais bulls, followed by reciprocal cross-fostering whereby calves of each breed combination were exposed to a medium (crossbred) or high (Holstein) level of milk. In this study, a smaller than desired difference between the medium and high levels of milk production was observed due to a lower than normal production of milk by the Holstein cows. This reduced milk level of the Holsteins was attributed to the accumulative effects of six consecutive years of production under Oklahoma range conditions.

The high level of milk (23-25 lb/day, produced by Holsteins) resulted in an additional 75 pounds of weaning weight in Charolais-Angus x Hereford-Holstein (crossbred x crossbred) calves. Increasing the level of milk consumption from 19.1 to 25.1 lb./day resulted in a reduction in apparent efficiency of conversion of milk to calf gain of 17 percent in crossbred x crossbred calves. Charolais x Holstein calves on the high level of milk consumed only 1.8 lb more milk per day than on the medium level of milk. Among Charolais x Holstein calves the high level of milk resulted in an additional 26 pounds of weaning weight, although 15 pounds of additional milk was required for each pound of additional gain.

Relative forage intake was reduced 49 percent in Charolais x Holstein calves on the high level of milk, but was not influenced by level of milk intake in crossbred x crossbred calves.

Introduction

Selection for increased calf weaning weight usually results in an automatic selection for higher milk production in cows due to the strong positive relationship between milk production level and calf weaning weight. In recent years, there has been considerable interest in the infusion of dairy breeding into beef herds as a means of increasing the milk yield of cows and intensifying the cow-calf enterprise.

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Since 1969 an intensive research effort at the Oklahoma Agricultural Experiment Station has been directed toward defining the relationships between milk production levels, resource (land and supplemental feed) requirements, reproduction of cows, and calf performance of Hereford, Hereford x Holstein, and Holstein cows managed under tallgrass range conditions.

Increasing the milk production level in cows resulted in distinct increases in calf weaning weights. However, the effects of increased milk consumption on calf performance were not clear since level of milk production was confounded by genetic differences for growth rate in dams of the calves.

Wyatt *et al.* (1976) reported results of reciprocal cross-fostering of calves of Holstein and Hereford cows, resulting in calves of two growth potentials, raised on two milk levels (low and high). This report will present results of calves raised on medium and high milk levels.

Materials and Methods

Thirty-one Hereford x Holstein (crossbred) and Holstein cows were used to study the effects of two levels of milk intake on calves of two growth potentials. A system was devised whereby calves of similar growth potential could be exposed to a medium (crossbred) and high (Holstein) level of milk consumption. The Hereford x Holstein cows were bred to Charolais x Angus bulls, and Holstein cows bred to Charolais bulls followed by reciprocal crossfostering of about one-half of the calves at birth. Thus, within each calf breed (crossbred x crossbred and Charolais x Holstein) one group was the recipient of a medium level of milk (19 to 21 lb./day) while another group received a high level of milk (23-25 lb./day).

All cows were seven-year-olds producing their sixth calf. Cows were maintained on tallgrass native range, and calved during December, January, and February.

Cows received a post-calving winter supplement level considered adequate for their size and milk production level, based on the results of earlier work at this station. Crossbred and Holstein cows were fed 5.2 and 7.6 pounds per day, respectively, of a 28 percent all-natural crude protein supplement. These supplement levels were calculated to allow a 20 percent winter weight loss including calving.

Parturition was induced in some cows by the administration of 40 mg. dexamethazone (Azium) within 10 days of the expected calving date to facilitate scheduling of the cross-fostering program.

Forage intake of calves was estimated in August 1976, while calves were on lush native pasture. Relative forage intake by calves was estimated by use of an external indicator technique employing chromic oxide as the indicator.

Results and Discussion

Performance of cows is summarized in Table 1. Supplement was fed at the rate of 5.2 and 7.6 pounds per day to the crossbred and Holstein cows, respectively. Winter weight losses were similar for both breeds, with cows raising the larger Charolais x Holstein calves tending to lose more weight. Since cross-fostering was conducted on the first calves born, calves raised on their natural dams (crossbred x crossbred on crossbred cows and Charolais x Holstein calves on Holstein cows) were generally born from two to four weeks after the cross-fostered calves.

Calf performance is summarized in Table 2. Crossbred x crossbred calves consumed 19.1 and 25.1 pounds of milk daily at the medium and high milk levels, while Charolais x Holstein calves consumed 21.0 and 22.8 pounds of milk daily at the medium and high levels, respectively. In previous years, the Holstein cows had averaged from 27-29 pounds of milk per day over the 240-day period. Apparently, the cumulative effects of six consecutive lactations under range conditions reduced the milking ability of the Holsteins. Lower milk production was especially noticeable among the Holsteins nursing Charolais x Holstein calves. This may be partially explained by the 32-day later average calving date of the Charolais x Holstein calves. Later calving

Table 1. Performance of cows

Breed of dam Breed of calf	Hereford x Holstein		Holstein	
	Crossbred Charolais x crossbred x Holstein	Charolais x Holstein	Crossbred Charolais x crossbred x Holstein	Holstein
Daily winter supplement post-calving, lb.	5.2	5.2	7.6	7.6
Weight, Fall 1975, lb.	1148	1196	1344	1292
Weight, Spring 1976, lb.	963	955	1106	1051
Winter weight change, lb.	-185	-241	-283	-241
Winter weight loss, %	16.1	20.2	17.7	18.7
Calving date	1-21-75	1-5-75	1-4-75	2-6-75

Table 2. Performance of calves

Breed of calf Milk intake level	Crossbred x cross bred		Charolais x Holstein	
	Medium	High	Medium	High
Daily milk consumption, lb.	19.1	25.1	21.0	22.8
Birth weight, lb.	67.9 ³	79.9	89.9	88.2
Weaning weight, lb. ¹	589	644	674	700
Daily gain, lb. ²	2.17	2.43	2.43	2.55
Conformation grade ³	11.9	10.9	10.4	11.0
Condition score ⁴	5.9	6.8	5.1	4.5

¹240-day sex corrected weaning weight. Sex correction factor of 1.05 used to adjust heifers to a steer equivalent.

²Rate of daily gain adjusted for birth weight.

³10 = average good, 11 = high good, 12 = low choice.

⁴1 = very thin, 9 = very fat.

dates with a resulting longer portion of the lactation in late summer would tend to reduce milk production and weaning weight. This is supported by the lower milk production seen for crossbred cows raising crossbred x crossbred calves.

At weaning crossbred x crossbred calves consuming the high levels of milk (25.1 pounds) were 75 pounds heavier than calves receiving the medium milk level (19.1 pounds). This represents a 11 percent increase in weaning weight or an additional 0.26 pounds per day gain. Increased milk consumption was also reflected in condition scores of the calves. Condition scores for crossbred x crossbred calves were 5.9 and 6.8 for the medium and high milk levels. Charolais x Holstein calves receiving the high level (22.8 pounds) were 26 pounds heavier at weaning than calves at the medium level (21.0 pounds). This was a four percent increase in weaning weight or an additional 0.12 pounds of gain per day. As previously mentioned, calving dates may have reduced weaning weights for both the crossbred x crossbred calves on the medium level of milk, and the Charolais x Holstein on the high level.

As milk consumed and rate of gain increased, the apparent efficiency with which milk was utilized for gain decreased (Table 3). Crossbred x crossbred calves receiving the high milk level required 1.5 pounds more milk per pound of gain. This represents a 15 percent decrease in the efficiency of milk utilization by calves at the high level of intake. An additional 23.1 pounds of milk was required to produce an additional pound of gain above that of crossbred x crossbred calves receiving the medium milk level. Charolais x Holstein calves consuming the high milk level required 0.3 pounds more milk per pound of gain compared to calves receiving the medium milk level. This represents a three percent decrease in efficiency of utilization compared to calves receiving

Table 3. Milk conversion efficiency

Breed of calf	Crossbred x crossbred		Charolais x Holstein	
	Medium	High	Medium	High
Milk per lb gain, lb.	8.8	10.3	8.6	8.9
Additional milk per lb. additional gain, lb.		23.1		15.0

Table 4. Relative forage intake

Breed of calf Milk intake level	Crossbred x crossbred		Charolais x Holstein	
	Medium	High	Medium	High
Actual milk production at trial	13.4	17.4	15.5	16.7
Dry matter intake/day, lb.	4.19	4.75	6.61	4.57
Relative forage intake	100	113	158	109

¹Expressed as percent of forage intake by crossbred x crossbred calves at the medium milk intake level.

the medium level or an additional 15 pounds of milk to produce an additional pound of weaning weight.

Milk production levels of cows of both breeds were similar and low during August when forage intake of the calves was estimated. The lack of a difference in milk production between the medium and high levels makes interpretation of the data difficult. Based on previous studies at this station, none of the milk production levels at the time of the trial would be expected to affect calf forage intake. The overall greater forage intake by the larger Charolais x Holstein calves may reflect their greater size and capacity to consume forage.

References:

Wyatt, R.D., Leon Knori, M.B. Gould, and Robert Totusek. 1976. Oklahoma Agri. Exp. Sta. MP-96: 38-42.

A Comparison of Milk Production in Angus and Hereford Cattle Under Range Conditions

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Story in Brief

For six consecutive summers from 1967 through 1972 milk production data and calf weights were obtained on 144 Hereford cow-calf pairs and 315 Angus cow-calf pairs. On the average, Angus cows produced 5.05 pounds more milk per day during the six-month lactation period than Hereford cows. The lactational pattern for both Hereford and Angus cows indicated that milk production tended to increase up to the third month of lactation and declined thereafter. On the average, Angus calves consumed 5.05 pounds more milk per day, gained 0.15 pounds more per day to weaning, weighed 32 pounds more at weaning and were fatter at weaning than Hereford calves. Hereford calves

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