

Effects of Two Milk Levels on Prewaning Performance of Two Calf Types

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Story in Brief

The effect of two levels of milk intake on the pre-weaning performance by calves of two growth potentials was determined. This was accomplished by breeding Hereford cows to Angus bulls and Hereford x Holstein (crossbred) cows to Charolais x Angus bulls, followed by reciprocal cross-fostering whereby calves of each breed combination were exposed to a low (Hereford) or medium (crossbred) level of milk.

The medium level of milk consumption (16-18 lb /day, produced by Crossbreds) resulted in an additional 88 and 121 lb of weaning weight in Angus x Hereford and Charolais-Angus x Hereford-Holstein (crossbred x crossbred) calves, respectively. Increasing the level of milk consumption from 10 to 16-18 lb/day resulted in a reduction in apparent efficiency of conversion of milk to calf gain of 26 and 37 percent in Angus x Hereford and Crossbred x Crossbred calves, respectively.

Increasing the milk consumption level of calves can increase calf growth rate but the desirability of this strategy for intensification will depend on the relationship between the costs of providing higher energy and protein requirement of heavier milking cows and return from additional calf gain.

Introduction

Recent economic conditions have made it essential for the cow-calf producer to efficiently improve the productivity of his herd. To the commercial producer, this means pounds of calf available for market at the time of weaning. 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 rapidly increasing the milk yield of cows and intensifying the cow-calf enterprise.

Increasing the milk production level in cows using beef-dairy crossbreeding has resulted in distinct increases in calf weaning weights. However, the effects of increased milk consumption on calf performance are not clear since the effects of increased milk level were confounded with genetic differences for growth rate potential in calves.

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The purpose of this study was to compare the effects of two levels of milk intake on the preweaning performance of calves of two growth potentials managed under range conditions.

Materials and Methods

Twenty-three Hereford and 15 Hereford x Holstein (crossbred) cows were used to study the effects of two levels of milk intake on calves of two growth potentials. A system was employed whereby calves of similar breeding could be exposed to a low (Hereford) and medium (crossbred) level of milk consumption. This was accomplished by breeding the Hereford cows to Angus bulls and the Crossbred cows to Charolais x Angus bulls followed by reciprocal cross-fostering of about one-half of the calves at birth. Thus, within each calf breed (Angus x Hereford and Crossbred x Crossbred) one group was the recipient of a low level of milk (10 to 11 lb/day) while another group received a medium milk level (16 to 18 lb/day).

All cows were eight-year-olds producing their seventh calf. Cows were maintained on tallgrass native range and calved during December and January.

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. Hereford and Crossbred cows were fed 3.0 and 6.0 lb per day, respectively, of a 30 percent all-natural crude protein supplement. These supplement levels were calculated to allow a 20 percent winter weight loss including weight loss at calving.

Parturition was induced in some cows by administration of 40 mg dexamethazone (Azium) within 10 days of their projected calving date to allow scheduling of the cross-fostering program. Calves were grafted on to foster dams within 12 hr following birth.

Forage intake trials were conducted in May and August 1977 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. Winter weight losses were similar for both cow breeds. Calves raised on their natural dams (Angus x Hereford on Hereford cows and Crossbred x Crossbred calves on Crossbred cows) had average birth dates one to two weeks after the cross-fostered calves.

Calf performance is shown in Table 2. Angus x Hereford calves consumed 10.6 and 16.3 lb of milk daily of the low and medium milk levels, while Crossbred x Crossbred calves consumed 10.3 and 18.0 lb of milk daily at the low and medium levels, respectively. When exposed to equivalent milk levels,

Table 1. Performance of cows

Breed of dam Breed of calf	Hereford		Hereford x Holstein	
	Angus x Hereford	Crossbred x Crossbred	Angus x Hereford	Crossbred x Crossbred
Daily winter supp post-calving, lb.	3.0	3.0	6.0	6.0
Weight, Fall 1976, lb	1146	1146	1228	1257
Weight, Spring 1977, lb	930	934	988	993
Winter weight change, lb	-216	-212	-240	264
Winter weight loss, %	18.8	18.5	19.5	21.0
Calving date	1-9-77	12-31-76	12-30-76	1-14-77

Table 2. Performance of calves

Breed of calf Milk intake level	Angus x Hereford		Crossbred x Crossbred	
	Low	Med	Low	Med
Daily milk consumption, lb	10.6	16.3	10.3	18.0
Birth weight, lb	68.2	68.6	74.6	79.6
Weaning weight, lb ^a	524	612	493	614
Daily gain, lb ^b	1.91	2.22	1.72	2.22
Conformation grade ^c	12.0	13.3	10.9	12.9
Condition score ^d	5.1	6.4	4.5	4.7

^a240-day sex corrected weaning weight. Sex correction factor of 1.05 used to adjust heifers to a steer equivalent.

^bRate of daily gain adjusted for birth weight.

^c11=high good, 12=low choice, 13=average choice.

^d1=very thin, 9=very fat.

Angus x Hereford and Crossbred x Crossbred calves consumed about the same amount of milk. Thus, it appears that the potential growth rate of calves had little effect on milk intake in this study. The range in milk consumption observed here should include levels which would be encountered under most range beef cattle production situations.

At weaning, Angus x Hereford calves consuming the medium levels of milk (16.3 lb) were 88 lb heavier than calves receiving the low milk level (10.6 lb). This represents a 17 percent increase in weaning weight or an additional .31 lb per day gain. Increased milk consumption was also reflected in condition scores (apparent fatness) of the calves. Condition scores for Angus x Hereford calves were 5.1 and 6.4 for the low and medium milk levels.

Crossbred x Crossbred calves receiving the medium level (18.0 lb) and 121 lb heavier at weaning than calves at the low level (10.3 lb). This was a 25 percent increase in weaning weight or an additional .50 lb of gain per day. Among Crossbred x Crossbred calves, the level of milk intake had little effect upon condition score. It is interesting to note that the larger Crossbred x Crossbred calves showed no advantage in growth rate when raised on equivalent milk levels with the smaller Angus x Hereford calves.

As milk consumed and rate of gain increased the apparent efficiency with which milk was utilized for gain decreased (Table 3). Angus x Hereford calves

Table 3. Milk conversion efficiency

Breed of calf	Angus x Hereford		Crossbred x Crossbred	
	Low	Med	Low	Med
Milk per lb gain ^a , lb	5.8	7.3	6.0	8.2
Additional milk per lb additional gain, lb		18.6		25.0

^aGain from birth to weaning.

Table 4. Relative forage intake^a

Breed of calf	Angus x Hereford		Crossbred x Crossbred	
	Low	Med	Low	Med
Trial 1 (May)	100	96	98	86
Trial 2 (August)	100	98	101	94

^aExpressed as percent of forage intake by Angus x Hereford calves at the low milk intake level.

receiving the medium milk level required 1.5 lb more milk per pound of gain than calves on the low milk level. This represents a 26 percent decrease in the efficiency of milk utilization by calves at the high level of intake. An additional 18.6 lb of milk was required to produce one additional pound of gain above that of Angus x Hereford calves receiving the low milk level. Crossbred x Crossbred calves consuming the medium milk level required 2.2 lb more milk/lb of gain compared to calves receiving the low milk level. This represents a 37 percent decrease in efficiency of utilization compared to calves receiving the low level or an additional 25 lb of milk to produce one additional pound of weaned weight.

Forage intake by calves of the same breed combination consuming low or medium milk levels did not differ greatly, however, there was a trend toward higher forage intake by calves receiving the low milk level (Table 4). Higher forage intake levels would be expected due to the lower milk intakes of calves reared on low milk.