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Milk Expected Progeny Difference and Its Effect on Milk Production and Calf Performance in First Calf Heifers from Angus and Polled Hereford Sires

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Story in Brief

Milk Expected Progeny Differences (EPD) are used to evaluate the genetic merit for maternal ability in beef bulls. This study was designed to examine the effectiveness of Milk EPD for predicting calf weaning weight differences, calf milk consumption, and correlated changes in other traits associated with the two-year-old cow and her calf. Polled Hereford and Angus sires (n=36) were selected at the extremes (High vs Low) of each breed for milk EPD. Calves (n=195) out of daughters sired by these bulls were evaluated for differences in birth weight and 205-d weight, and the cows were evaluated for condition score and estimated 24-h milk production. Cows sired by High Milk EPD bulls had heavier calves at weaning (Polled Hereford, 232.2 kg; Angus, 229.9 kg) than did cows sired by Low Milk EPD bulls (Polled Hereford, 218.4 kg; Angus, 219.3 kg). Cows sired by High Milk EPD bulls had lower condition scores at weaning (Polled Hereford, 5.1; Angus, 4.9) than did cows sired by Low Milk EPD bulls (Polled Hereford, 5.3; Angus, 5.2). The actual difference in calf 205-d weight was extremely close to the predicted value by the Milk EPD for cows sired by Polled Hereford and Angus bulls. Milk EPD is an effective tool for identifying differences in maternal ability but there may be a small cost in ability to maintain condition.

(Key Words: Beef Cattle, Milk Expected Progeny Difference, Growth.)

Introduction

Calf weaning weight is an important trait in beef production and is greatly determined by cow maternal ability. It is generally assumed that maternal ability is largely a function of the milking ability of the cow. Thus milking ability of the cow herd plays a vital role in cow-calf production since weaning weight of the calf greatly influences net income. Calculation and use of expected progeny differences for maternal milk have heightened interest in selection for milk production. Beef cattle breed associations have adopted the use of the Milk Expected Progeny Differences (EPD) to predict the difference in weaning weight of calves from daughters of different bulls. The Milk EPD is an estimate of the milking ability of a bull's daughters compared with the average of the daughters of other bulls.

The purpose of this study was to quantify differences in milk production, calf performance and dam's body condition when sires of first calf heifers varied widely in Milk EPD.

Materials and Methods

Angus and Polled Hereford Bulls with large differences in Milk Expected Progeny Difference (Milk EPD) were mated to cows scheduled to calve from 1989 to 1991 (spring- and fall-calving). These cows were Hereford-Angus, 1/4 Brahman-1/4 Angus-1/2 Hereford, and 1/4 Brahman-1/2 Angus-1/4 Hereford.

Thirty-six bulls were chosen to form each of the four groups (High Milk EPD Angus n=9, High Milk EPD Polled Hereford n=9, Low Milk EPD Angus n=9, Low Milk EPD Polled Hereford n=9). Average Milk EPD from the four groups (Table 1) showed a difference of 12.0 and 14.2 kg for Polled Hereford and Angus sire groups, respectively. Daughters (n=195) of High and Low Milk EPD bulls had their first calves as 2-yr-olds in the spring and fall of 1991 (n=75), 1992 (n=76), and 1993 (n=44). Heifers from the four milk groups were randomly mated (artificial insemination) to Angus (n=2), Gelbvieh (n=1), Polled Hereford (n=2), and Salers (n=21) bulls at least twice and then placed in single sire breeding pastures with crossbred bulls for a total breeding period of 75 d. Spring-calving heifers were bred to calve in February, March, and April and fall-calving heifers were bred to calve in September, October, and November.

Condition scores were obtained for the heifers at 28-d intervals between birth and weaning. Birth weights were obtained and male calves were castrated within 24 h of birth. Calves remained with their dams on pasture and were not creep fed. Spring-born and fall-born calves were weaned at an average of 205 and 240 d, respectively. Fall-born calves were weaned at an older age because this is a common practice of Oklahoma production systems. Calf weight, hip height, condition score, and conformation score were determined at weaning. Calf weaning weights were adjusted to 205 d of age for spring- and fall-born calves.

Monthly estimates of 24-h milk production were obtained using weigh-suckle-weigh procedures on all cows during the first year of lactation (both spring and fall). Cows and calves were gathered from pastures and in holding pens the afternoon prior to measurement. Calves were separated from cows around 1800. The following morning at 0545 calves were placed with dams and allowed to nurse. Groups were then randomly separated into smaller pens (approximately 25 cows per pen). Calves were separated from dams as soon as the calves had finished nursing (15 to 30 min). This procedure was repeated at 1145 with the exception that calves were weighed prior to and after nursing. The difference between these two weights was considered to be the amount of milk produced by the dam in 6 h. The 1145 procedure was repeated at 1745. Estimates obtained at 1145 and 1745 milkings were summed and doubled to estimate 24-h milk production.

Spring-calving (April through September) and fall-calving (November through May) cows were evaluated for 6 mo. Six month average 24-h milk production was computed for both spring and fall groups using estimates for the first 6 mo of lactation.

Cows were maintained on native range and Bermuda grass pastures at Lake Carl Blackwell Research Range, located west of Stillwater, OK. Each pasture maintained approximately 40 cows. Bermuda hay and approximately 4 to 6 lb of 41% CP range cubes per day were provided for supplementation from October through May. Range cubes (41% CP) were also provided through the breeding season (March through June) for spring-calving cows.

Data were analyzed using least squares analysis of variance to determine the effects of cow group (CG), season of calving, year, sex of calf, and all two-factor interactions on 24-h milk production, age adjusted weaning weight, calf birth weight, and dam’s condition score. Sire of dam nested within CG was included in all models and was used to test CG.

Results and Discussion

Two-year-old cows sired by High Milk EPD Angus and Polled Hereford bulls had significantly higher ($P<.05$) 24-h milk production estimates than did 2-yr-old cows sired by Low Milk EPD Angus and Polled Hereford bulls (Table 2). Least squares means and standard errors for monthly measurements of 24-h milk production and Average Milk Production (AMP) are presented in Table 2 by cow breed group.

There were significant differences between the cow breed groups in the first, second, and fourth months. The groups sired by Angus were significantly different in those 3 mo, but the Polled Hereford sired groups were not significantly different in any of the 6 mo, even though the High Milk EPD Polled Hereford sired groups tended to have higher 24-h milk production estimates than the Low Milk EPD Polled Hereford sired groups. Although the six monthly lactation estimates indicated no significant difference between the Polled Hereford sired milk groups, High Milk Hereford cows produced more milk, on average ($P<.1$) than did Low Milk Hereford. There were no significant differences ($P>.10$) in birth weight between cow groups. Significant differences ($P<.05$) were found for 205-d adjusted calf weaning weights for the calves among the four different milk groups (Table 3). The difference was not significant ($P>.10$) between the High and Low Milk Angus groups even though the High Milk Angus tended to have heavier adjusted calf weaning weights than the Low Milk Angus. High Milk Herefords did have a significantly higher 205-d weight ($P<.05$) than did the Low Milk Herefords.

Logically, one would assume that heavier calf weights from daughters of High Milk EPD bulls are not likely obtained without some cost in the cow's ability to maintain size and condition. Indeed, body condition scores for daughters of High Milk EPD sires were lower ($P<.05$) than for daughters of Low Milk EPD sires (Table 3).

These results provide verification that Milk EPD is an accurate predictor of weaning weight differences of daughters' calves between Polled Hereford and Angus sires, and that producers who make bull selections based on Milk EPD should be able to use the values to rank bulls with confidence. The subsequent increase in calf weaning weight does not come without cost in the cow's ability to maintain herself. This suggestion is borne out in the loss of condition score for the High Milk groups.

Table 1. Average milk, birth weight, and weaning weight expected progeny differences (kg) (EPD) of Polled Hereford and Angus sires of first calf heifers.

Breed	n	Milk EPD level	Milk EPD	BW EPD	WW EPD
Angus	9	High	+8.3	+1.1	+8.5
Angus	9	Low	-5.9	+2.1	+11.4
P. Hereford	9	High	+3.1	+1.2	+10.1
P. Hereford	9	Low	-3.0	+2.5	+12.0

Table 2. Least squares means and standard errors for monthly measurements of 24-h and 6 mo average 24-h milk production (AMP) by cow group.

	Milk production (kg)			
Month of lactation[d]	Low Milk Hereford	High Milk Hereford	Low Milk Angus	High Milk Angus
First	$5.3 \pm .4^{b}$	$6.1 \pm .5^{ab}$	$4.9 \pm .4^{b}$	$6.4 \pm .4^{a}$
Second	$4.5 \pm .3^{bc}$	$5.3 \pm .4^{b}$	$3.6 \pm .4^{c}$	$4.9 \pm .3^{ab}$
Third	$4.5 \pm .4^{a}$	$4.4 \pm .5^{a}$	$3.7 \pm .5^{a}$	$4.9 \pm .4^{a}$
Fourth	$4.3 \pm .4^{ab}$	$4.8 \pm .5^{ab}$	$3.8 \pm .5^{b}$	$5.2 \pm .4^{a}$
Fifth	$3.9 \pm .3^{a}$	$4.2 \pm .4^{a}$	$3.4 \pm .4^{a}$	$4.3 \pm .3^{a}$
Sixth	$3.4 \pm .5^{a}$	$4.4 \pm .6^{a}$	$3.8 \pm .5^{a}$	$4.5 \pm .4^{a}$
AMP	$4.2 \pm .2^{bc}$	$4.8 \pm .3^{ab}$	$3.7 \pm .3^{c}$	$4.9 \pm .2^{a}$

a,b,c Means in a row with different superscripts are significantly different ($P<.05$).

d Means reported by month and AMP are in kg/24 h.

Table 3. Least squares means and standard errors for age adjusted weaning weight.

	Age adjusted weaning weight, kg		
Cow group	Birth wt, kg	Weaning wt, kg	Condition score
Low Milk Hereford	$36.5 \pm .67$	217.9 ± 4.2^{b}	$5.3 \pm .08^{a}$
High Milk Hereford	$36.4 \pm .83$	231.7 ± 5.2^{a}	$5.2 \pm .10^{a}$

Low Milk Angus	35.5 ± .79	218.9 ± 5.0[ab]	5.2 ± .10[a]
High Milk Angus	33.8 ± .65	229.4 ± 4.1[a]	5.0 ± .08[b]
a,bMeans in a column with different superscripts are significantly different (P<.05).			

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