

PERFORMANCE OF CALVES BY SIRES WITH EITHER LOW OR HIGH MATERNAL EXPECTED PROGENY DIFFERENCES

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Story in Brief

Spring and fall calving mature crossbred cows were mated to sires from one of four groups made up of either Angus or Polled Hereford bulls having either low or high expected progeny differences for the maternal component of weaning weight. A total of 396 birth and 382 weaning records from resulting calves were analyzed to detect any differences in preweaning performance associated with sire breeds and groups. Traits analyzed included birth weight, calving difficulty, preweaning average daily gain, age-adjusted weaning weight, weaning conformation, weaning condition and weaning hip height. Published expected progeny differences for the sires used in the study are presented, and indicate that small differences in preweaning growth may be expected among sire groups. Results from least squares analyses of variance indicated no detectable differences in any of the characters of interest that were attributable to either sire breed or group. Additional effects included in the analyses were found to have similar effects as in previously reported results.

(Key Words: Beef Cattle, Milk EPD, Maternal EPD, Preweaning.)

Introduction

In recent years, beef cattle producers have had the opportunity to obtain a vast array of information on which to base breeding decisions. Many breed associations currently publish sire summaries, in which results from best linear unbiased prediction (BLUP) analyses are reported. In most cases, these results are reported in the form of an Expected Progeny Difference (EPD) for several characters of economic importance. Early summaries contained primarily EPDs for growth traits such as birth weight, weaning weight and yearling weight. With producer acceptance of the technology, however, came an

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increase in the number of traits that were reported. Additional traits for which estimates of genetic merit are calculated include maternal ability, scrotal circumference, and for some of the larger breeds, measures of carcass merit.

An EPD for the maternal component of weaning weight, commonly referred to as a milk or a maternal EPD, is currently reported on bulls in all beef cattle sire summaries. Maternal EPDs are based on the genetic portion of an individual's weaning weight not accounted for by direct merit for growth. This is not necessarily the same thing as genetic merit for milk production. At this point, two major questions about maternal EPDs remain unanswered, namely; does a sire's maternal EPD accurately predict differences in weaning weight of his daughter's calves, and what is the association between maternal and other traits of economic importance?

A study designed to answer the above questions was begun in 1988. Semen was obtained from bulls with relatively high accuracy for either low or high maternal EPD. An effort was made to select bulls with similar genetic merit for growth traits, however, to maintain high accuracy on maternal EPD, some variability exists in the genetic potential for growth among the individual sires. The current study was conducted to determine if differences in the sires' direct genetic merit for growth were significantly associated with maternal EPD groups. This information is important in the objectives of the overall project to establish that the results obtained from milk production data are not associated with differences in growth potential of the females across sire groups. The results presented here are on the preweaning performance of calves born during the first two years of the study. Since differences in average growth EPDs among sire groups were small, differences in calf performance among sire groups are also expected to be small.

Materials and Methods

In 1988 and 1989, mature cows of six crossbred types (Angus x Hereford, Hereford x Angus, Brahman-Angus x Hereford, Brahman-Hereford x Angus, Brahman x Angus and Brahman x Hereford), calving during spring or fall calving seasons, were mated to Angus (AN) and Polled Hereford (HP) bulls. Within each sire breed, bulls with either a low (LO) or a high (HI) reported maternal EPD were selected. Three bulls of each breed-maternal EPD group combination were used each year in both seasons. EPDs obtained from the most recent available sire summaries, averaged across sires in groups, for birth weight, weaning weight direct, weaning weight maternal and yearling weight are presented in Table 1.

Calves were born between late January and early April, and between early September and late November for spring and fall calving seasons, respectively. Birth weight and calving difficulty score was recorded on each

Table 1. Average EPDs for birth weight, weaning weight (direct and maternal) and yearling weight, by sire group.

EPD	Angus ^a		Polled Hereford ^b	
	Low	High	Low	High
Birth wt	5.3	3.6	4.9	1.5
Weaning wt direct	25.3	20.7	18.5	15.4
Weaning wt maternal	-9.3	20.2	-4.0	23.6
Yearling wt	41.8	38.5	26.2	22.6

^a Source, American Angus Association (1991).

^b Source, American Polled Hereford Association (1991).

calf within 24 h of birth. Spring and fall-born calves were weaned at an approximate average age of 205 d and 240 d, respectively, and weaning weights were adjusted accordingly to 205 d and 240 d. Calf weight, conformation (muscling) score, condition score and hip height were recorded at the time of weaning.

A total of 396 birth and 382 weaning records were analyzed using least squares procedures. All traits were analyzed with a model that included the main effects of sire breed, maternal EPD group, calf sex and dam breed type nested within sire breed. Year, season and the two-way interactions of year by season and sire breed by season were also included in all models. The random effect of sires was used to test sire breed and maternal EPD group. Results of analyses on birth weight, calving difficulty, age-adjusted weaning weight, preweaning average daily gain, weaning conformation, weaning condition and weaning hip height are reported.

Results and Discussion

Based upon the group average EPDs in Table 1, it appears that slight differences in growth traits might be expected due to maternal EPD groups within breeds. Additionally, sire breed effects would not be unexpected, although comparisons of EPDs between breeds is inappropriate. Least squares means of calf performance for each trait considered are presented in Table 2, by sire breed and maternal EPD group. Observed differences in birth weight agree closely with those expected from birth weight EPD information. The largest expected difference in birth weight was between low and high maternal EPD Polled Hereford-sired calves, at 3.4 lb. The observed difference (3.7 lb) in calf birth weights between these groups, although not significant ($P > .1$), was close to the expected. The largest difference between sire group means was observed for weaning weight between low and high maternal EPD Polled

Table 2. Adjusted^a mean performance of calves in each sire group.

Character	Angus		Polled Hereford	
	Low	High	Low	High
Birth weight, lb	79.0 ± 2.8	77.6 ± 3.1	82.4 ± 3.2	78.7 ± 3.3
Calving difficulty ^b	1.02 ± .06	1.08 ± .07	1.03 ± .07	1.10 ± .07
Prewaning average daily gain, lb	2.13 ± .06	2.12 ± .06	2.15 ± .07	2.13 ± .07
Age-adjusted weaning weight, lb	549 ± 13	547 ± 15	556 ± 16	547 ± 16
Weaning conformation ^c	12.8 ± .2	12.8 ± .2	12.9 ± .2	12.9 ± .2
Weaning condition ^d	5.56 ± .07	5.52 ± .08	5.51 ± .08	5.60 ± .08
Weaning hip height, in	44.2 ± .6	44.2 ± .6	44.6 ± .7	44.2 ± .7

^a Means are adjusted for number of calves by sires within groups, dam breed group, year and season effects.

^b Calving difficulty scores were; 1 = no assistance, 2 = non-mechanical assistance and 3 = mechanical assistance required.

^c Conformation scores were; 11 = below average muscling, 12 = slightly below average muscling, 13 = average muscling, 14 = slightly above average muscling and 15 = above average muscling.

^d Condition scores were on a standard scale of 1 to 9, with 1 being emaciated, 5 being moderately conditioned and 9 being extremely obese.

Hereford-sired calves (9 lb). This was considerably greater than expected (3.1 lb), but was still overshadowed by within sire group variation and was not significant ($P > .1$). For each of the other traits, within sire group variation was sufficient to prevent detectable differences between sire groups.

Sex of calf was a significant source of variation ($P < .05$) for all growth traits (birth weight, preweaning average daily gain, age-adjusted weaning weight and weaning hip height), as well as weaning conformation. As expected, male calves were larger, more muscular and grew faster than their female counterparts, when compared within sire breeds.

Dam breed type and season effects were also significant sources of variation for growth traits. Results obtained from these analyses were similar to those reported by Ziehe et al. (1991) in a comparison of the same dam breed types in both seasons.

These results indicate that sire breed (Angus and Polled Hereford) and maternal EPD group (low and high) effects on preweaning calf performance were small. This was the desired result since growth EPD differences were minimized when low and high maternal EPD sires were chosen. This information will be useful in future analyses of the maternal ability of the heifers produced because differences in direct genetic merit for growth will have an insignificant effect in the comparison of calf weaning weights between sire groups. Therefore, differences in the maternal ability of these females may be accurately tested with only slight adjustments required for the confounding effect of genetic merit for growth.

Literature Cited

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