



Expected Progeny Difference: Part III, Maternal Trait EPDs

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Maternal effects are an important consideration when evaluating beef cattle performance. Extensive studies have been conducted to quantify maternal effects for a variety of traits, especially those measured during the preweaning period. Phenotype is the physical expression of the genetic makeup of an animal. In beef cattle, the dam makes at least two contributions to the offspring phenotypic value. These contributions are the sample half of her genes passed directly to the offspring and the maternal effect she provides her calf. A **maternal effect** is defined as any environmental influence that the dam contributes to the phenotype of her offspring. The contribution of the dam is environmental with respect to the calf (mothering ability, milk production, environment, maternal instinct). The genetics of the dam allow her to create this environment for her calf. Maternal effects are important during the nursing period with diminishing effects through post weaning.

Milk EPD. Weaning weight can be determined by the genes for growth in the calf and genes for milk (mothering ability) in the cow. There are separate EPD values for these two components. The Weaning Weight EPD evaluates genetic merit for growth and the Milk EPD evaluates genetic merit for mothering ability. The Milk EPD that results from the separation of weaning weight into growth and milk segments is, like any other EPD, fairly simple to use. It is the expected difference in weaning weight of calves from daughters of a particular sire, due to differences in mothering ability. As an example,

Figure 1. Example of Milk EPD.

| | Sire A | Sire B |
|---------------|--------|--------|
| EPD in pounds | +10 | -5 |

consider two bulls in Figure 1.

The expected difference in the progeny from daughters of Sire A and Sire B is 15 pounds. Sire A has a Milk EPD of +10; Sire B has a Milk EPD of -5. The expected weaning weight difference, due to mothering ability alone, in calves from daughters by the two bulls is 15 pounds. The 15 pounds are expressed in pounds of weaning weight, not pounds of milk.

Combined Maternal EPD (sometimes called maternal weaning weight or total maternal) reflects both the milking ability transmitted to daughters and direct weaning growth transmitted through daughters to their calves. An example is

Figure 2. Combined Maternal EPD.

| | Weaning Weight EPD | Milk EPD | Combined EPD |
|--------|--------------------|----------|--------------|
| Bull A | +20 | +12 | +22 |
| Bull B | +4 | +6 | +8 |

$$\begin{aligned} \text{Combined (Bull A)} &= 1/2(20) + 12 = 22 \\ \text{Combined (Bull B)} &= 1/2(4) + 6 = 8 \end{aligned}$$

illustrated in Figure 2.

Bull A has a direct Weaning Weight EPD of +20 pounds. This expresses the ability of the bull to transmit weaning growth directly to his progeny. On average, calves sired by Bull A should be 16 pounds heavier at weaning than calves sired by Bull B, assuming both bulls are mated to a comparable set of females and the calves are exposed to the same environmental conditions. The 16-pound difference in future progeny performance is due to genes for direct weaning growth.

The Milk EPD for Bull A (+12) is the contribution to his daughter's calves solely through transmission of genes for mothering ability. The Expected Difference in the Progeny from daughters of Bull A and Bull B is 6 pounds. Bull A has a Milk EPD of +12; Bull B has a Milk EPD of +6. The expected weaning weight difference, due to mothering ability alone, in calves out of daughters by the two bulls is +6 pounds.

The Combined EPD for Bull A (+22) is computed by taking 1/2 the Weaning Weight EPD plus all the Milk EPD. The +22 pounds affect both the milking ability transmitted to daughters and the direct weaning growth transmitted through the daughters to their calves. In a similar method, the Combined EPD for Bull B is 1/2 times the Weaning Weight EPD plus the Milk EPD, or +8 pounds. An average difference of 14 pounds would be expected as the difference in weaning weight of calves out of daughters of the bulls based upon the genetic merit for growth (WW EPD) and milk (Milk EPD).

Calving Ease EPDs

Calving ease heritabilities have been reported to be small (.00 to .13) for beef cattle. The magnitude of the estimates indicate that little genetic progress can be made on selecting directly for calving ease. However, there are exceptions where calving ease heritabilities have been reported to be over .46 in

particular studies. Some breed associations report calving ease EPDs along with birth weight EPDs while other associations' reports do not include calving ease EPDs. Breeds that report calving ease EPDs may present them in different formats. Be sure to study the meaning of calving ease EPDs separately for each breed. Descriptive material written at the beginning of most sire summaries should be useful in interpreting the meaning of calving ease EPDs. Different breeds may list the calving information in different formats. At this time, calving ease EPDs are available only for the Simmental and Gelbvieh breeds. The EPDs are presented differently by each breed.

For the Simmental breed, the calving ease EPDs are given in two ways: Calving Ease EPD and Maternal Calving Ease EPD. Calving ease EPDs are expressed as deviation of percent of unassisted births. When comparing the EPDs of two animals, a larger EPD represents a higher percent of unassisted births. Calving Ease EPDs may be given for heifers and for cows separately. For heifers, this is the ease with which calves of a sire are born to first-calf heifers. For cows, this is the ease with which calves of a sire are born to mature cows.

Maternal calving ease EPDs are the ease with which daughters of a sire calve as first-calf heifers. These may also be given as the ease with which daughters of a sire calve as mature cows. When comparing sires, the larger EPD represents a higher percent of unassisted births for calves born from daughters of a bull.

For the Gelbvieh breed, the Calving Ease Direct EPD is an EPD that is expressed as a ratio, with a higher ratio representing a better (easier) calving ease. This value represents the direct effect a sire has on calving ease. EPD values greater than 100 indicate above-average calving ease (fewer difficulties expected). Ratios below 100 indicate below-average calving ease (more difficulties expected).

For maternal in the Gelbvieh breed, the Calving Ease Daughters EPD is an EPD expressed as a ratio for a sire's daughters calving ease with a higher ratio being a more favorable calving ease. This EPD value represents the calving ease that a sire transmits to his future daughters.

The description of calving ease EPDs given for the Simmental and Gelbvieh breeds illustrate that each breed must be studied before using the EPDs as tools for selection. When available, calving ease EPDs can be used to add additional information to selection decisions.

Summary

Milk EPDs are widely available from beef cattle breeds. The values are expressed in pounds of weaning weight. Direct comparisons of Milk EPDs may be made between individuals within a breed. The Milk EPD is the expected difference in weaning weight of calves from daughters of a bull compared with calves from daughters of another bull, due to mothering ability. Beef producers may use Milk EPDs as part of their selection program when choosing bulls to sire replacement heifers for their herd. The Combined Maternal EPD is another value available for use in sire selection. It is the sum of one-half the Weaning Weight EPD plus all the Milk EPD. The Combined Maternal EPD reflects both the mothering ability transmitted to daughters and direct weaning growth transmitted through daughters to their calves.

Calving Ease EPDs are available for certain breeds. These values may be reported separately for heifers and for cows. Details about these values and their use should be studied before selection decisions are made.

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Samuel E. Curl, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0902