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Expected Progeny Differences

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Since greater than 85 percent of the genetic improvement in a cow herd comes from the sire, effective and appropriate sire selection decisions are imperative to the sustained profitability of a cow calf enterprise. Although many selection tools exist, expected progeny differences, or EPDs, are the most accurate, effective and widely used selection tool available, so it is important to understand their meaning and interpretation.

EPDs are predictions of relative genetic merit expressed as the expected difference in performance between one animal's progeny when compared to another, and are based upon individual, progeny and ancestral performance, ancestral relationships, and genomic data. Although often perceived as absolutes, EPDs can and will vary.

When an animal is young and only limited information is available, EPDs assume the individual received a random assortment of genes from the parents. However, as breeders report progeny performance data on the animal and its progeny, EPDs change. The extent to which EPDs can vary is dependent upon their associated accuracy, which is a measure of the reliability of the EPD, and in effect, represents the probability that the estimate is correct. Within a given level of accuracy, there is a range within which the EPD will most likely stay, which is termed the possible change value. Possible change values are the standard deviation for the EPD at a given accuracy, meaning that around two-thirds of the time, the EPD will fall within the possible change values.

Consider comparing two yearling bulls using birth weight EPD. Sire A has a birth weight EPD of 0.0, and sire B has a birth weight EPD of +5.0. Because neither bull has any progeny records, each bull's individual performance and ancestral records contribute to the EPD, and accuracy will be relatively low (approximately 0.35). The accuracy value indicates that the current estimate or EPD has a 35 percent chance of being the true relative progeny performance value of these two bulls. The possible change value of birth weight EPD at this accuracy is approximately 1.7, meaning that sire A's true progeny performance value for birth weight would likely fall within ± 1.7 lbs. of 0.0 (-1.7 to +1.7) and sire B's true progeny performance value would likely fall within ± 1.7 lbs. of 5.0 (+3.3 to +6.7) two-thirds of the time.

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Because birth weight EPD is an indicator of a sire's ability to transmit birth weight to his progeny and is expressed in pounds, then the expected average difference in progeny birth weights of sire A and sire B would be 5 pounds. This means if sire A's calves averaged 80 lbs. at birth, sire B's calves would be expected to average 85 lbs. These numbers could just as easily be 67 and 72 lbs. or 93 and 98 lbs. However, actual birth weights will typically range from 20 lbs. above the average to 20 lbs. below the sire group average. So, even though we typically think of this example as a drastic difference in birth weight, sire A will frequently sire calves that are heavier at birth than sire B. In fact, given the standard deviation for birth weight, as many as 30 percent of sire A's calves will be heavier at birth than the average calf from sire B. Still, given the information, the average of sire A's calves is expected to be somewhere between 1.6 and 8.4 lbs. lighter than sire B.

The above example illustrates how to interpret differences among EPDs when comparing animals. However, it is critical to understand the units of the EPD of interest when making comparisons. Although many EPDs are expressed in pounds, several have other units. Nonetheless, they all express the relative expected difference in progeny performance for a trait and are the most useful predictions of genetic merit available. Producers should familiarize themselves with EPD units and definitions prior to making selection decisions.

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