



Expected Progeny Difference: Part IV, Use of EPDs

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Use of EPDs for selection in purebred herds

Purebred producers need to consider EPDs in their breeding programs. Competitors are using EPDs and making genetic change in their beef herds. However, care needs to be exercised when making selection decisions. Type fads have caused some problems in the past when single traits have been emphasized. Similar, or worse, problems may arise if a single performance trait is emphasized. For example, if the members of one breed association began to emphasize yearling weight, and ignored all other characteristics, several concerns might arise. Birth weight would be expected to increase, with the attendant calving difficulty. Mature size should also increase, perhaps to the point where the functionality of the cow herd would diminish. This could also lead to problems in reaching desirable quality grade at an acceptable weight. Each trait has a set of drawbacks if changes are carried to an extreme. The availability of EPDs would make such extremes easier to achieve if breeders chose to blindly emphasize a single trait.

A more balanced selection program is certainly desirable. Some producers recommend choosing herd sires that have a balanced yearling weight EPD, milk EPD and birth weight EPD. It also needs to be recognized that there are still many important traits that are not included in the sire summaries. Careful monitoring of reproductive performance, conception rates, calf mortality, regularity of calving, and libido in bulls is critically important. Carcass characteristics may have increased importance in the near future; therefore, breeders are encouraged to obtain whatever carcass data is feasible and use it in making some selection decisions. Carcass EPDs should be available in several breeds soon, but more complete databases need to be established.

Most beef breed associations have EPDs. Purebred breeders should obtain EPDs on each member of their herd if their association provides the service. Although the accuracies are sometimes low on these EPDs, they should be used when choosing replacements, and where possible, when culling cows.

Purebred producers are not only users of EPDs, but they also provide the data used in calculating EPDs. Producers are encouraged strongly to provide complete, accurate records on all calves born each year. Complete, accurate record keeping is the only way that useful EPDs can be calculated.

Use of EPDs for selection in commercial herds

Obviously, it will be the rare commercial producer that uses bulls that are listed in a breed association's sire summary. What then should the commercial producer do about EPDs? Many breed associations have a mechanism in place where individual purebred producers can obtain EPDs on each animal in their herd including the calves. Commercial producers should demand the information from their purebred breeding stock sources.

A commercial producer has a major responsibility of choosing the appropriate breed, or breeds, for his/her program. Once breeds are chosen, examination of what is needed in replacement breeding stock is in order. Some recommendations for commercial scenarios are shown in Table 1.

Each of these recommendations should be followed while at the same time considering the prevailing conditions. Rougher conditions probably dictate the need to avoid very high EPDs for growth or milk and even more to avoid high birth weights. Growth EPDs should be geared to the needs of the potential buyers. Also, traits for which there are no EPDs as yet can be important. Traits associated with reproduction certainly fall into this category. Commercial producers should demand that the seller's bulls should have passed a breeding soundness examination.

EPDs within a breed are directly comparable between herds. Therefore, if a commercial producer has more than one source of breeding stock, he/she can compare the genetic merit of the different sources. EPDs cannot be compared between breeds. A bull with a low birth weight EPD from a large mature size breed may sire calves that are heavier than a bull with a high birth weight EPD from a moderate sized breed. A low birth weight EPD does not guarantee a minimum of calving difficulty if the choice of breeds is incorrect.

Pedigree estimated EPDs

Many sale catalogs will contain Expected Progeny Differences (EPDs) for the bulls offered for sale. Some bulls will appear in catalogs with limited or no EPD information. This may be particularly true for young bulls that have not had their performance information included in the breed genetic evaluation yet. Bull buyers may use a quick and easy procedure to compute "Pedigree EPD" values for young bulls with no EPDs.

Pedigree EPDs may be computed provided that you have access to EPDs on the animals in the pedigree of the young bull. By using the EPDs on animals in the young bull's pedigree, you are ready to compute Pedigree EPDs.

Each calf receives a random sample half of the sire's genes and a random sample half of the dam's genes. The two halves combine to form the complete genetic makeup of the calf. Parents of the calf also receive their genetic makeup in the same way, with half of their genetic makeup contributed by each of their parents. By understanding this halving nature of inheritance, the EPDs on parents and grandparents in the pedigree of a young bull may be used to compute Pedigree EPDs.

Procedure to calculate Pedigree EPD

The first step in calculating the Pedigree EPD for a young bull is to determine how much EPD information is available on the animals in the pedigree of the bull. Most of the time, the breeder of the young bull will supply you with a performance pedigree including EPDs for the sire, maternal grandsire (MGS), maternal great grandsire (MGGs), and maybe even the dam of the young bull.

Next, calculate the Pedigree EPD on the young bull using the EPD information available to you. The following are some examples:

- (1) If both sire and dam of the young bull have EPDs, take one-half the EPD of each parent.

$$\text{Ped. EPD} = \frac{1}{2} \text{ EPD of Sire} + \frac{1}{2} \text{ EPD of Dam}$$

- (2) If the EPD on the dam is missing, you may use EPDs on her relatives.

$$\begin{aligned} \text{Ped. EPD} &= \frac{1}{2} \text{ EPD of Sire} + \left(\frac{1}{2}\right)^3 \text{ EPD of MGS} \\ &= \frac{1}{2} \text{ EPD of Sire} + \frac{1}{4} \text{ EPD of MGS} \end{aligned}$$

- (3) Another option is to use the maternal great grandsire (MGGs) information, too.

$$\begin{aligned} \text{Ped. EPD} &= \frac{1}{2} \text{ EPD of Sire} + \left(\frac{1}{2}\right)^2 \text{ EPD of MGS} + \left(\frac{1}{2}\right)^3 \text{ of MGGs} \\ &= \frac{1}{2} \text{ EPD of Sire} + \frac{1}{4} \text{ EPD of MGS} \\ &+ \frac{1}{8} \text{ EPD of MGGs} \end{aligned}$$

Table 1. Recommendations for EPDs for Various Commercial Scenarios.

<i>Use of Individual</i>	<i>Breed</i>	<i>Birth</i>	<i>Weaning</i>	<i>Yearling</i>	<i>Milk^a</i>
Terminal sire on mature cows	large carcass	not too high	high	high	not relevant
Bull to use with heifers	small to medium size	low	moderate	moderate	consider, if keeping heifers
Sire replacement heifers	medium size maternal	low to moderate	moderate to high	moderate to high	varies

NOTE: If the EPD of the Dam is known, then you cannot use the EPD information on the MGS and MGGs.

Knowing the procedure to compute Pedigree EPDs may be useful in selecting young bulls with no EPDs available. Some breed associations have an "Interim EPD" program based on pedigree information to provide EPDs on young animals that have not had an opportunity to have their individual performance included in the most recent national cattle evaluation for the breed. Many sale catalogs may already give you the Pedigree EPD for convenience.

Across-breed EPDs

Currently, all EPDs are used only on a within-breed basis. They are calculated for the specific breed; therefore, the EPDs are only useful for comparisons of future progeny performance for cattle within that breed. Although there is interest in developing across-breed EPD comparisons, the methodology for accomplishing this is in the development stage.

Summary

Commercial and purebred cow-calf producers have EPDs available to them as a powerful selection tool. The EPDs allow comparisons between individuals within a breed for performance traits. The purebred breeder may obtain EPDs on each member of their herd, by participating in cattle evaluation services available through their respective breed association. Commercial producers may use EPDs provided to them in sire summaries, bull sale catalogs, and other sources in order to make directional change in the genetics of the beef herd. Once the appropriate breed choices are made, the producer has the opportunity to use EPDs as a tool in sire selection. EPDs allow fair comparisons of future progeny performance for bulls of the same breed. Cow-calf producers have EPDs as an opportunity to add predictability to the genetics of their cattle.

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