

Understanding and Using Expected Progeny Differences (EPDs)

An Expected Progeny Difference (EPD) is a selection tool and estimates the difference in progeny of different parent animals of the same breed. It allows you to estimate a young animal's breeding value — that animal's value as a parent — by predicting how a bull or cow's future progeny will perform. EPDs are expressed in the same unit of measurement as the trait (e.g. weaning weight is measured in pounds so the EPD value is in pounds and ribeye area is expressed in inches²) above or below (+/-) the breed average.

The breed average is not zero so **do not compare EPD values to zero**. Also, a positive EPD does not necessarily mean it's above average. For example, if a bull has a +10 weaning weight EPD but the breed average is +15, you can expect him to sire calves that weigh five pounds *less* than the breed average bull.

EPDs help both purebred breeders and commercial producers make informed decisions regarding breeding stock selection by evaluating numerous traits such as growth-related traits, carcass and reproductive efficiency. They objectively compare or rank individual animals within a breed, regardless of age or herd location, by removing environmental bias such as climate, feed and special management. They are also calculated so that the values are not affected if an animal is mated with a genetically superior animal or a genetically inferior animal.

How EPDs work

EPDs are effective selection and genetic improvement tools for your herd. However, they are only effective if they are understood and applied correctly.

Keep in mind that it is the *difference* in EPDs that are important for predicting performance among animals. The examples inside help to illustrate this point.

In addition, the animal with the highest or lowest EPD is not necessarily the most desirable animal. Often, one genetic trait is correlated with another (e.g. bulls with high growth EPDs may sire calves with higher birth weights) and using EPDs for selection involves tradeoffs. A balance of traits is best and the perfect balance for you will depend on your climatic, nutritional and economic environment, as well as the management goals you have set for your herd.

EPD values should be used in conjunction with pedigree and visual assessment to evaluate seedstock. Successful cattle breeding requires a thoughtful and balanced approach to optimize fertility, growth and carcass merit while improving profitability and efficiency.



EPDs evaluate group averages and offspring's performance. They cannot predict individual performance or weights.

Carefully establish your herd goals and your selection goals to determine which traits are most important.

Factors to consider when using EPDs:

- Compare EPDs to the breed average and/or to other animal's EPDs, not to zero. A positive EPD doesn't necessarily mean it's above average (e.g. if a bull has a +10 weaning weight EPD but the breed average is +15, he is expected to sire calves that weigh 5 lbs *less* than a breed average bull).
- Average or below-average EPDs are not necessarily bad. Using EPDs for sire selection involves **trade-offs** (e.g. bulls with high growth EPDs may sire calves with a higher birth weight).
- **Heritability** — some traits have higher heritability than others and are more easily passed to offspring (e.g. growth traits such as weaning weight respond faster to selection than reproductive traits such as age at first calving).
- **Correlation between traits** — many traits are correlated meaning that the expression of one trait is related to the expression of another trait. **Avoid extremes that may be unpredictable.** Selection for one trait or for extremes generally results in unexpected consequences due to genetic correlations (e.g. intense selection for high yearling weight will also increase birth weight). The correlation between traits can be either positive or negative and close attention should be paid to these relationships when developing selection criteria in a breeding program.
- **Accuracy** of the EPD — an accuracy value should be provided with the EPD.

EPD Accuracies

EPDs offer producers the most accurate information about animals in a breeding herd. Of equal importance is accuracy — the amount of reliability of the EPD value. An EPD value without an accuracy value is not very informative. The accuracy value tells you how much data was used in the calculation so the higher the number, the more data was used and the more reliable it is.

A high accuracy (greater than 80 percent) means the EPD is not expected to change much as further information is obtained. A low accuracy (less than 40 percent) means the EPD may change quite a bit as new progeny information is gathered. A proven sire will have a much higher accuracy than a young sire or non-parent bull.

Accuracy is useful in managing risk. You can be relatively confident that animals with high accuracy values will reliably breed as indicated.

Importance of Accurate Information

Since EPDs are more reliable as more data is collected, the Canadian Angus Association requests that all performance data for a herd, regardless of whether the calf is registered or not, be submitted. Thus, all animals, even commercial and dead calves need to be reported.

In addition, it is important that animals that are being compared be treated similarly. Ensure you have proper contemporary/management groups and that animals that are treated differently, have been sick, receive special treatment, etc. are placed in a separate contemporary group.

Finally, ensure that you submit accurate weights and that calves in the same contemporary group are all weighed at approximately the same age using the same scale.

Using EPDs (examples)

Remember, it is the *difference* in EPDs that is important in predicting performance among animals.

Example 1

If Bull A has a weaning weight EPD of +10 lbs and Bull B has a weaning weight EPD of +60 lbs, the EPD difference is 50 lbs. You would expect Bull B's progeny to weigh, on average, 50 lbs more than Bull A's progeny at weaning when mated to similar cows.

Calf	A	B
1	500	400
2	510	450
3	520	500
4	530	550
5	540	600
6	560	600
7	570	650
8	580	700
9	590	750
10	600	800
Avg.	550	600

Note that not all calves from Bull B have a higher weaning weight than Bull A's, but the average is 50 lbs higher.

Example 2

If Sire A has a Birth Weight EPD of +4 and Sire B has a Birth Weight EPD of -1, the expected difference in the progeny of Sire A and Sire B for birth weight is 5 pounds. We could expect the average birth weight of Sire A's calves to be 5 pounds heavier than the average birth weight of Sire B's calves.

However, Sire A has an accuracy value of only 0.25 indicating that not much data was used to calculate this EPD and therefore the value could change substantially as more information is obtained. Sire B, on the other hand, has a high accuracy value so you can be relatively confident that his EPD is reliable.

	Sire A	Sire B
Birth Weight EPD in pounds	+4	-1
Accuracy	0.25	0.90

If the breed average EPD for birth weight is +5 then Sire A can be expected to sire calves that weigh 1 lb less on average than a breed average bull and Sire B can be expected to sire calves that weigh 6 lbs less on average than a breed average bull.

Example 3

If Sire A has a Milk EPD of +15 and Sire B has a Milk EPD of +10, we would expect, on average, that calves from daughters of Sire A to be 5 lbs heavier at weaning than calves from daughters of Sire B due to the difference in milk production of Sire A and Sire B's daughters. Note: pounds refer to pounds of weaning weight, not pounds of milk.

Example 4

Bull A has a high birth weight but he has a lot of calves and they all have low birth weights. Although this bull has a high birth weight, his birth weight EPD is low with a high accuracy value.

Animals Without EPDs

Sometimes an animal will not have an EPD value. If this is the case and you are not sure why, ask yourself:

- Is it a twin?
- Is it an embryo transfer?

Animals who are twins or the result of embryo transfer will not have EPDs until they have progeny with 205-day weights on record.

- Do the parents have EPDs?
- What was the age of the animal when the 205-day weight was taken? Was it too old/young?
- What is the contemporary/management group size? An animal in a contemporary groups of its own (only one animal) will not receive EPDs.
- Is there missing data on the calf crop? If you didn't submit all required data for the calf crop, you will receive a missing data report and will not receive EPDs for that animal until complete information is submitted.

If the above do not apply, please contact the Canadian Angus Association.

A Sample Sire Summary Evaluation

Bull	Birth Weight		Weaning Weight		Yearling Weight		Milk	
	EPD	Acc	EPD	Acc.	EPD	Acc	EPD	Acc
A	6.6	0.75	31.3	0.75	39.5	0.68	-5.6	0.58
B	0.1	0.82	14.6	0.83	24.6	0.80	6.0	0.73
C	0.0	0.89	0.3	0.89	11.1	0.88	18.9	0.87
D	-5.9	0.87	-3.8	0.87	-14.4	0.86	10.3	0.85
Breed Average	2.1		9.3		22.0		8.0	

Producer 1 is looking for a sire that can be used on heifers; she wants a bull that will produce low birth weights and she wants to keep some heifer calves as replacements. Growth performance is not her first priority. The sire that fits her need is **sire D**. He has a low birth weight EPD and above average milk EPD.

Producer 2 is looking for a sire that will maintain performance and milking ability. He will select a bull that will increase growth performance and milk while maintaining calving ease. **Sire B** is his choice.

Producer 3 has a herd of above-average-frame cows and is not planning on keeping heifers as replacements. She is looking for a bull that will give her the most profit at weaning. **Sire A** will give her the best result in weaning weight. If heifers are kept as replacements, they will, on average, be inferior for maternal milk.

Producer 4 wants to maintain his calving performance and growth performance but would like to increase the milking ability in his females. **Sire C** is his choice.

EPDs...

- Estimate the genetic potential of an animal based on its own performance/pedigree records and those of its parents, offspring and other relatives in comparison to other animals. They measure the value of the animal as a parent for a particular trait.
- The most accurate way to rank animals on genetic merit for various traits.



Canadian Angus Association

142, 6715 - 8th Street NE, Calgary, AB, Canada, T2E 7H7

Phone: (403) 571-3580 Fax: (403) 571-3599 Toll-free: 1-888-571-3580

www.cdnangus.ca Email: cdnangus@cdnangus.ca