



Bull Selection Based on Breeding Programs

Beneficial Categories



Background

There are a large variety of beef operations in Canada and breeding programs are not one-size-fits-all. The best breeding program is one that helps achieve operational goals. Each breed of cattle has specific traits that allow them to excel in certain geographical or management environments. For example, the Angus breed has many advantages in Canadian purebred and crossbreeding programs. Advantages include, but are not limited to:

- Angus cows consistently deliver a calf that thrives with little assistance even in Canada's sometimes harsh calving season
- Angus cows are renowned for their maternal traits, calving ease, and ability to milk
- An Angus cow will typically produce a calf each year that more than exceeds half her body weight
- Angus are known for their stayability (a cow's continuing ability to bear calves); even 12- and 13-year-old Angus cows are known to be productive
- Angus cattle have superior marbling ability, opening the door to improved beef tenderness
- Cancer eye is not prevalent in Angus cattle and their dark skin and udders mean sunburned udders are rarely a problem
- Both purebred and Angus-cross cattle demonstrate superior feed conversion, providing higher net returns on investment

When selecting a bull for AI or natural breeding, it is important to consider your long-term goals because a bull's genetic influence can remain in the herd for generations, especially if heifers are retained. When searching for a bull, consider expected progeny differences (EPDs) and genomically enhanced expected progeny differences (gEPDs).

Understanding and Using EPDs in Bull Selection

EPDs are useful tools when planning breeding programs as EPDs provide a genetic snapshot of an animal's breeding potential. Appearance and pedigree should be considered when buying a bull but

EPDs allow a fair comparison of breeding value by removing environmental bias such as climate, feed and special management.

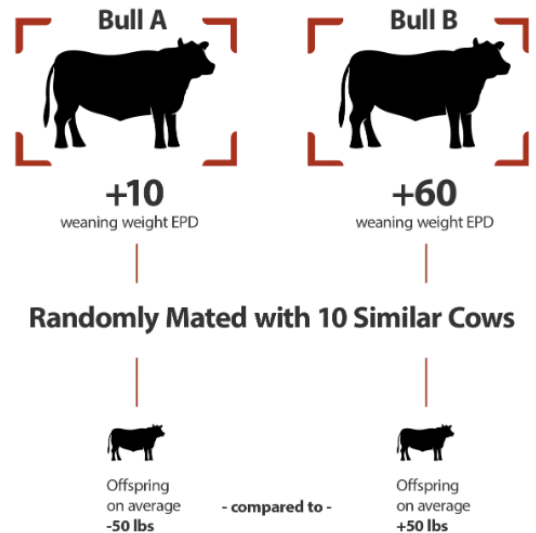
Example of EPD Use

To use EPDs effectively you must understand how they work.

Imagine you are interested in purchasing a couple of bulls for your herd.

You are looking at the EPDs in a sale catalogue. Bull A has a weaning weight EPD of +10 and Bull B has a weaning weight of +60. What does that mean? How can you use the EPDs to choose between the two bulls?

If these animals were randomly mated with 10 similar cows, we would expect the group average weaning weight of Bull A's offspring to be 50 lbs lighter than that of Bull B's ($60-10=50$).



Using EPDs for Sire Selection

It would be easier if we could assume that the highest EPDs are the best. Unfortunately, it is not that simple. Like most decisions, using EPDs for sire selection involves trade-offs. For example, bulls with high growth EPDs may sire calves with a higher birth weight as well. And there may be other impacts on your operation to consider. The trade-offs you are willing to accept will be based on your operational goals. A balance of traits is required, and the perfect balance for you will depend on your climate, nutritional and economic environment, as well as the management goals you have set for your herd.

It should also be kept in mind that influences from selection can differ from trait to trait. This is because some traits have higher heritability than others and are more easily passed to offspring. For instance, growth traits such as weaning weight respond faster to selection than reproductive traits such as age at first calving.

One way to select for several traits is to set minimum and maximum acceptable levels for each trait, and then choose sires that meet the criteria. Another method would be to rank all sires on each trait, then develop a weighted index which ranks each bull from one (most desirable) to five (least desirable) for each trait. The bull with the lowest total score would be your first choice.

A Sample Sire Evaluation

Bull	Birth Weight	Weaning Weight	Yearling Weight	Milk
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	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

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 needs is sire D. He has a low birth weight EPD and above-average milk EPD.

Producer 2 has a sound breeding program; he 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.

Another important aspect to consider when selecting animals based on their EPDs is the accuracy of those EPDs. The accuracy represents the reliability of the EPD against the true breeding value. Accuracies are reported as a percentage value. High accuracy values (greater than 0.80) mean the EPD is closer to the true breeding value than an EPD value with a lower accuracy (less than 0.20). EPDs with low accuracy have a much greater chance of changing as more information becomes available than an animal with a high accuracy EPD. Although EPDs for low accuracy animals can be considered unreliable relative to higher accuracy EPDs, they are still the best objective measure of an animal's genetic merit.

Bull Selection Using Economically Relevant Traits

The ideal bull will be different across operations depending on operational goals. However, profitability of a herd is one of the top priorities for any operation. Essentially, one goal of bull selection and beef operations is identifying traits that drive profitability. Identifying essential traits that are important to the success of your operation will help focus in on the ideal bull(s). Traits are categorized as indicator traits or economically relevant traits. Economically relevant traits (ERTs) are traits directly associated with revenue or cost. Focusing on ERTs can help focus on information that will directly impact an operation's profitability.

Below is a list of EPDs that are characterized as economically relevant. Other EPDs are indicator traits; they are genetically correlated to ERTs but are not ERTs themselves. This is not an exhaustive list and focuses on EPDs available for the Angus breed.

- Calving Ease Direct
- Calving Ease Maternal
- Weaning Weight Direct
- Yearling Weight
- Maternal Weaning Weight
- Mature Daughter Weight
- Heifer Pregnancy
- Carcass Weight
- Percent Retail Cuts
- Marbling
- Tenderness
- Days to Finish
- Dry Matter Intake
- Stayability
- Maintenance Energy

To find out more information on bull selection, visit the links below:

[Canadian Angus Association – Angus Advantages](#)

[Canadian Angus Association – Genetic Evaluations](#)

[American Angus Association – Angus Advantages](#)

[Beef Cattle Research Council – Bull Selection: Breeding Programs that Suit your Operational Goals](#)

[Government of Manitoba – Using EPDs in a Breeding Program](#)

[The Beef Site – Buying Power: Bull Selection to Improve your Bottom Line](#)

[Spangler, M.L. 2015. Economically Relevant Traits and Selection Indices. Range Beef Cow Symposium XXIV.](#)

[Beef Cattle Research Council – Bull Selection: Using Economically Relevant Traits](#)

[National Beef Cattle Evaluation Consortium Beef Sire Selection Manual 2nd Edition](#)