



By the Numbers

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Better growth EPDs

Expected progeny differences (EPDs) are the language of the industry in terms of making genetic improvement in beef cattle. Simplistic in nature and presented in units of measure for the trait, how can we improve upon them? Genomic additions to these selection tools provide better EPDs, utilizing additional information at an earlier age. Genomic-enhanced growth EPDs provide an excellent demonstration of this improvement.

Contributions to the growth trait EPDs

EPDs contain a variety of information, seamlessly incorporated into one EPD for the trait and the associated accuracy. The obvious contributions to EPDs are birth weight, weaning weight and yearling weight. Yearling weight is actually used in the EPD model in the form of postweaning gain, which is 365-day yearling weight minus 205-day weaning weight. As you can see, the phenotypic measures for birth, weaning and yearling are age-adjusted and any age-of-dam adjustments have taken place.

The genetic evaluation for growth traits also includes a four-generation pedigree. The analysis also accounts for the merit of mates. So, if favorable sires are mated to favorable cows, the positive mating is taken into account. If an animal excels in a contemporary group of superior matings, their performance data has a more positive impact than excelling in a group with lesser competition.

Genomic results enter the evaluation as

With the inclusion of genomic results, the growth trait evaluation has an additional piece of information added to the genetic system.

indicator traits for birth weight, weaning weight, postweaning gain and maternal milk. These indicators are correlated to the phenotypic weights and affect the accuracy. Fig. 1 depicts a calf that has a genomic result for a given company affecting his EPD. The initial pedigree-estimate interim EPD (signified with the I before the EPD) is given as half the sire and half the dam EPD. The genomic-enhanced growth EPDs (no longer interims) are the result of the genomic

Highlights of weekly genomic-enhanced EPDs

- Genomic results are incorporated into EPDs without a six-month wait for biannual evaluations.
- Young animals that may not have weight measures yet will receive EPDs within a week of the genomic results being processed by the Association, for a comprehensive prediction beyond pedigree-estimated interims.
- Angus phenotypic and genomic databases with a four-generation pedigree are used simultaneously each week for EPD calculations.
- When calves are genotyped, their dams that had no EPDs in the past now receive weekly NCE EPDs.
- The dollar values (\$Values) are updated with the change of associated trait EPDs.

indicator traits affecting the prediction for this calf.

Keep in mind that embryo transplant (ET) calves that are produced by non-registered recipient cows can take advantage of the genomic information and receive National Cattle Evaluation (NCE)-generated EPDs and accuracy values. This tool will assist in beginning to identify genetic differences in full siblings reflected in the EPDs following the incorporation of the genomic data.

Accuracy is increased by including the genomic results in Fig. 1. The jump in accuracy is similar or slightly better than if the animal had a reported weight measure in a proper contemporary group. This is not to say that reporting weights isn't important, as it continues to be the foundation for EPDs and future improvements in the enhanced genomic evaluations.

Fig. 2 provides an example of when growth measures had been reported on the individual prior to the genomic result being included in the EPD. You will note less accuracy increase and some fluctuation in the EPD values. Keep in mind the variety of sources contributing to the accuracy in this case, such as the animal's own record, the genomic indicator traits and the pedigree contributions.

Fig. 1: Example of individual growth EPDs based on pedigree, before and after genomic results are included

Before genomics	BW	WW	YW	Milk
EPD	I -1.5	I+56	I+99	I+23
Accuracy	(.05)	(.05)	(.05)	(.05)
After genomics	BW	WW	YW	Milk
EPD	-1.4	+54	+99	+22
Accuracy	(.29)	(.27)	(.29)	(.13)

Fig. 2: Example of individual growth EPDs based on pedigree and individual performance, before and after genomic results are included

Before genomics	BW	WW	YW	Milk
EPD	+ .8	+ 64	+114	+ 21
Accuracy	(.33)	(.22)	(.13)	(.11)
After genomics	BW	WW	YW	Milk
EPD	-.2	+59	+111	+22
Accuracy	(.37)	(.28)	(.31)	(.14)

Use of genomic-enhanced EPDs

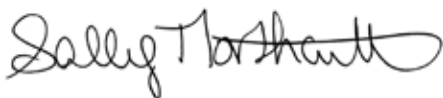
EPDs are a beef cattle selection tool for cow-calf and seedstock producers to rank or compare the relative genetic merit of animals. The fact that genomics are included doesn't change the application of the selection tool. EPDs are to be used in the same way.

Typically, this tool is used to select sires for economically important traits that will help future progeny meet the desired characteristics for the producer's breeding program.

Keep in mind that EPDs are reported in the units of measure for the trait, such as pounds of yearling weight. Sire search tools are available online at www.angus.org/Nce/SireEvaluationDefault.aspx. Angus breeders use EPDs heavily throughout their herd selections on both the male and female side and capitalize on the online tools available through AAA Login.

Supporting percentile rank and breed averages tables are available electronically through www.angus.org to allow breeders to compare animals directly against the breed population and chart their course for making genetic improvement.

With the inclusion of genomic results, the growth trait evaluation has an additional piece of information added to the genetic system. The weekly genetic predictions for the economically relevant growth traits will encompass weight trait and genomic databases along with pedigree relationships. Every Friday morning, the genomic-enhanced NCE EPDs are available at www.angus.org.



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Editor's Note: "By the Numbers" is a column by Association performance programs staff to share insights with Angus members about data collection and interpretation, the National Cattle Evaluation (NCE), genetic selection, and relevant technology and industry issues. If you have questions or would like to suggest a topic for a future column, contact Sally Northcutt, director of genetic research, or Bill Bowman, director of performance programs, at 816-383-5100.