



By the Numbers

► by **Sally Northcutt**, director of genetic research, American Angus Association

Why doesn't my bull have EPDs?

We take expected progeny differences (EPDs) for granted at times until we come across an animal that doesn't have them. Then, tracing through what performance records currently contribute to the animal's genetic merit comes under study. Most questions on "missing EPDs" relate to the concept of interim EPDs (I-EPDs).

What is an interim?

Interim EPDs are calculated on animals during the time period between the American Angus Association National Cattle Evaluations (NCE) that occur twice each year, once in June and again in December. An interim value is indicated by an "I" in front of the number. While admittedly low in accuracy, an interim value gives you a snapshot of the animal's value as a parent, and, thus, it provides a temporary selection-decision tool until the next NCE run in which enough information is available to calculate a true NCE EPD.

How is an NCE EPD different?

The EPDs from the biannual evaluations have no letter "I" preceding the EPD. These are calculated using all available performance data for a particular trait, accounting for relationships among animals.

The mixed model methodology behind the evaluations is complex. In the spring 2005 NCE, approximately 4.5 million weaning weight records were evaluated to generate more than 5 million EPDs.

The EPDs resulting from this run have varying accuracies, depending on the amount of information (the animal's own record, progeny records, ancestral records, etc.) that contributes to each animal's

predicted genetic value. To be included in the twice-a-year NCE runs, a nonparent animal must have a performance record that meets data requirements and is part of a valid contemporary group. (To be included weights must be submitted prior to the published cutoff date for an NCE run, so submit weights as soon as practical.)

Parent animals have progeny with performance records and are incorporated into the evaluations even if the parent does not have an individual record for the trait of interest. The evaluations to generate EPDs utilize many generations of pedigrees.

Interims using the calf's own performance. The best case is when interims have the calf's own record relative to its contemporaries included in the prediction. For example, a bull calf's adjusted 205-day weight relative to his contemporaries plays a role in calculating the interim weaning weight (WW) EPD. The calculations take into account the EPDs on the calf's sire and dam, too.

$$\text{I-EPD} = (0.5 \times \text{EPD of sire}) + (0.5 \times \text{EPD of dam}) + (0.5 \times \text{Mendelian sampling effect})$$

The Mendelian sampling effect predicts how the calf's own genetic value deviates

from the average of his parents. This is the place where the calf's individual performance relative to his contemporaries plays a role. This interim would typically have an accuracy value of 0.20 to 0.30, depending on the trait.

Methodology behind the calculation of interims can be found in the *Beef Improvement Federation Guidelines* or at <http://beefimprovement.org/guidelines.html> (see Chapter 5: "National Cattle Evaluation").

Interim with pedigree only. In this case, only pedigree information, sometimes called a pedigree index, is involved in calculating the interim EPD. As an example, if a bull calf has no contemporaries and his parents have true NCE EPDs, then a pedigree-estimated EPD is computed as an average of the parental EPDs. The accuracy on the resulting interim is low, at 0.05.

$$\text{I-EPD} = (0.5 \times \text{EPD of sire}) + (0.5 \times \text{EPD of dam})$$

Parents with interims

The most common answer to the question, "Why doesn't this animal have an EPD?" traces to the parents not having true NCE EPDs from the biannual evaluation. In many cases it is the dam that has interims. It is not possible to generate an interim EPD on an animal if one or both parents have interim EPDs without an individual weight record on the calf submitted in a proper contemporary group (at least two calves of the same sex, managed the same and weighed at the same time).

Once weights are turned in on the calves, the parents will become part of the NCE run (now having progeny), and the calf in question would have EPDs.

So, if a calf has no contemporary-group-defined weight, for example, and the dam has interims, then the calf's EPD for the trait will be missing.

The carcass interim question

Carcass interim EPDs on young animals are generated from the sire EPDs and the maternal grandsire EPDs. This is because carcass EPDs are generated from a sire-maternal grandsire model during the NCE run. One would like the interim calculations

Guidelines for weaning weight interims

- The animal must have registered parents.
- The animal must have been weighed at weaning with at least one other animal of the same sex in a proper contemporary group with not more than three days between weigh dates.
- Interim expected progeny differences (EPDs) are not calculated from interims of parents if the animal has no weight record.
- Individual weights of embryo transfer (ET) calves raised by registered Angus recipient cows are used for interim EPDs and are included in the National Cattle Evaluation (NCE).
- Individual weights of embryo transplants raised by nonregistered Angus recipient cows are not used in interim or NCE EPDs.

Note: An animal's own weaning weight must meet all data edits required for NCE, in addition to being from a proper contemporary group.

to mimic the “true” EPD runs as much as computations will allow. Carcass interims use different pedigree pieces (sire and maternal grandsire), and, since the calf does not have his own record for carcass data, this is just a pedigree index as described above, with an accuracy of 0.05.

What about ET calves?

The individual weights on embryo transfer (ET) calves generally are not used in the interim EPD calculation. However, if the ET calves are raised by registered Angus recipient cows, in a contemporary group of ET calves also raised by registered Angus recipients, we are able to incorporate the individual ET calf data into the interim calculations and the NCE.

ET calves out of commercial recipient dams receive only a pedigree-estimated interim EPD with a 0.05 accuracy, since the EPD is just the average of the sire EPD and the donor dam EPD. If the donor dam has interims, the ET calf will have no EPD. (The donor dam would need to have a natural calf with performance data submitted in a proper group, and then she would have true EPDs generated during the next NCE.)

Interpreting what you see

To summarize, let’s say we identified a yearling bull on which we wanted more information. Doing an EPD/pedigree search online revealed the performance figures shown in Fig. 1. What can you tell from the bull’s record?

First, his calving ease, birth weight and weaning weight are true NCE EPDs, and his individual records were available at the time of the last NCE.

The interim yearling weight (YW) EPD with an accuracy value of 0.36 indicates his yearling weight was turned in since the last NCE and is now reflected in his current interim. When the fall 2005 NCE is run in June, this EPD will lose its interim status and will be replaced by an NCE EPD. As more information on progeny is added, the accuracy value will increase. The same holds for the yearling height and scrotal circumference (SC) EPDs.

The interim carcass values with accuracies of 0.05 indicate these values are pedigree-estimated interim EPDs and do not reflect any progeny. Unless this status changes before the next NCE, they will remain interim values.

As with yearling weight, accuracies of 0.32 and 0.33 for the interim ultrasound EPDs indicate the bull’s interim has contributions from his own scan data, in addition to pedigree information. He will receive true EPDs when the next NCE is run.

Creating weaning weight interim EPDs (natural calves)

Information available on calf			Resulting calf EPD
Sire EPD	Dam EPD	Calf wt.	
NCE ^a	NCE	Yes ^b	Interim ^c
NCE	NCE	No	Interim
NCE	Interim	Yes	Interim
Interim	NCE	Yes	Interim
Interim	Interim	Yes	Interim
None	None	Yes	Interim
Interim	Interim	No	None
None	None	No	None
Interim	NCE	No	None
NCE	Interim	No	None

^a“NCE EPD” is a true EPD generated from the American Angus Association National Cattle Evaluation.

^b“Yes” indicates the calf’s adjusted weight met the American Angus Association edits and is from a proper contemporary group.

^c“Interim” is an interim EPD.

Enough said about interims

Interim EPDs are temporary in a sense. We expect the typical animal to progress toward true NCE EPDs, either by way of its own record or progeny data entering into the twice-annual evaluations. The NCE EPDs take into account much more information than interims. Do not be shocked if the NCE EPD is not the same as the interim EPD.

Sometimes we invest too much confidence in an interim, as if we never expect change. EPDs change. Interim EPDs have low accuracies. Let’s not forget that lower-accuracy animals are expected to have changes in their EPDs as more information becomes available on their genetic merit.

A calf with a pedigree-estimated interim EPD has a 0.05 accuracy associated with it. The animal’s own performance is not included in the interim calculation. Even on interims that include the calf’s own performance, the accuracies are still typically below 0.30. Utilize the possible-change tables available through the Association to help manage the interval of change expected on EPDs at a given accuracy level. Details on possible change associated with accuracy values are provided on page 4 of the spring 2005 *Angus Sire Evaluation Report* and online at www.angus.org/sireeval/accuracy.htm.

Also, don’t be surprised to see bulls published in the *Angus Sire Evaluation Report* with a mixture of interim and true values. It is a reflection of how much information was available to compute each EPD at the time the NCE was run. And, while a bull may have a true value for birth, weaning and yearling weights, he may not have enough information to calculate a true value for carcass EPDs.

Twins are a complication in genetic evaluations. Although they will receive an interim EPD, a twin will not enter the NCE runs until that twin has progeny incorporated into the analysis.



E-MAIL: snorthcutt@angus.org

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

Fig. 1: Example of EPDs available online through EPD/pedigree search

Production						Maternal					
CED Acc	BW Acc	WW Acc	YW Acc	YH Acc	SC Acc	CEM Acc	Milk Acc	MkH MKD	MW Acc	MH Acc	\$EN
+3 .30	+3.1 .38	+40 .32	I +90 .36	I +4 .25	I +.65 .25	+4 .19	+34 .26				-8.85

Carcass						Ultrasound					
Cwt Acc	Mrb Acc	RE Acc	Fat Acc	%RP Acc	Grp Prog	%IMF Acc	RE Acc	Fat Acc	%RP Acc	Grp Prog	
I -3 .05	I +.40 .05	I +.10 .05	I +.006 .05	I +.09 .05		I +.17 .32	I +.48 .33	I +.039 .33	I -.41 .33		