By the Numbers

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Data path to EPDs

One of the key concepts for Angus breeders to understand is the timing involved in submitting performance data being processed to produce genetic selection tools. Data arriving into Beef Improvement Records (BIR) for the Angus Herd Improvement Records (AHIR℠) program takes two major paths to become expected progeny differences (EPDs). These EPDs are produced in the form of interim EPDs and National Cattle Evaluation (NCE) EPDs.

Interim EPDs

When a breeder submits performance data to the American Angus Association, it arrives either electronically or in paper form. The data are processed to provide summary reports of adjusted measures and interim EPDs. As a daily routine, interim EPDs are computed using as much information on the animal and its parents as possible.

If one of the parents has an interim EPD for the trait of interest, then an interim EPD cannot be computed on the progeny unless that progeny has a performance measure from a valid contemporary group that meets data edits. For details on contemporary group and interim EPD requirements, go to *www.angus.org/performance/index.html* and search back issues of "By the Numbers" on contemporary groups (May 2005, "Understanding contemporary grouping") and interims (April 2005, "Why doesn't my bull have EPDs?").

The designation for interim, or "I," precedes the EPD on animals up until they have their own record used in an NCE or they are parents, grandparents or great-grandparents of animals with records. Otherwise, the letter "I" will be retained with the animal's EPDs. Also, any changes to the EPDs for their parents will influence the interim EPDs.

Embryo transfer (ET) calves and preweaning traits (birth, weaning, yearling and milk EPDs) are an example to review. An ET from an unknown recipient dam has a pedigree-estimated interim EPD with accuracy equal to 0.05. Both parents of the ET must have had NCE EPDs in order to compute the interim EPD. The ET calf will retain interim status until it has progeny data used in an NCE or is a pedigree tie to grandprogeny with performance records.

Table 1: Data description from the Fall 2006 *Sire Evaluation Report*

Trait	No. records	No. EPD	Avg.	SD	Min.	Max.
Production:						
Calving ease direct, %	789,291	4,928,809	1	5	-34	19
Birth weight, lb.	4,195,497	5,162,047	1.6	2.4	-11.6	15.5
Weaning direct, lb.	4,845,637	5,877,324	20	18	-60	91
Yearling weight, lb.	2,415,922	5,877,324	35	32	-81	143
Yearling height, in.	423,958	758,869	.3	.4	-2	2.4
Scrotal circumference, cm	369,907	806,421	.14	.44	-3.60	3.17
Maternal:						
Calving ease maternal, %	789,291	4,928,809	3	4	-32	18
Maternal milk, lb.	4,845,637	5,877,324	9	9	-38	46
Mature weight, lb.	104,237	256,488	18	30	-159	255
Mature height, in.	104,237	256,488	.5	.3	-3.8	5.1
Carcass:						
Carcass weight, lb.	83,331	6,330	2	9	-42	54
Marbling score	83,331	6,330	.09	.17	-.65	.86
Ribeye area, sq. in.	83,331	6,330	.07	.17	-.76	.86
12th-rib fat thickness, in.	83,331	6,330	.000	.019	-.112	.096
Ultrasound:						
Intramuscular fat, %	630,794	1,074,546	.03	.15	-.58	1.11
Ribeye area, sq. in.	636,134	1,074,546	.07	.22	-1.09	1.46
Fat thickness, in.	639,078	1,074,546	.001	.014	-.074	.155
Current sires[1]		**No. Indexes**				
Wean Value ($W), $/head		23,619	22.22	5.06	-14.53	43.69
Feedlot Value ($F), $/head		23,693	16.26	13.21	-58.45	76.06
Grid Value ($G), $/head		21,012	13.36	6.44	-23.57	40.49
Beef Value ($B), $/head		21,012	28.11	11.67	-59.83	61.96
Cow Energy ($EN), savings, $/cow/year		23,693	7.87	7.14	-24.69	49.07

[1]Current sires have at least one calf recorded in the American Angus Association herd book within the past two years.

Breeder cutoff

Twice each year a breeder cutoff date for performance data is posted by the Association in the *Angus Journal* and at *www.angus.org.* For example, the most recent breeder cutoff date was June 9, 2006. At this point the Association begins preparing the complete database for a genetic evaluation that results in 17 EPDs and five primary Angus dollar value indexes ($Values). This comprehensive run uses millions of records to generate the genetic predictions.

The database

Table 1, also found at *www.angus.org/sireeval/averages.html,* illustrates the number of records used by trait and the resulting counts for EPDs. The number of records is less than the number of EPDs because EPDs are generated on animals in the pedigree, such as parents, grandparents and great-grandparents, that may not have had their own performance record to be included in an evaluation.

A four-generation pedigree is typically used in the genetic evaluation procedures to account for relationships among the animals. All the trait evaluations use animal model procedures, with the exception of the carcass trait EPD procedure, which uses a

Table 2: Example EPD transition from interims to NCE

Date	Action	WW EPD	WW ACC	YW EPD	YW ACC	IMF EPD	IMF ACC
March	Calf born; pedigree estimate interim EPD	I+30	0.05	I+64	0.05	I+.20	0.05
October	Calf weaning data submitted to AHIR	I+32	0.25	I+64	0.05	I+.20	0.05
November	Breeder cutoff occurs						
December	NCE EPD update; new evaluation released; (the letter "I" drops from the WW EPD and YW EPD)	+32	0.26	+62	0.20	I+.20	0.05
March	Calf yearling data submitted to AHIR;	+32	0.26	I+64	0.23	I+.20	0.05
	Ultrasound data processed by AHIR	+32	0.26	I+64	0.23	I+.24	0.23
June	Breeder cutoff occurs						
July	NCE EPD update; new evaluation released	+33	0.26	+64	0.23	+0.23	0.25

Interim EPDs in blue are based on pedigree estimates from parental NCE EPDs.

Interim EPDs in green include calf's own performance record relative to contemporaries.

sire/maternal grandsire model. This makes sense because carcass data are reported on progeny and not the parents themselves.

The Beef Improvement Federation (BIF) *Guidelines for Uniform Beef Improvement Programs* provide more details on animal model procedures used in beef cattle evaluation to generate EPDs. Visit *www.beefimprovement.org/library.html* for more information. The formulas behind the NCE conducted biannually are far more complex than daily interim routines in order to encompass information on an animal's own performance, pedigree, progeny and close relatives.

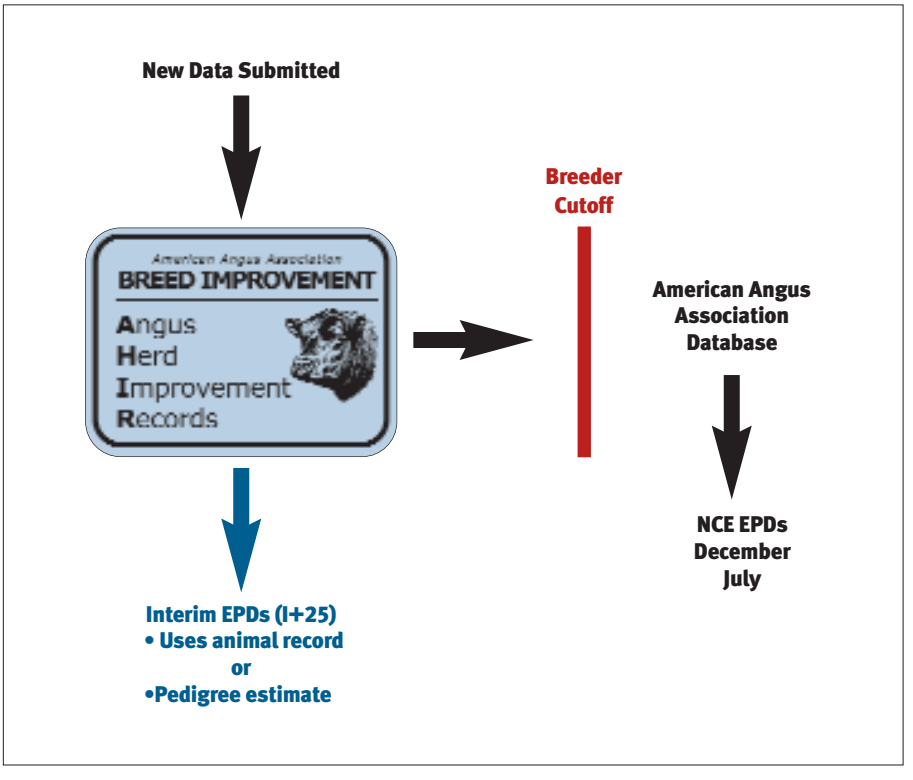
Evaluation cutover to new data

The most recent cutover, or release of new EPDs, was in mid-July. The next update of EPDs on all animals in the Association database will occur in December (see Fig. 1). When new EPDs are released, animals with their own performance record that were used in the evaluation but were previously just showing interim EPDs, no longer have the "I" in front of their EPDs. That's an easy way to determine if the animal was included in the biannual evaluation.

For example, a bull calf at weaning has a pedigree-estimated interim EPD for ultrasound percent intramuscular fat (%IMF). Later this bull is scanned with a proper contemporary group and the interpreted results are processed at the Association. The bull calf now receives an interim EPD that includes his own performance relative to the contemporary group, and that interim is also affected by his parental EPDs.

If the animal's record was received at the Association by the breeder cutoff date, then the animal's own record and those of its contemporaries will enter the breed's genetic evaluation for ultrasound involving more than 600,000 records. Finally, at the cutover to new EPDs, this animal has an NCE EPD (see Table 2) that is no longer preceded by an "I." It is no longer an interim.

Fig. 1: Pathway to NCE EPDs



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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.*