



By the Numbers

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

Heifer pregnancy EPD is coming

One of the American Angus Association's research initiatives is to characterize reproductive traits in the Angus breed. Reproductive traits comprise perhaps the most difficult class of traits for which to create genetic prediction values. Yet, reproductive success is of vital economic importance in a beef production system.

Gathering numbers

Seedstock and commercial producers continually ask about the availability of reproductive selection tools to improve their herds.

A large database for research enhances the ability to develop genetic predictions, such as expected progeny differences (EPDs) and indexes, for the reproductive complex. Angus producers are submitting breeding records as part of their performance data. Already the Association has amassed nearly 40,000 breeding records.

As directed by the Association's Board of Directors, research was conducted to develop heifer pregnancy EPDs (HP EPDs) as a

genetic selection tool. The following report summarizes the initial research and resulting EPDs that were developed.

At the February 2007 Board meeting, Directors approved the release of HP EPDs on sires with a minimum 0.30 accuracy in a special research report. Sire EPDs for heifer pregnancy in daughters will be published following the June 15, 2007, deadline for submitting performance data to the Association. Heifer breeding records must be submitted by the June 15 deadline in order to be included in the heifer pregnancy genetic evaluation.

Procedures and edits

A heifer's breeding record was coded as a success or failure of being pregnant, based on any pregnancy-check data or calving information recorded and submitted by the breeder. Heifers were excluded from the analysis if their age at the time of the evaluation did not allow them time to have recorded a calf.

Edited data on 10,913 heifers were analyzed in a threshold analysis with a full animal model and three-generation pedigree. Variance components from previous research by Bormann et al. (*J. Anim. Sci.* 2006.

84:2022) representing a heritability of 0.13 were used in the analysis.

Contemporary group was defined as breeding herd, breeding year, season and synchronization code. Data edits included the removal of any

Submit data now for heifer pregnancy EPDs

The initial research release of sire heifer pregnancy expected progeny differences (HP EPDs) is planned to follow the American Angus Association's deadline for submitting performance data on June 15, 2007. Breeders must submit their heifer breeding records by the June 15 deadline in order to be included in the heifer pregnancy genetic evaluation.

Table 1: Descriptive statistic for heifer pregnancy genetic evaluation

| | | | | |
|--------------------------------|--------|------|---------|---------|
| No. of heifer breeding records | 10,913 | | | |
| No. of contemporary groups | 320 | | | |
| No. of animals with EPDs | 30,304 | | | |
| | Mean | SD | Minimum | Maximum |
| Mean EPD | 8 | 2 | -10 | 15 |
| Mean accuracy | 0.15 | 0.11 | 0.00 | 0.82 |

contemporary groups with no variation (0% pregnant or 100% pregnant). The final analysis represented 320 contemporary groups from 167 herds.

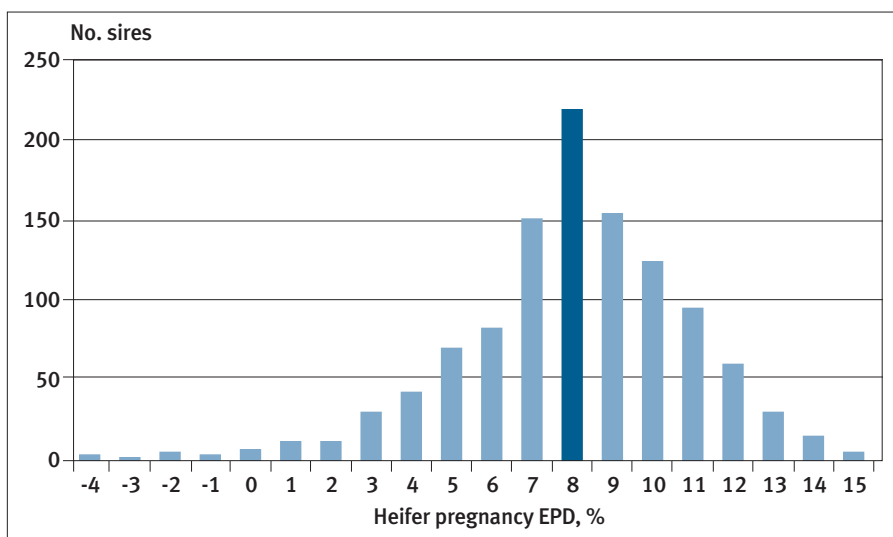
Results

EPDs were generated on 30,304 animals, as described in Table 1. EPDs are reported on an arbitrary base to illustrate the range and distribution of genetic values.

Fig. 1 illustrates the distribution of EPDs for the current sires having HP EPDs generated in the analysis. The EPDs ranged from -10 to +15 on 1,098 current sires. Accuracies varied from 0.05 to 0.82.

Table 2 depicts an example percentile breakdown for the HP EPDs for the current sires in the research project. As with all percentile rankings, these values are to be used as a guide to determine where an individual of interest falls within a particular class of animals, in this case the 1,098 current sires with HP EPDs.

Fig. 1: Distribution of heifer pregnancy EPDs for 1,098 current sires



Genetic trend, correlations

In evaluating the genetic trend for heifer

Table 2: Example percentile breakdown for heifer pregnancy EPDs in current sires

| Percentile | HP EPD, % |
|------------|-----------|
| 1% | +15 |
| 5% | +12 |
| 10% | +11 |
| 25% | +10 |
| 50% | +8 |
| 75% | +7 |
| 90% | +4 |
| 95% | 0 |

Table 3: Heifer pregnancy EPD example

| | |
|------------|------|
| Bull A | +13% |
| Bull B | +8% |
| Difference | 5% |

pregnancy, the average HP EPD by animal birth year has remained unchanged over time. The genetic trend line is flat, and no trend has occurred for heifer pregnancy based on this initial analysis, as would be expected in situations where little selection pressure has been applied.

The review of correlations among other traits using sires with an accuracy of 0.50 or greater showed that HP EPDs were

uncorrelated with EPDs for scrotal circumference, calving ease, milk, fat (ultrasound and carcass), percent intramuscular fat (IMF), marbling or any growth traits. In other words, selection for improved heifer pregnancy can be made without affecting these other traits.

Use of HP EPDs

HP EPDs are to be used as a tool to increase the chance of a sire's daughters becoming pregnant during a normal breeding season. The unit of measure for the EPD is a percentage. A higher EPD is the more favorable direction for selection pressure. As with other EPDs, the relative difference among sires is of importance rather than the absolute value.

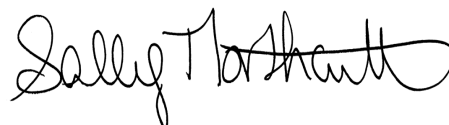
Table 3 provides an example use of HP EPDs. Assume there are 100 daughters for each of the two bulls, managed and treated alike in the same breeding environment. When comparing daughters of the two bulls, one would expect an average of five more pregnant daughters out of 100 from Bull A compared with Bull B. Essentially, Bull A's daughters have a 5% greater chance of becoming pregnant than Bull B's daughters.

Summary

A research version of HP EPDs on sires has been computed using the Association's

breeding record database. These EPDs are designed to characterize differences among sires in the Angus breed for daughters' heifer pregnancy. When comparing two sires based on their HP EPDs (reported in units of percentage), a higher-EPD sire would be expected to have daughters with a greater probability or chance of becoming pregnant than a sire with a lower EPD.

The initial research release of sire HP EPDs is planned to follow the Association's deadline for submitting performance data on June 15. Breeders must submit their heifer breeding records by the June 15 deadline in order for it to be included in the heifer pregnancy genetic evaluation.



E-MAIL: snorthcutt@angus.org

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 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.