



# By the Numbers

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## Can we talk about the cow for a change?

The first heifer pregnancy genetic evaluation for Angus cattle was released as a research report on the Association's web site in July 2007 as part of the Fall 2007 Angus National Cattle Evaluation (NCE). Breeding records continue to accumulate, but more work still needs to be done.

### Heifer pregnancy

Reproductive measures are perhaps the most difficult class of traits to face in terms of creating genetic values. That is not to downplay the importance of these traits. Seedstock and commercial producers continually ask about the availability of reproductive selection tools to use in their herds.

The initial Angus research on heifer pregnancy was conducted by Iowa State University (ISU). An additional research analysis was conducted at Colorado State University (CSU). Both projects confirmed heifer pregnancy to be lowly heritable, at 0.13, confirming what literature reports had suggested previously.

The heritability indicates that 13% of the variation in this trait is due to genetics,

leaving a large portion (87%) due to environment. Thus, as a trait with low heritability, response to selection could be slower or more challenging than the classic growth and carcass traits to which we are accustomed.

**When submitting breeding and pregnancy-check data, the goal is to fully describe the events in each cow's reproductive herd life.**

### Breeding records

Large numbers of breeding records are desirable in an evaluation of this kind. Fig. 1 depicts the growth in breeding records and calculated expected progeny differences (EPDs) since the first Angus heifer pregnancy research report was released. Association members continue to submit breeding records through AAA

Login ([www.angusonline.org](http://www.angusonline.org)) and Angus Information Management Software (AIMS). The growth in data reported is steady, but a more sizable breeding database would allow

a more comprehensive genetic evaluation to characterize the Angus breeding population.

When submitting breeding and pregnancy-check data, the goal is to fully describe the events in each cow's reproductive herd life. From the start, her breeding records, contemporaries, breeding dates, service sires, artificial insemination (AI) and pasture details, along with outcomes and calf performance through her last production day in the herd are tracked. Fig. 2 illustrates the breeding data entry screen currently available in AAA Login. Data entry fields include these items, with specifics such as synchronization and disposal-reason codes.

### Research report and sire listing

At its February 2007 meeting, the American Angus Association Board of Directors approved the release of heifer pregnancy (HP) EPDs on sires with a minimum 0.30 accuracy in a special research report. There were 429 sires released in the Fall 2007 report.

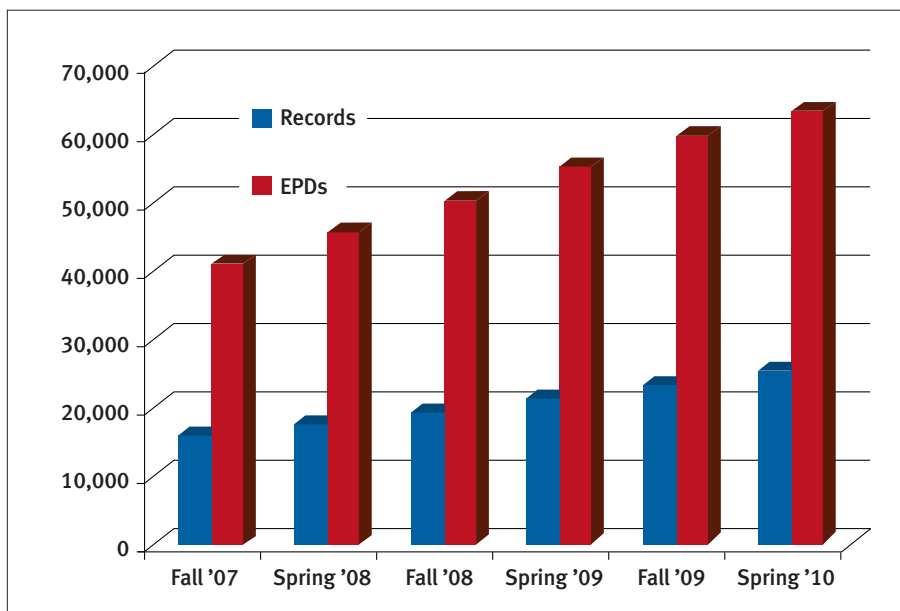
In the recent Spring 2010 report, a list of 677 sires meeting the accuracy criteria are listed. These sire EPDs for heifer pregnancy and associated accuracies can be found at [www.angussiresearch.com](http://www.angussiresearch.com). If you go to the web today to access the most current heifer pregnancy research summary, the report includes a percentile ranking table for the sire 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.

Only the sire EPDs are part of the release. Interims are not calculated, nor are there EPDs on females. It is important to note that HP EPDs do not account for all the physiological factors associated with a heifer's reproductive success.

In reviewing the results of the HP EPD research run, keep in mind that as the Angus Herd Improvement Records (AHIR®) database for heifer breeding records grows, we would expect re-rankings in sires to occur, particularly since this trait is more lowly heritable. To keep this in perspective,

Fig. 1: No. of heifer breeding records and HP EPDs generated, by evaluation



**Fig. 2: Example AAA Login breeding data entry screen**

Fields indicated with an asterisk(\*) are required.

Customer: 326835 \*      Owner: \*      Year: \*      Group Code: \*  
 Breeding Season: \*      Tag: \*      Birth Date: \*  
 Heifer Assn Item: AAA \*      Disposal Date: \*      Days Preg: \*      Open: \*  
 Reason/Disposal Code: 0 - Not Reported \*      Days Preg: \*      Open: \*  
 Preg Check Date: \*      Days Preg: \*      Open: \*  
 Management:  Check to retain Management information for next entry.  
 Pasture Code: \*      Flush: Not Flushed \*  
 Click to Expand/Collapse AI Breeding  
**AI Breeding**  
 Check to retain AI Breeding information for next entry  

	Sire Assn Item	Sire Tag	AI Date	Sync
1.	AAA			Not Synchronized
2.	AAA			Not Synchronized
3.	AAA			Not Synchronized
4.	AAA			Not Synchronized

 Click to Expand/Collapse Pasture Breeding  
**Pasture Breeding**  
 Check to retain Pasture Breeding information for next entry  

	Sire Assn Item	Sire Tag	Date In	Cole Out	Observed Date	Sire Group	Sync
1.	AAA						Not Synchronized
2.	AAA						Not Synchronized
3.	AAA						Not Synchronized

**Fig. 3: DNA profile scores including a profile score for heifer pregnancy (HP)**

DNA PROFILE SCORES																
HP	Stay	Mat	Doc	ADG	YW	FE	CWT	Marb	RE	Fat	%CH	YG	Tend	Color	BVDV	
5	5	3	4	7	8	8	7	10	8	8	10	9	4			

it is helpful to view the EPDs as groups of sires that do better than average, for example, rather than chasing a particular animal in a specific percentile ranking.

**What’s next?**

The American Angus Association’s reproductive database is in its infancy compared with where we want to be in years to come. Breeders are encouraged to continue to submit breeding records to the Association, particularly for first-calf heifers.

Next, the potential exists to incorporate genomic profile results into the heifer pregnancy genetic evaluation. This approach would allow any animal with a genomic profile to be incorporated into the evaluation procedures. The analysis would simultaneously utilize breeding records, genomic inputs and pedigree in a full animal model to generate more EPDs for this trait than ever before.

Profile scores through the Igenity® genomic profile for Angus cattle are already available as a convenience tool. Yet, the next major step is to seamlessly incorporate the genomic details into the HP EPD calculations.

As an intermediate step to genomic-enhanced HP EPDs, the profile score for HP (see Fig. 3) provides an indication of the genetic merit for the combination of the DNA markers evaluated. However, when the future heifer pregnancy evaluations generate

the genomic-enhanced HP EPD, these will provide a more complete picture of the genetic merit for the trait.

**In summary**

Today Angus breeders have HP EPDs available on a web-based listing for use as an additional selection tool. Progress is under way to characterize reproductive traits in Angus cattle more fully through genomic-enhanced selection tools. The breeding records will continue to be very important as a database, particularly in the case of lowly heritable traits such as heifer pregnancy. Breeders are encouraged to work with the Association in expanding the scope of animals represented for these traits that are more difficult to measure and quantify from a genetic standpoint.



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**Editor’s Note:** “By the Numbers” is a column by Association performance programs staff to share insights about data collection and interpretation, the NCE, genetic selection, and relevant technology and industry issues.