Repro Tracks

▶ by **Bill Beal,** *beef cattle reproductive physiologist, Virginia Tech*

Selection for fertility — now and in the future

Fertility is the most economically important trait to a commercial beef producer. However, it is difficult to generate accurate breeding values for reproductive traits. The best tool for improving the genetics controlling reproduction is the use of expected progeny differences (EPDs) for heifer pregnancy rate. Angus breeders must become more committed to submitting data to improve the accuracy of heifer pregnancy rate EPDs and hope for improvements in genomic-enhanced EPDs to increase selection for reproductive traits.

Breeder question No. 1

Is there any other way to effectively select for fertility in my Angus herd, other than culling the open cows at the end of my breeding season?

Response: The economic rationale for culling open cows and heifers is simple and undeniable. Non-pregnant cows won't raise a calf and, therefore, cost you money to keep with no potential for return in the short-term. In addition, you are correct in assuming that strict culling of open cows and heifers, although costly and unnerving, is a "powerful" selection tool for fertility.

Unfortunately, because the heritability of reproductive traits is less than 15%, most of the open females you cull failed to become pregnant due to some factor other than genetics. This means if you strictly cull all open cows and heifers, without regard to their EPDs for growth, maternal or carcass traits, you can end up losing some of the best genetics in your herd — ouch!

In addition to presenting a frustrating contest between economics and genetics, using culling as a genetic selection tool is sort of "after the fact." A better approach would be to use a selection tool that enhances the likelihood of pregnancy in a heifer or cow based on genetic selection before breeding. The best tool for improving the genetics controlling reproduction is the use of EPDs for heifer pregnancy rate (HP).

Heifer pregnancy EPDs are not available on all registered animals. However, HP EPDs are available on sires with a minimum accuracy of 0.30. The HP EPDs are published in a special research report.

Heifer pregnancy EPDs for sires are calculated from breeding records indicating whether the daughters of a bull become pregnant during their first breeding season. The length of the breeding season, the number of matings and the use of natural service or AI are not factors used in determining the HP EPD. Instead, HP EPD is simply an indicator of the likelihood of a bull's daughters becoming pregnant at some time in their first breeding season.

Breeder question No. 2

Why aren't the HP EPDs reported for every registered animal?

Response: Simple answer: not enough data. The American Angus Association staff published the first Research Report on Heifer Pregnancy Evaluation in 2007. That evaluation was updated recently and now includes 28,597 heifer breeding records used to generate EPDs for 760 sires.

While this may sound impressive, it points to a major problem in calculating meaningful HP EPDs. The 28,597 heifer breeding records used to calculate HP EPDs may seem like a lot, but it is less than 1/200 of the number of records used to generate the EPDs for birth weight in the spring 2011 Sire Evaluation Report. The Association needs more heifer breeding records.

Angus breeders can submit heifer breeding data electronically by entering the American Angus Association login area and clicking on the "Submit Data" tab. The "AHIR Yearling Heifer Breeding Data" can be selected and breeding data for each heifer in a herd can be entered. Data for both, heifers that become pregnant and those that are open, must be submitted. Data submitted is processed and added to the database used to calculate HP EPDs.

Processing heifer pregnancy data is done *at no cost to the breeder*. Additional data makes the HP EPDs more accurate. If you haven't done so, please submit the data for your heifers.

Breeder question No. 3

Will the use of genomic results provided by Igenity or Pfizer become useful in identifying Angus bulls or cows with better fertility?

Response: Good question! Theoretically, the use of DNA profiles that reveal genetic markers for economically important traits are most useful for traits that are difficult or expensive to measure directly in large numbers of animals. Fertility certainly fits those criteria.

If reliable prediction equations for reproductive traits can be generated by performing DNA profiles and collecting fertility data on a large number of Angus cows or heifers, DNA profiles should become useful to estimate fertility traits. The "key" is to collect both DNA profiles and data from a large enough group of animals, the so-called "discovery population," such that DNA alone can be used to accurately predict genetic breeding values for reproductive traits on all animals.

At the present time only one of the two companies performing DNA testing (Igenity) is providing a DNA profile score for heifer pregnancy rate. The score for HP returned to breeders who submit samples for DNA profiling is reported as a number from 1 to 10. Higher scores are considered more favorable and indicate an increase in the chance of a bull's or a cow's daughters becoming pregnant during a normal breeding season.

Frankly, the current DNA profile scores are of limited value because they do not allow direct comparisons between animals using all available evaluation data, such as breeding records and pedigree. In the future, HP should be included in the EPDs calculated and reported on a weekly basis and the DNA profile scores for HP will be included to provide a genomic-enhanced EPD for heifer pregnancy. When that happens, the use of DNA profiles to improve selection for reproductive traits will become much more valuable.

Editor's note: *Bill Beal is a beef cattle reproductive physiologist and professor emeritus at Virginia Tech. He conducts research involving estrus synchronization, artificial insemination, embryo transfer and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to Beal at wbeal@vt.edu.*