



By the Numbers

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Docility genetic evaluation research

Word of mouth and the rumor mill have historically been the basis of differentiating temperament on cattle to this point. Through data collection by breeders and the analysis of that data, a factual means to describe temperament differences in Angus cattle is now a reality.

Economically important

Cattle behavior has been documented to influence economically important traits. Researchers at Colorado State University (CSU) have studied cattle temperament as related to beef cattle production systems, handling facilities and carcass end product. Data from the Iowa Tri-County Steer Carcass Futurity (TCSCF) reflect a

difference of \$62.19 per head in net dollars returned between the most docile category and the most aggressive category of cattle evaluated. Quality grade was also greatly enhanced in the more docile cattle, with double the percentage of carcasses grading Prime and premium-Choice.

Producers typically place some emphasis on bull behavior as part of their selection

criteria for breeding stock. Surveys of commercial cow-calf producers rank disposition in the same magnitude of importance as a trait such as calving ease in selecting bulls for use in their programs.

During the past few years, Angus breeders have been submitting yearling cattle temperament scores on a 1-to-6 scale. The scoring system for yearling cattle scored in a chute or scale between 320 and 440 days of age is as follows:

1. Docile — Mild disposition. Gentle and easily handled. Stands and moves slowly during processing. Undisturbed, settled, somewhat dull. Does not pull on headgate when in chute. Exits chute calmly.

2. Restless — Quieter than average, but may be stubborn during processing. May try to back out of chute or pull back on headgate. Some flicking of tail. Exits chute promptly.

3. Nervous — Typical temperament is manageable, but nervous and impatient. Displays a moderate amount of struggling, movement and tail flicking. Repeated pushing and pulling on headgate. Exits chute briskly.

4. Flighty — Wild. Jumpy and out of control, quivers and struggles violently. May bellow and froth at the mouth. Displays continuous tail flicking. Defecates and urinates during processing. Frantically runs fence line and may jump when penned individually. Exhibits long flight distance and exits chute wildly.

5. Aggressive — May be similar to Score 4, but with added aggressive behavior, fearfulness, extreme agitation and continuous movement, which may include jumping and bellowing while in the chute. Exits chute frantically and may exhibit attack behavior when handled alone.

6. Very Aggressive — Extremely aggressive temperament. Thrashes about or attacks wildly when confined in small, tight places. Pronounced attack behavior.

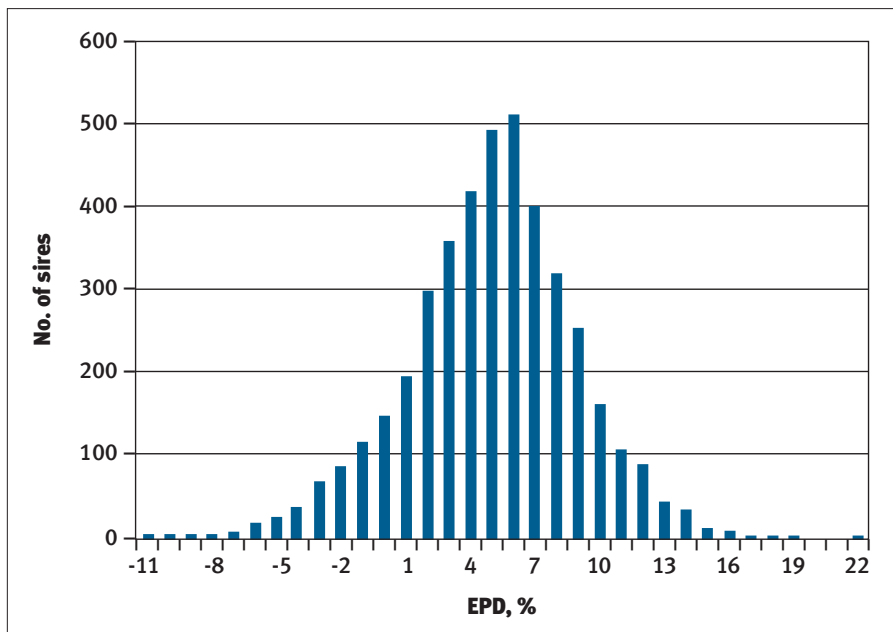
Genetic parameters

Heritability estimates for temperament in beef and dairy cattle tend to be moderate to high, indicating that selection for improved temperament would be effective. Heritability estimates can range from 0 to 1. As a comparison with other traits, reproductive traits tend to be lowly

Table 1: Descriptive statistics for docility genetic evaluation

No. of yearling temperament scores	34,869			
No. of contemporary groups	3,679			
No. animals with EPDs	127,837			
	Mean	SD	Minimum	Maximum
Mean EPD, %	5	4	-11	22
Mean accuracy	.13	.09	.05	.87
Current sires (n = 4,328)				

Fig. 1: Distribution of Angus docility EPDs



heritable and carcass traits are more highly heritable.

Yearling cattle temperament scores processed through Angus Herd Improvement Records (AHIR®) were edited to explore the genetic parameters for docility and the potential for a docility expected progeny difference (EPD). University of Missouri scientist Bob Weaber analyzed the data set to calculate temperament heritability estimates, which ranged from 0.36 to 0.45. Estimates of maternal heritability were near 0. The variance components generated from this research were used in an in-house genetic evaluation for the trait, representing a heritability equal to 0.37.

The Limousin breed, for example, currently publishes an EPD to describe genetic differences in cattle docility and the genetic trend line published by the North American Limousin Foundation illustrates genetic progress in the trait. The heritability reported was 0.40 (www.nalf.org).

EPD research

An edited performance file of AHIR temperament scores was used with a four-generation pedigree to calculate a docility EPD. Four categories were used, for scores 1; 2; 3; and the combined category of scores 4, 5 and 6.

The contemporary group was defined in a similar format to the Association's National Cattle Evaluation (NCE) for yearling weight. Groups with no variation in temperament scores were removed from the analysis. There were 3,679 contemporary groups represented in 34,869 temperament scores. The animal model evaluation included contemporary group, age of dam classes 2 years through 10 years, linear effects of calf age deviated from 365, and categorical temperament scores. The evaluation produced 127,837 EPDs calculated for parents, non-parents with individual records and pedigree ties (see Table 1).

Results

The docility EPD is presented as a percentage, similar to the concept used in heifer pregnancy EPDs. A higher value is considered more favorable in terms of docile temperament. Since this is a threshold trait, herds that exhibit no problems in

temperament will realize no improvement in selecting for favorable docility EPDs.

Table 1 illustrates a sizeable spread between the most and least docile current sire EPDs. Fig. 1 provides a distribution of EPDs for the current sires (n = 4,328). The docility EPD tended to be positively correlated with yearling weight EPD, but not with other performance and carcass traits.

The genetic trend for this new prototype EPD is essentially flat when reviewing the average EPD by birth year for animals in the evaluation.

Using docility EPDs

Docility EPDs can be used as part of a complete selection program in the event that a breeder needs to make improvement in a herd's temperament. In the following example, a 10% difference exists between the docility EPDs for Bull A and Bull B.

Bull	Docility EPD
Bull A	+13%
Bull B	+3%
Difference	10%

On the average, assuming the two bulls were mated to comparable females, one would expect 10 more calves out of 100 sired by Bull A to have a temperament in

the most docile score (score = 1) compared with calves sired by Bull B. In herds where temperament problems are not an issue, this expected difference would not be realized.

EPD release

The docility EPDs are a new research project in Angus cattle. Plans are to release a web-based research report and sire listing with the Spring 2008 National Cattle Evaluation. Temperament scores submitted prior to the Nov. 9, 2007, NCE cutoff date will be eligible to be included in the docility research report.



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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 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.