



By the Numbers

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Docility genetic evaluation research

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) reflects a difference of \$62.19 per head in net dollars returned between the most docile category vs. 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 USDA Prime and premium Choice.

Scoring system

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 1-6 scale. The scoring system is given in Fig. 1

Fig. 1: Six-point scoring system for yearling cattle, age 320-440 days

Code	Description
1	Docile
2	Restless
3	Nervous
4	Flighty
5	Aggressive
6	Very Aggressive

Source: Beef Improvement Federation Guidelines.

from 0.36 to 0.45. Estimates of maternal heritability were near 0. The variance components generated from this research were used in a genetic evaluation for the trait,

representing a heritability equal to 0.37. Similar estimates have been reported for heritability of docility in the Limousin breed (www.nalf.org).

Genetic evaluation details

An edited performance file of yearling temperament scores was used with a four-generation pedigree to calculate an expected progeny difference (EPD) for docility. 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 without any variation in temperament scores were removed from the analysis. In the latest evaluation, there were 8,396 contemporary groups represented in 92,901 temperament scores. The animal model evaluation included contemporary group, age of dam classes 2-year through 10-year, linear effects of calf age deviated from 365, and categorical temperament scores.

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 heritable and carcass traits are more highly heritable.

University of Missouri scientist Bob Weaber analyzed the yearling cattle temperament scores to estimate temperament heritability, which ranged

The evaluation produced 267,487 EPDs calculated for parents, nonparents with individual records, and pedigree ties (see Table 1).

Results

The docility EPD is presented as a percentage, where 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 sizable spread between the most and least docile current sire EPDs. The docility EPDs tended to be positively correlated with yearling weight EPD, but not with other performance and carcass EPDs. The genetic trend for this 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 cattle temperament. In the following example, a 10 percentage point difference exists between the EPDs for Bull A and Bull B. 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.

Example:

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

EPD Release

Although the docility EPDs have been available as a research genetic evaluation on www.angus.org since the Spring 2008 NCE, these EPDs are now available on a weekly basis through the website and AAA Login (www.angusonline.org).



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.

Table 1: Descriptive statistics for docility genetic evaluation

No. of yearling temperament scores	92,901			
No. of contemporary groups	8,396			
No. animals with EPDs	267,487			
	Mean	SD	Minimum	Maximum
Mean EPD, %	8	8	-34	43
Mean Accuracy	.29	.10	.05	.95