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INTRODUCTION

- Temperament (docility) has been identified as a key breeding goal in the worldwide beef cattle industry;
- Temperament has detrimental effects on animal welfare and performance, handlers' safety, meat quality, and longevity in the herd;
- Most behavioral traits are heritable and can be improved through genetic selection;
- American Angus Association has performed genetic predictions for temperament since 2008.

The goals of this study were to define the statistical models and estimate (co)variance components for temperament in American Angus.

MATERIAL AND METHODS

266,029 Angus animals with phenotypic info

THRIBBS1FSQ¹ software, 1M chain length, 50%-75% burn-in, 10 thin

Temperament measured at yearling, in a 1-6 scale

Temperament score scale:



Four models were evaluated:

- Reduced model (1) $y = Xb + Ww + Zu + e$
- Maternal genetic model (2) $y = Xb + Ww + Z_1u + Z_2m + e$
- Maternal environmental model (3) $y = Xb + Ww + Zu + Sp + e$
- Complete model (4) $y = Xb + Ww + Z_1u + Z_2m + Sp + e$

- Where: **y**: vector of phenotypic values; **b**: systematic effect vector; **w**: random vector of contemporary group; **u**: random vector of direct genetic effect; **m**: random vector of maternal genetic effect; **p**: random vector of maternal permanent environmental effect; **e** is a residual vector.

RESULTS AND DISCUSSION

The selected systematic effects were:

Systematic effects

- Age of dam in years (from 3 to 12 years);
 - Conception type (embryos transference or natural conception);
 - Calf age deviation from 365 days.
- Contemporary group, concatenation of**
- Birth, weaning and temperament dates (month and year);
 - Birth, weaning and temperament herd;
 - Birth, weaning and temperament gender (bull, steer, or female);
 - If the animals were in creep feeding system and have ultrasound info;
 - Animal age deviation group (adjusted to 365 days and to 452 days).

A t-test of temperament mean was performed for all environmental variables. The significant environments were:

- Embryos transference (docile) and natural (more aggressive)
- Animals under **creep feeding system** (docile);
- Animals with **ultrasound information** (docile);
- **Birth year** (Fig 2).
- **Bull** (docile), **cow**, and **steer** (aggressive);
- **Age of dam** (Fig 1);
- **Birth season**: Summer (docile) -> Spring (more aggressive);

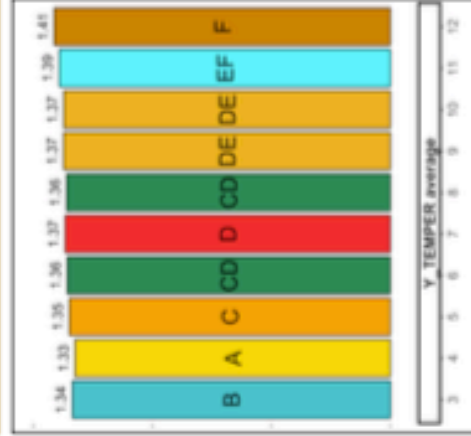


Fig 1. Average of temperament score per age of dam (year).



Fig 2. Average of temperament score per birth year.

Table 1. The fitness of the model measurements, DIC, and heritability estimates for the animal model tested using temperament score.

Model	DIC	h^2_d	h^2_m	$r^2_{d,m}$
Model 1	-748,337	0.39±0.01	-	-
Model 2	6049	0.44±0.02	0.04±0.01	-0.39±0.04
Model 3	-5,902,728	0.38±0.01	-	-
Model 4				<i>it did not achieve the convergence</i>

CONCLUSION

- The best-fitted model included direct genetic effect and maternal permanent environmental effect;
- Temperament scores are influenced by environmental factors, e.g. gender, age of dam, and creep feeding system;
- Temperament is inheritable with a heritability on liability scale ranging from 0.38 to 0.44.

ACKNOWLEDGMENTS

¹Tsuruta S, Miztal I. In 8th World Congress Gen. Appl. Livest. Prod. 2006; 27-31. Belo Horizonte, Brazil.