Genetic parameters for body conformation scores and heifer pregnancy in Nelore cattle

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Objective

The objective of the present investigation was to estimate genetic associations between finishing precocity score (PRE), bone score (BONE), and probability of pregnancy at 14 months (HP) in Nelore cattle.

Introduction

Intensive selection for growth traits has been used in different beef cattle breeding programs. As a consequence of the growing market requirements for high-quality meat, traits related to body conformation of the animals have received increasing attention on the part of breeders. The current scenario of beef production requires efficient improvement of both reproductive traits and body structure- and carcass-related traits. Studies investigating the genetic association between body structure and reproductive traits in Nelore cattle are scarce.

Material and methods

Data from the Genetic Breeding Program of Agro-Pecuária CFM Ltda. that have been stored and analyzed since 1994 by the Animal Breeding and Biotechnology Group, College of Animal Science and Food Engineering, Pirassununga, State of São Paulo, were used in this study. The animals born between 1984 and 2008 on 12 farms located in the states of Mato Grosso do Sul, São Paulo, and Bahia.

The PRE is a measure of the ability of the animal to store fat reserves and is used to identify animals that will deposit finishing fat earlier. This variable was obtained by attributing visual scores ranging from 1 to 6, with a score of 6 indicating animals with greater fat reserves. The BONE was attributed to each animal using the following scores: 1 = light, 2 = intermediate, and 3 = heavy. The variable was evaluated based on the bone structure of the legs and hocks. About 60 days after the end of the breeding season, heifers (approximately 14 months of age) were evaluated by rectal palpation or ultrasound for the diagnosis of pregnancy. The heifer pregnancy (HP) was analyzed as a categorical trait, with a value of 1 (success) assigned to heifers that were diagnosed pregnant and a value of 0 (failure) assigned to those that were not pregnant at that time. The total number of records used in this study were 161,842, 78,337, 55,430 for PRE, BONE, and HP, respectively.

The Bayesian linear-threshold analysis via the Gibbs sampler was used to estimate the (co)variance components applying a multi-trait animal model.

Results and discussion

Posterior mean of heritability estimates for PRE, BONE, and HP were 0.26 ± 0.01, 0.26 ± 0.01, and 0.50 ± 0.02, respectively. Therefore, the genetic improvement of these traits is possible in the selection programs. The heritability estimates of HP obtained for Nelore animals are higher than those reported for *Bos taurus* animals, which range from 0.13 to 0.27 (Evans et al., 1999; Doyle et al., 2000). According to Eler et al. (2002), HP shows greater variability in *Bos indicus* animals because of recent selection for this trait. The posterior mean of genetic correlation between PRE and BONE was 0.85 ± 0.02. Thus, selection for higher PRE in this population should lead to animals with higher BONE. This genetic association needs to be taken into account during selection in this population since animals with higher BONE values are undesired. The posterior mean of genetic correlation of 0.25 ± 0.04 between PRE and HP suggest little improvement in reproductive precocity when animals are selected for higher visual score of PRE. Genetic correlation between BONE and HP was close to zero (0.03 ± 0.00), indicating that in the present population selection for any of these traits would not lead to changes in the other trait.

Conclusions

All traits studied present important additive genetic variation and can be used as selection criteria in Nelore cattle. The simultaneous inclusion of all visual scores studied here in a selection index does not seem to be necessary for the present population because the genetic correlations between them were close to unity. The genetic correlations of HP and visual scores were of low magnitude, indicating that selection for the traits related to body structure and conformation has little or no effect on HP.

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