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Herdability of the Weaning Weight in Brangus and Tabapuã Cattle Breeds in the Pre-Amazon Region

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ABSTRACT *Brazil stands out because it is the largest producer of beef cattle in the world, yet there is a need to improve the quality of livestock. Data weight gains from birth to weaning were collected of Brangus and Tabapuã breeds from two farms in Imperatriz city (Maranhão State-Brazil) and heritability were estimated by variances between half-siblings. The average weight at weaning at seven months of age was 184.2 (± 14.1) kg for Brangus and 212.4 (± 22.2) kg for Tabapuã. The mean weight gain was 155.9 (±12.1) for Brangus and 181.9 (±17.6) for Tabapuã. The heritability coefficient was low compared to the observed values in Brazilian literature, 0.12 and 0.16, and for Brangus and Tabapuã, respectively. Low heritability coefficient reflects high environmental influence on the phenotype, in this case, the management, mainly in the health and food pre-Amazon region.*

Introduction
Brazil has the second largest herd of cattle in the world, surpassed only by India, according to data from the Food and Agriculture Organization of the United Nations (FAO , 2010) . The number of cattle in Brazil, according to Brazilian Institute of Geography and Statistics (IBGE, 2010), its recorded is 205.2 million of animals , considering breeds for the production of meat and milk also.

Several breeding programs of cattle in Brazil use the estimates of genetic parameters for economic traits to select breeding in successive generations. The weaning weights, and yearling year, in addition to weight gain, are features commonly used in genetic evaluation of breeding (BRAZIL, 1999). Among the parameters used in selection in cattle, the heritability is excellent due to wide variation, from 0.26 to 0.42 (Marcondes et al., 2000).

The heritability of the characteristic is a genetic parameter specific to each population and represents how far the expression of the trait depends on the components of genetic variance and environmental, and any change in any of these components will result in a change in the value of the ratio or proportion of heritable variation total is attributable to additive genetic (Falconer, 1989). In this perspective, the aim of this work was to assess the heritability estimates with variances between half-siblings, the genetic component that contributes to the performance from birth to weaning in Brangus and Tabapuã breeds created in the Amazon region, Brazil.

Materials and Methods
Data on birth weight and weaning weight of offspring from seven reproducers of Brangus were collected at OIAC Farm (from 63 to 82 offspring per stallion) and six reproducers of Tabapuã at Valle do Mutum Farm (from 70 to 91 offspring per stallion), both located in Imperatriz city, Maranhão State, Brazil (Latitude: -5.5255, Longitude: -47 477 5 ° 31 '32 "South, 47 ° 28' 37" West). The climate is tropical with a dry season (Classification of Köppen-Geiger climate: Aw) for the year 2012.

The cows were managed on *Brachiaria brizantha* Marandu and supplemented with mineral *ad libitum* in trough. Calfs were managed with the cows in the same pasture and consuming the same mineral supplement when needed. Animals were individually weighed at birth and at weaning at seven months of age on mechanical balance with a maximum capacity of 3,000 kg and dimensions about 3.00 x 2.50 m. The reproductive management was done through artificial insemination with estrus synchronization.

The average weight and standard deviation of all descendants were established in a descriptive way for birth weight, weaning weight and weight gain has been established by the difference between the weaning weight and birth weight. Variance analysis were performed with the weight gain of observations stepbrothers allowed calculation of heritability based on information from relatives as described by Lopes (2005) for each race.

Results and Discussion
The estimated results for the genetic parameters for the two breeds are described in Table 1.

Table 1. Mean and standard deviation (sd) of birth weight, weaning weight and weight gain, with heritability (h^2) estimates for Brangus and Tabapuã breeds.

Parametres	Brangus (Mean±sd)	Tabapuã (Mean±sd)
Birth Weight (kg)	28,3 ± 1,4	30,5 ± 0,9
Weaning weight (kg)	184,2 ± 14,1	212,4 ± 22,2
Weight Gain (kg)	155,9± 12,1	181,9± 17,6
h^2 in the weaning weight	0,12	0,16

The variances of reproducers of Brangus breed was not significant (P>0.05), and Tabapuã breed, the variances between reproducers was significant (P<0.05), thus demonstrating the genetic effect between reproducers only in Tabapuã breed. The weaning weight for Brangus and Tabapuã breeds were higher than those found by Guterres et al. (2007) (173.35±13.63 kg) for Brangus breed and those found for animals results of crossing between Charolais x Nellore breeds assessed in the Rio Grande do Sul State (Brazil) (Pereira et al.,

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2000) (143 kg) and for cattle from multiple crosses between Angus x Nellore breeds in the Paraná State (Brazil) (167.5 kg) by Cubas et al. (2001).

Araújo et al. (2010) evaluated animals from crosses between Angus x Nellore breeds from farms of Midwest, Southeast and South regions of Brazil and found weaning weight of 189 kg, in other words, higher than the Brangus breed and less than the Tabapuã breed researched in this study. However, the means of Tabapuã breed was near to Braford breed (221 kg) (Restle et al., 1999) and less than reported by Cruz et al. (2009) with a weight of 242 kg for crossing between Angus x Nellore breeds from São Paulo State (Brazil).

The heritability, according to Lopes (2005), when is established between 0.0 to 0.2, it is considered low. Lower values mean that much of the variation of the characteristic is due to environmental differences between individuals. Tabapuã and Brangus breeds have showed low heritability for weaning weight. The values obtained is very low of desired, since heritability values found by Ferraz Filho et al. (2002) observing the magnitude of the heritability estimates of weights decreased from 205 to 550 days of age, however, these heritability values, although low at 550 days show in general that Tabapuã breed has enough genetic variability to occur in response to selection based on weights studied.

Ribeiro et al. (2001) estimated the heritability of 0.16 to weaning weight in herds in Paraiba State (Brazil), suggesting high environmental influence at this stage, indicating a better response can be obtained by this population of animals when used in other breeding methods that do not selection. Comparing the estimates of heritability of this work with the de Araújo et al. (2010), that found additive heritability for weaning weight in animals equal to 0.3 for cattle crosses between Angus x Nellore breeds.

Heritability estimates were much lower than those found by Bertrand and Benyshek (1987) for Brangus (0.28), by Everling et al. (2001) for a multi-racial population of Angus x Nellore (0.23), by Bocchi et al. (2008) for a mixed breed (0.30), by Lopes et al. (2009) for Brangus (0.43) and Pons, Miracles and Teixeira (1989) for Hereford (0,37). Therefore, the values found in this study were not within the scope of heritability described in the literature.

Conclusions

Thus, we conclude that the coefficients of heritability for weaning weight in the Brangus and and Tabapuã breeds would not be useful for system selection in breeding program in an extensive production system in the pre-Amazon region of Maranhão State (Brazil) due to be a characteristic highly influenced by the environment.

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REFERENCE

Araújo, R. O., Rorato, P. R. N., Weber, T., Everling, D. M., Lopes, J. S., & Dornelles, M. A. (2010). Genetic parameters and phenotypic and genetic trends for weight at weaning and visual scores during this phase estimated for Angus-Nellore crossbred young bulls. Revista Brasileira de Zootecnia, 39(11), 2398-2408. | Bertrand, J. K., & Benyshek, L. L. (1987). Variance and covariance estimates for maternally influenced beef growth traits. Journal Animal Science, 64, 728-734. | Bocchi, A. L., Oliveira, H. N., Ferraz, J. B. S., & Eler, J. P. (2008). Avaliação genética multirracial para ganho de peso pré-desmama em bovinos de uma população composta. Revista Brasileira de Zootecnia, 37(7), 1207-1215. | BRASIL. Ministério da Agricultura e do Abastecimento. (1999). Sumário nacional de touros das raças zebuínas: Tabapuã. Uberaba: Embrapa Gado de Corte/ABCZ. | Cruz, G. M., Rodrigues, A. A., Tullio, R. R., Alencar, M. M., Alleoni, G. F., & Oliveira, G. P. (2009). Desempenho de bezerros da raça Nelore e cruzados desmamados recebendo concentrado em pastagem adubada de Cynodon dactylon cv. Coastcross. Revista Brasileira de Zootecnia, 38(1), 139-148. | Cubas, A. C., Perotto, D., Abrahão, J. J. S., & Mella, S. C. (2001). Desempenho até a desmama de bezerros Nelore e cruzas com Nelore. Revista Brasileira de Zootecnia, 30(3), 694-701. | Everling, D. M., Ferreira, G. B. B., Rorato, P. R. N., Roso, V. M., Marion A. E., & Fernandes, H. D. (2008). Estimativas de herdabilidade e correlação genética para características de crescimento na fase de pré-desmama e medidas de perímetro escrotal ao sobreano em bovinos Angus-Nelore. Revista Brasileira de Zootecnia, 30(6), 2002-2008, (supl.). | Falconer, D. S. (1989). Introduction to quantitative genetics. 3rd ed. New York: Longman Scientific and Technical. | FAO. (2010). The State of Food and Agriculture. FAO, Rome. | Ferraz Filho, P. B., Ramos, A. A., Silva, L. O. C., Souza, J. C., & Alencar, M. M. (2002). Herdabilidade e correlações genéticas, fenotípicas e ambientais para pesos em diferentes idades de bovinos da raça tabapuã. Archives of Veterinary Science, 7(1), 65-69. | Guterres, L. F. W., Rorato, P. R. N., Boligon, A. A., Weber, T., Kippert, C. J., Lopes, J. S., & Souza, P. R. S. (2007). Efeito da inclusão da covariância genética aditiva direta materna no modelo de análise sobre a magnitude das estimativas de parâmetros e valores genéticos preditos para ganho de peso na raça Brangus. Ciência Rural, 37(3), 809-814. | IBGE. (2010). Produção da Pecuária Municipal. v. 38. Rio de Janeiro, Brasil. | Lopes, J. S., Rorato, P. R. N., Weber, T., Dornelles, M. A., Comin, J. G., & Araújo, R. O. (2009). Parâmetros genéticos e tendências genética e fenotípica para características de crescimento em uma população da raça Brangus. Revista Brasileira de Zootecnia, 38(4), 662-669. | Lopes, P. S. (2005). Teoria do melhoramento animal. Belo Horizonte: ed. FEPMVZ. | Marconde, C. R., Bergmann, J. A. G., Eler, J. P., Ferraz, J. B. S., Pereira, J. C. C., & Penna, V. M. (2000). Análise de alguns critérios de seleção para características de crescimento na raça Nelore. Arquivo Brasileiro de Medicina Veterinária e Zootecnia, 52(1), 83-89. | Pereira, L. P., Restle, J., Brondani, I. L., Alves Filho, D. C., Silva, J. H. S., & Muehlmann, L. D. (2000). Desenvolvimento ponderal de bovinos de corte de diferentes grupos genéticos de Charolês x Nelore inteiros ou castrados aos oito meses. Ciência Rural, 30(6), 1033-1039. | Pons, S. B., Milagres, J. C., & Teixeira, N. M. (1989). Efeitos de fatores genéticos e de ambiente sobre o crescimento e o escore de conformação em bovinos Hereford no Rio Grande do Sul. I – Peso e escore de conformação à desmama. Revista Brasileira de Zootecnia, 18(5), 391-401. | Restle, J., Vaz, F. N., Brondani, I. L., Gonçalves, J. M., & Andreatta, E. (1999). Estudo da carcaça de machos Braford desmamados aos 72 ou 210 dias, abatidos aos catorze meses. Pesquisa Agropecuária Brasileira, 34(11), 2137-2144. | Ribeiro, M. N., Pimenta Filho, E. C., Martins, G. A., Sarmento, J. L. R., & Martins Filho, R. (2001). Herdabilidade para efeitos direto e materno de características de crescimento de bovinos nelore no Estado da Paraíba. Revista Brasileira de Zootecnia, 30(4), 1224-1227. |