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Genetic parameters estimate for gestation length in Holstein cattle

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The reproductive efficiency of herds is crucial in dairy cattle breeding programs. Thus, the inclusion of reproductive traits, such as gestation length (GL) can be a way to obtain higher efficiency of herds and avoid significant losses due to stillbirths and abortions.Therefore, we aimedto compare the models using gestation length(GL) as a trait of cow or calf and estimate genetic parameters for gestation lengthin Holstein cattle from Brazil. A total of 339,510 records of gestation length was used in this study. The data was provided by Associação Brasileira de Criadores de Bovinos da Raça Holandesa (ABCBRH) and Embrapa Gado de Leite. To define the best model to evaluate GL, a total of 16 models were contrasted, in which GL was defined as cow phenotype (GLc) in eight models (MOD1 to MOD8), and as calf phenotype (GLb) in the models MOD9 to MOD16.In summary, the models differ regarding the maternal effects, service bull effects, cow's permanent environmental effect, and bull's permanent environmental effect.The models were compared based on goodness of fit, genetic parameter estimates, and predictive ability (using the linear regression method – LR). The heritability estimates ranged between GLc and GLb models. For GLc, the estimates ranged from 0.20 to 0.21. For GLc models, the estimates ranged from 0.14 to 0.69.The MOD4 (with effects: additive direct and service bull environmental permanent effects) and MOD16 (with effects: additive direct and maternal; and maternal and service bull environmental permanent) were the best models according to the Deviance Information Criterion (DIC) for GLc and GLb, respectively, and also according to predictive ability.A higher accuracy (0.38) was observed for MOD16 compared to MOD4 (0.31). The bias was lower for MOD16 (0.55) than for MOD4 (0.68). Overall, the MOD4 is the best model for the genetic evaluation of GL of the Brazilian Holstein cattle. The GL as calf's phenotype presented the best predictive ability and can be considered in the genetic evaluation of Holstein cattle in Brazil.

Keywords: model comparison, permanent environment, service bulls, reproductive traits, heritability, breeding programs.

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