Heritability and Genetic Evaluation of Black Bengal Goats for Growth Traits

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Abstract

Estimation of heritability (h2) and its use in predicting animals' breeding are keys to selection and breeding programs aiming to livestock improvement. In this study, heritability of birth weight (BWT), weaning weight at 3-month (WWT), 6-months body weight (SMWT), and growth rates from birth to weaning (GR 1), birth to 6-month (GR 2) and weaning to 6-month (GR 3) were estimated using data collected from 607 pedigree recorded growing Black Bengal goats during 2017–2020 of Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka, Bangladesh. After basic statistical analyses, variance components and heritability were estimated using an animal model fitted in Variance Component Estimation (VCE) 4.2.5 software and then obtained heritability values were used to predict breeding values of animals for each trait with Prediction and Estimation (PEST) software. The least squares means of BWT, WWT, SMWT were 1.16 ± 0.10, 5.55 ± 0.05, 8.76 ± 0.10 kg and of GR 1, of GR 2 and of GR 3 were 48.73 ± 0.63, 41.89 ± 0.59 and 34.57 ± 0.91 g day^{-1}, respectively. Parity of dam, type of birth, season of birth and year of birth and some interactions among them had significant effect on growth at different stages. Parity of dam significantly affected ($p < 0.01$) birth weight only and birth weight increased with the progress of parity. Season of birth significantly influenced ($p < 0.01$) all the growth traits except BWT and similarly, type of birth had significant effect ($p < 0.01$) on all growth traits except GR 3. Year of birth had significant influence on BWT ($p < 0.001$), SMWT ($p < 0.01$) and post-weaning growth rate whereas sex had no significant effect on any of the growth traits. The heritability $\pm$ standard errors were 0.46±0.02, 0.42±0.05, 0.47 ± 0.03, 0.43 ± 0.04, 0.48 ± 0.02 and 0.49 ± 0.02 for BWT, WWT, SMWT, GR 1, GR 2 and GR 3, respectively. Estimated higher heritability's indicates that selection would be effective if based on them. The mean of predicted breeding values were 0 .0010 for BWT, 0.0013 for WWT, 0.0027 for SMWT, -0.0033 for GR 1, 0.0127 for GR 2 and -0.0011 for GR 3, respectively. The predicted breeding values of the traits on each animal could well be used in selecting candidates in the on-going goat improvement program.

Keywords: Black Bengal goat, breeding value, growth traits, heritability

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