Genetic parameters estimation for reproductive traits of goat breeds in Croatia

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Abstract

The objective of this study was to estimate genetic parameters for reproductive traits - litter size (LS) and birth weight (BW) in Alpine, Saanen, and German Improved Fawn goat breeds in Croatia. Pedigree information for 141,384 animals and 123,450 phenotypic records for each trait collected on 12,410 does from year 2000 to 2017 were included in the analysis using a single-trait repeatability animal model. Fixed class effects in the model were breed, parity, season of kidding as year-month interaction (and litter size for BW), while age at lambing was treated as covariate and fitted using quadratic regression nested within parity. Direct additive genetic effect, flock-year of lambing, and permanent environment effect within parity were included in the model as random effects. Variance components were estimated using Residual Maximum Likelihood method as implemented in the VCE-6 program. Estimates of heritability, flock-year of lambing, and permanent environment effect for LS were 0.075±0.003, 0.111±0.004, 0.677±0.003, respectively. For BW, estimates of heritability, flock-year of lambing, and permanent environment effect were 0.098±0.004, 0.406±0.007, 0.184±0.004, respectively. Regardless of being similarly heritable traits, large discrepancy in estimates of permanent environment and flock-year of lambing effect among the traits indicate a significantly higher phenotypic plasticity of BW in comparison to LS. The obtained results should contribute to better understanding of phenotypic variability of BW and LS in dairy goat populations. Fitting these sources of phenotypic variability in BLUP models for prediction of BVs should provide high accuracy and unbiased ranking of the animals, especially in joint across flock evaluation systems with considerably different environmental conditions among flocks.