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Effect of incomplete pedigrees and the structure of relationship matrix on estimates of genetic parameters and breeding values for economical traits in Karakul sheep

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Abstract

In order to investigate the effect of incomplete pedigree and relationship matrix structure on genetic parameters and breeding values of the economic traits of Karakul sheep, the collected data were used at Karakul Sarakhs sheep breeding station during 1990-2014. The studied traits included birth weight, weaning weight, average daily gain from birth to weaning, and degree of skin. Data for each trait in complete and incomplete pedigree mode (for 25, 50, 75 and 100 percent defects of the father, mother and parent in the pedigree). Realistic and simulated data were analyzed according to the animal model and with the DMU software. The genetic trend of these traits was estimated by the nationality of the average breeding value of the birthday. Genetic trend, direct and maternal heritability, additive genetic variance, estimated variance of the traits studied in each one in three scenarios: 1) defective father 2) mother defect and 3) defective parent and 2 types of actual and simulated data with incomplete levels zero, 25, 50, 75 and 100 percent of the pedigree were estimated. the results showed that direct heritability of real data in birth weight, weaning weight, average daily gain from birth to weaning and skin degree traits in father, mother, and parent, defective scenarios were more than the simulated data but the genetic trend of these traits with the same scenarios in real data were less than those of the simulated data, the accuracy of 50k marker estimates was more than the 600k marker in all traits. Overall, the results of this study showed that increasing the percentage of father defects increased maternal heritability and decreased direct heritability and genetic trend of studied traits. Estimates of variance components and heritability are not valid in defective scenarios of more than 75% of the fathers, because an increase in variance is associated with decreasing environmental variance and indicates the inability of the model to separate genetic, maternal and environmental effects. In birth weights up to 75% and in weaning weights up to 50%, and in the average daily gain from birth to weaning to 75%, father defects can be applied without any significant difference in the genetic trend.

Keywords: Karakul sheep, incomplete pedigree, economical traits, breeding value, genetic trend