Genetic evaluation of growth of Dorper sheep in semi-arid Kenya using random regression models

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Abstract

Data consisting of 8922 weight records from 2642 Dorper sheep from 20 to 380 days of age spanning 1981–1996 were used to model the growth trajectory using random regression (RR) and estimate genetic parameters. The independent variables were orthogonal (Legendre) polynomials of age at weighing and orders of fit up to 3 were considered. Analyses were carried out fitting sets of RR coefficients due to direct and maternal additive genetic and environmental effects, and heterogeneous error variances. Direct additive genetic variance increased steadily along the trajectory from 0.9 at 20 days of age to 2.44 at 380 days of age. Maternal additive genetic variance increased steadily along the trajectory from 0.13 to 2.92. Direct permanent environmental effect variances increased steadily from a value of 0.66 at 20 days to 2.13 at 380 days of age. Maternal permanent environmental variances declined from 0.87 at 20 days of age to 0.01 at 200 days of age followed by an increase to 0.87 at 380 days. Direct genetic heritability estimates declined sharply from 0.13 at 20 days to 0.07 at 80 days of age then fluctuated thereafter. Maternal genetic heritability estimates increased along the trajectory up to 320 days of age after which it declined slightly. The genetic and phenotypic correlations decreased with increasing lag in time between the weights. The Dorper sheep growth was adequately modeled using RR models despite the limited data. This study has demonstrated the possibility of application of RR models for routine genetic evaluation of Dorper sheep in Kenya.