

Estimates of (Co)Variance Components and Genetic Parameters for Body Weights and Growth Efficiency Traits in the New Zealand White Rabbits

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Abstract : The genetic parameters of growth traits in the New Zealand White rabbits maintained at Sheep Breeding and Research Station, Sandynallah, The Nilgiris, India were estimated by partitioning the variance and covariance components. The (co)variance components of body weights at weaning (W42), post-weaning (W70) and marketing (W135) age and growth efficiency traits viz., average daily gain (ADG), relative growth rate (RGR) and Kleiber ratio (KR) estimated on a daily basis at different age intervals (1=42 to 70 days; 2=70 to 135 days and 3=42 to 135 days) from weaning to marketing were estimated by restricted maximum likelihood, fitting six animal models with various combinations of direct and maternal effects. Data were collected over a period of 15 years (1998 to 2012). A log-likelihood ratio test was used to select the most appropriate univariate model for each trait, which was subsequently used in bivariate analysis. Heritability estimates for W42, W70 and W135 were 0.42 ± 0.07 , 0.40 ± 0.08 and 0.27 ± 0.07 , respectively. Heritability estimates of growth efficiency traits were moderate to high (0.18 to 0.42). Of the total phenotypic variation, maternal genetic effect contributed 14 to 32% for early body weight traits (W42 and W70) and ADG1. The contribution of maternal permanent environmental effect varied from 6 to 18% for W42 and for all the growth efficiency traits except for KR2. Maternal permanent environmental effect on most of the growth efficiency traits was a carryover effect of maternal care during weaning. Direct maternal genetic correlations, for the traits in which maternal genetic effect was significant, were moderate to high in magnitude and negative in direction. Maternal effect declined as the age of the animal increased. The estimates of total heritability and maternal across year repeatability for growth traits were moderate and an optimum rate of genetic progress seems possible in the herd by mass selection. The estimates of genetic and phenotypic correlations among body weight traits were moderate to high and positive; among growth efficiency traits were low to high with varying directions; between body weights and growth efficiency traits were very low to high in magnitude and mostly negative in direction. Moderate to high heritability and higher genetic correlation in body weight traits promise good scope for genetic improvement provided measures are taken to keep the inbreeding at the lowest level.

Keywords : genetic parameters, growth traits, maternal effects, rabbit genetics

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