

Linear Models versus Threshold Models for Predicting Direct and Maternal Genetic Effects on Number of Lambs Weaned in Iranian Kurdi Sheep

Mahyar Heydarpour

(Animal Science Department, College of Agriculture, Ferdowsi University of Mashhad, Iran)

Meat quantity has traditionally contributed most of the net return in the sheep farmers of Iran. Recent high prices for sheep meat are likely to increase the interest in, and importance of the reproductive rate in sheep herds. Kurdi is a native sheep breed in North East of Iran with unique features like good feed conversion and better resistance capabilities to withstand environmental stress. The number of lambs weaned (NLW) can be a good criteria for reproductive performance in a sheep herd. This reproductive trait is recorded in discrete category but analyses as a continuous trait. The objective of this study was to compare the accuracy of a threshold animal model to a linear model for direct and maternal genetic evaluation of NLW in Iranian kurdi sheep. The information of NLW was extracted from data notebooks of Kurdi sheep breeding station from 1995 to 2007. The number of lambs weaned was recorded in two categories (0 and 1) and a total of 9600 records were available. Most of the records categorized in class1 (74.8%) and the average number of weaned lambs was 1.2. Analyses were performed using an animal model (linear and threshold) with a maternal effect. Year of birth and sex were considered as fixed effects and age of dam as a covariate in all models. A cross-validation method was used to assess the predictive ability of the models. The estimates of direct and maternal variances and also covariance between direct-maternal were obtained larger in threshold model comparing to the linear model. Larger estimates of heritabilities also were obtained when the threshold model was employed. For the direct additive genetic effect, the correlation from the threshold model was 10% higher than the linear model (0.56 vs 0.51) and the maternal effects followed the same pattern with 7% increasing (0.59 vs 0.55). The results confirmed the better performance of a threshold animal model compared to a linear animal model for genetic evaluation of NLW. However, the advantage of using a univariate threshold model instead of a linear model was small. Further investigation is needed for fully judge the predictive ability of the two models.

Keywords: Threshold model, lambs weaned, prediction, Kurdi sheep breed