Estimation of dispersion parameters for test-day milk traits of the Bovec sheep in Slovenia

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Abstract

The objective of this study was to estimate genetic and environmental dispersion parameters for daily milk (DMY), fat (DFY) and protein (DPY) yields as well as fat (FC), protein (PC) and lactose (LC) contents using test-day records of the indigenous dairy Bovec sheep. Milk is processed into Bovec cheese with a protected designation of origin. Data were taken from the Central Database for Small Ruminants and included 79,470 test-day records of 4,837 ewes from 51 flocks that were recorded according to ICAR regulations by the AT4 method in the years 2001 to 2016. The suckling period was about 40 days, followed by a milking period of about 154 days. The average DMY was 1003 g with 6.64% FC, 5.61% PC and 4.50% LC. The pedigree file included 6,078 animals. For 73.5% of these animals, both parents were known. Single-trait repeatability test-day animal models were used for DMY, DFY and DPY, while single-trait test-day animal models were used for FC, PC, and LC estimations. The fixed part of the model for all traits included breed, stage of lactation (months), parity and litter size. The random part of the models for all traits contained the additive genetic effect of the animal and the effect of flock-year-season, while the models for DMY, DFY and DPY additionally contained the effect of permanent environment over lactations. Variance components for random effects were estimated using the Residual Maximum Likelihood method as was implemented in the VCE-6 program. Heritability estimates for test-days were 0.13 (DMY), 0.10 (DFY), 0.12 (DPY), 0.18 (FC), 0.25 (PC) and 0.24 (LC). The flock-year-season effect explained more phenotypic variance for DMY (0.27), DFY (0.25) and DPY (0.28) than for FC (0.09), PC (0.09) and LC (0.10). The largest part of the phenotypic variance of FC (0.74), PC (0.67) and LC (0.66) remained in the residual. Identical and lower variance ratios (0.05) were explained by the permanent environment effect over lactations for DMY, DFY and DPY. The provided dispersion parameters are actually used in the breeding value prediction, which is applied for milk traits of the Bovec sheep for more than 10 years.

Keywords: sheep, milk, test-day, genetic parameters