GM 3 Estimation of heritabilities for characteristics related to growth in Texel breed lambs

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Estimación de heredabilidades para características relacionadas al crecimiento en corderos de la raza Texel

Introduction

To increase the efficiency in meat production, genetic parameters knowledge is essential. In this context, with meat aptitude, the Texel breed has desired characteristics in sheep breeding to produce more meat in a shorter time. The present study aimed to estimate the maternal and direct heritabilities using the animal model for the traits birth weight (BW), weaning weight (WW), weight at 30 days after weaning (WW30), weight at 60 days after weaning (WW60) and average daily gain from birth to weaning (WGBW) in Texel lambs, managed in the southern region of Brazil.

Materials and Methods

Phenotypic records of 834 Texel sheep, born between 2020 and 2021, raised in the state of Rio Grande do Sul, were used. The data come database of the company ProAGO - Programa de Avanço em Genética Ovina®. The traits studied were BW, WW, WW30, WW60 and WGBW. The animals were weighed at birth and at weaning (≈90 days of age). WW30 and WW60 are records taken at 120 and 150 days of age, respectively. WGBW was calculated using weight at weaning minus weight at birth, divided by age in days at weaning (kg/day). The genealogy was composed of 2828 observations compiled from the kinship information of the 834 animals evaluated for the characteristics in question, descendants of 49 rams and 476 ewes, and has identification of the animal, sire, dam and year of birth.

The (co)variance components and genetic parameters were estimated by Bayesian inference using Gibbs sampling, with the GIBBS2F90 program (Misztal *et al.*, 2002) in single trait analysis. 800,000 cycles were considered, with an initial discard of 200,000 cycles and a sampling interval of 20. Subsequent estimates were obtained using the POSTGIBBSF90 application (Misztal *et al.*, 2002). Single-trait (univariate) analyzes were used to estimate the variance and heritability components using the model:

$$\mathbf{y} = X\boldsymbol{\beta} + Z\mathbf{a} + M\mathbf{m} + W\mathbf{pe} + \mathbf{e}$$

where: vector and of the dependent variables (traits); X, Z, M and W are the incidence matrices that relate the observations to the **β** -fixed effects, for direct genetic random effect, **m** of maternal genetic random effect and **pe** of maternal permanent environmental effect and **e** is the vector of residual random effect. The effects of the contemporary groups (GC-farm, sex, type of birth, year of birth and weaning date) were considered as fixed effects. In addition, were considered as covariates, the effects of the linear and quadratic covariates of animal age at the time of evaluation and the effect of the linear and quadratic covariate for sheep age.

Results and Discussion

The results for maternal heritability for the BW, WW, WW30, WW60 and WGBW characteristics were respectively 0.38 ± 0.05; 0.04 ± 0.01; 0.07 ± 0.02; 0.07 ± 0.03; 0.05 ± 0.007), being of high magnitude only for the BW, as the animal ages, the influence of maternal heritability exerts less effect on animal performance. Results of direct heritability were of moderate magnitude for all characteristics (BW, WW, WW30, WW60 and WGBW), being respectively (0.27 ± 0.01; 0.27 ± 0.04; 0.32 ± 0.04; 0.29 ± 0.04; 0.21 ± 0.006). This is an important indicator of the possibility of having a response to genetic selection for these traits. Since there is a well-established non-linear relationship between lamb survival and birth weight, that is, both very light lambs (prone to death due to hypothermia and starvation) and very heavy lambs (higher risk of dying due to dystocia) are at risk of dying before weaning, while lambs with an intermediate weight will have a better chance of survival (Sawalha *et al.* 2007). The analysis of growth-related characteristics such as WW and WGBW is a useful tool in the case of sheep with slaughter aptitude, since better WW and WGBW are indicators of the lamb's ability to grow in response to milk (direct h^2) and an indicator of the ewe's ability to supply milk and care for the lamb (maternal h^2). Selection for these characteristics impacts the efficiency of the flock and the system (Olivier *et al.*, 2001; Hatcher *et al.*, 2008), since, after weaning, the animals are expected to continue with good development so that they arrive at slaughter with a better weight and in less time, or, in the case of the females, that they reach the weight for the mating as early as possible.

Conclusions

All characters had moderate values of direct heritability, therefore, BW, WW, WW30, WW60 and WGBW are subject to direct selection, generating a positive response in the genotype and genetic progress of the population.

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