

Genetic parameters for growth, wool and *in vivo* carcass traits in Dohne Merino sheep of Uruguay

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Introduction

Characterized as a synthetic breed and highlighted by the adaptation to different agroecological situations in the world, Dohne Merino (DM) revealed itself as an important alternative. This breed was imported into Uruguay in 2002, standing out for its fast growth, fine wool and potential use both as a pure breed and in crossbreeding. Sheep national genetic evaluations (NGE) in Uruguay are routinely carried out by the Uruguayan Wool Secretariat (SUL) and the National Agricultural Research Institute (INIA) (www.geneticaovina.com.uy). The objective of this work was to estimate national genetic parameters of DM to develop a more precise evaluation and therefore a greater potential genetic progress of the breed.

Materials and methods

Data from 4,331 animals of twelve progenies (2008-2019) from four stud-flocks and two experimental stations (INIA and SUL) were included in the analysis. Genetic parameters for Birth weight (BWT), Weaning weight (WWT), Yearling weight (YWT), Scanning weight (SWT), Rib eye area (REA), Fat thickness (FAT), Greasy fleece weight (GFW), Clean fleece weight (CFW), Fibre diameter (FD), Staple length (SL) were estimated. A Bayesian analysis was performed with the GIBBSF90 computer package (Misztal et al., 2002). A description of the dataset is presented in Table 1.

Table 1. Descriptive statistic of ages, growth, wool and *in vivo* carcass traits.

Trait	N	Mean	Standard deviation	Range
Weaning age (days)	2891	110	23.4	55–175
Scanning age (days)	1666	335	58.7	236–442
Yearling age (days)	2847	363	30.2	300–501
BWT (kg)	1828	5.0	1.11	2.00–8.70
WWT (kg)	2988	29.0	6.32	10.0–48.5
SWT (kg)	1735	54.4	14.53	22.5–95.0
YWT (kg)	3060	52.0	14.11	22.0–95.0
REA (cm ²)	1735	10.8	3.32	3.1–22.99
FAT (mm)	1731	2.5	1.13	0.7–7.5
GFW (kg)	3060	3.04	0.894	0.97–9.9
CFW (kg)	2412	2.26	0.582	0.9–6.4
FD (μm)	2911	18.4	1.46	14.0–23.7
SL (cm)	2416	8.9	1.45	4.0–14.5

Results and discussion

Moderate magnitude h^2 for BWT, WWT, SWT and REA were estimated, while FAT presented a low magnitude h^2 (Table 2). The estimated BWT h^2 was slightly higher than the reported by Swanepoel (2006) (0.28 ± 0.01). Li et al. (2013) described very similar h^2 values for WWT (0.34 ± 0.02) and FAT (0.13 ± 0.01). Highly positive genetic correlations between WWT-SWT and WWT-FAT and moderate positive genetic correlations between WWT-BWT, WWT-REA, SWT-REA and SWT-FAT ranging from 0.29 to 0.60, were found in this study. A high h^2 for FD and SL was observed in this population. Cloete et al. (2001) described a very similar value for FD (0.61 ± 0.06), conversely, a lower estimate for SL is presented by Cloete and Scholtz

(1998) (0.35 ± 0.06). Moderate magnitude h^2 for GFW, CFW and YWT are similar to those reported by Cloete and Scholtz (1998) and Li et al., (2013). There was a very high genetic and phenotypic correlation between CFW and GFW, and moderate positive genetic correlations between GFW-FD, GFW-SL, CFW-SL, FD-SL ranging from 0.20 to 0.35. Genetic correlations among the other wool traits were generally small.

Table 2. Genetic and phenotypic parameters for growth, carcass and wool traits in Dohne Merino. Heritabilities (bold), genetic (below diagonal), and phenotypic correlations (above diagonal), posterior standard deviation in parenthesis, and highest posterior density interval at 95% in brackets.

<i>Growth and Carcass</i>					
Trait	BWT	WWT	SWT	REA	FAT
BWT	0.36 (0.06) [0.25; 0.47]	0.29 (0.12) [0.05; 0.53]	0.05 (0.13) [-0.20; 0.30]	-0.18 (0.14) [-0.46; 0.10]	-0.34 (0.13) [-0.60; -0.08]
WWT	0.26 (0.05) [0.17; 0.36]	0.35 (0.05) [0.25; 0.45]	0.78 (0.05) [0.67; 0.88]	0.60 (0.10) [0.40; 0.80]	0.71 (0.08) [0.56; 0.86]
SWT	0.30 (0.06) [0.19; 0.41]	0.51 (0.04) [0.44; 0.58]	0.41 (0.06) [0.30; 0.52]	0.60 (0.09) [0.42; 0.78]	0.50 (0.11) [0.29; 0.72]
REA	0.10 (0.06) [-0.02; 0.22]	0.25 (0.05) [0.15; 0.34]	0.51 (0.04) [0.43; 0.59]	0.34 (0.06) [0.23; 0.46]	0.40 (0.13) [0.14; 0.66]
FAT	0.06 (0.04) [-0.03; 0.14]	0.03 (0.04) [-0.05; 0.10]	0.27 (0.04) [0.20; 0.34]	0.14 (0.04) [0.07; 0.21]	0.13 (0.03) [0.08; 0.19]
<i>Wool and YWT</i>					
Trait	GFW	CFW	FD	YWT	SL
GFW	0.31 (0.04) [0.23; 0.39]	0.92 (0.02) [0.88; 0.95]	0.20 (0.09) [0.03; 0.36]	0.07 (0.10) [-0.13; 0.26]	0.29 (0.10) [0.09; 0.48]
CFW	0.93 (0.01) [0.92; 0.94]	0.34 (0.04) [0.26; 0.43]	0.09 (0.09) [-0.08; 0.26]	-0.01 (0.10) [-0.21; 0.18]	0.35 (0.10) [0.16; 0.54]
FD	0.16 (0.05) [0.07; 0.26]	0.12 (0.05) [0.02; 0.22]	0.64 (0.04) [0.56; 0.72]	0.15 (0.08) [0.00; 0.31]	0.23 (0.08) [0.07; 0.38]
YWT	0.50 (0.03) [0.44; 0.57]	0.47 (0.04) [0.40; 0.55]	0.16 (0.05) [0.06; 0.27]	0.41 (0.04) [0.32; 0.50]	0.05 (0.10) [-0.15; 0.24]
SL	0.28 (0.05) [0.19; 0.37]	0.27 (0.05) [0.17; 0.36]	0.17 (0.07) [0.04; 0.30]	0.26 (0.05) [0.16; 0.36]	0.50 (0.05) [0.40; 0.60]

Conclusion

Data evaluation in different geographic locations is a very important way to obtain assertiveness in research of a particular breed and location. Our estimation of genetic parameters for growth, wool and carcass traits in DM sheep of Uruguay will help in developing an Uruguayan genetic evaluation of the breed.

Keywords: breeding; genetic correlation; heritability

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14-15 de Diciembre de 2021

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