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ASPECTS OF SELECTION IN AN  
INTERBRED FLOCK BASED ON  
PERENDALES CROSSED WITH  
MERINO X ROMNEY EWES

A THESIS PRESENTED IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
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## ABSTRACT

Genetic, phenotypic and environmental parameters were estimated from hogget traits recorded on 237 Perendale x (Merino x Romney) ewe hoggets between 1977 and 1984. Non-genetic effects on weaning weight (WW) for 634 ewe and ram lambs were analysed. A selection objective and criteria was defined and appraised for the flock.

The traits examined were hogget liveweight (HLW), greasy fleece weight (GFW), clean fleece weight (CFW), quality number (QN), character grade (CHG), handle grade (HG), coting grade (CG), soundness grade (SG), greasy colour grade (GCG), scoured colour grade (SCG), staple length (SL), total crimp number (TCN), clean scoured yield (Y), mean fibre diameter (MFD) and crimps per centimetre (CPC).

The least squares method of fitting constants was used to estimate the major environmental factors influencing the traits studied. Heritabilities ( $h^2$ ) were obtained by the daughter-dam regression (DDR) and daughter-dam correlation (DDC) methods. The genetic ( $r_G$ ), phenotypic ( $r_P$ ) and environmental ( $r_E$ ) correlations were calculated by the daughter-dam method.

The estimates of environmental effects agree in most cases with the published estimates. Between year differences were important sources of variation and had a highly significant effect on all traits except SCG. Rearing rank effect was found to be the most important source of variation for WW and HLW. Age of dam and sex had a highly significant effect on WW. Neither rearing rank nor age of dam exerted any significant influence on wool traits.

The estimates of heritability calculated by daughter-dam regression method were: HLW (0.16), GFW (0.17), CFW (0.24), QN (0.42), CHG (0.38), SG (0.02), GCG (0.38), SCG (0.09), SL (0.12), TCN (0.08), Y (0.41) and MFD (0.29).

Genetic and phenotypic correlations calculated among some hogget traits were respectively: HLW x GFW (0.67 and 0.66); HLW x CFW (0.62 and 0.56); HLW x SL (0.79 and 0.44); HLW x MFD (-0.45 and 0.24); GFW x CFW (0.87 and 0.94); GFW x SL (0.37 and 0.60); GFW x MFD (-0.98 and 0.38); CFW x GCG (0.52 and 0.02); QN x MFD (-0.79 and -0.30); SG x MFD (0.73 and -0.21); GCG x SCG (0.87 and 0.38); GCG x Y (0.96 and 0.04) and SCG x Y (0.77 and 0.00).

Lifetime economic weights derived using the marginal profit method were calculated to define a selection objective for the flock studied. The traits included in the objective were number of lambs weaned (NLW (dam)), WW, CFW, MFD and SCG. Besides the traits in the objective, HLW, GFW, QN and GCG were included as selection criteria. The appropriate selection indices for ram hoggets ( $I_1$ ), ewe hoggets ( $I_2$ ) and lambs ( $I_3$ ) were respectively:

$$I_1 = 4.66 \text{ NLW (dam)} + 0.62 \text{ HLW} + 0.10 \text{ WW} + 3.91 \text{ GFW} \\ - 1.70 \text{ MFD} + 0.50 \text{ GCG.}$$

$$I_2 = 4.79 \text{ NLW (dam)} + 0.61 \text{ HLW} + 0.04 \text{ WW} + 1.99 \text{ GFW} \\ + 0.23 \text{ QN} + 1.60 \text{ GCG.}$$

$$I_3 = 4.87 \text{ NLW (dam)} + 0.48 \text{ WW.}$$

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