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DIRECT AND CORRELATED RESPONSES TO SELECTION FOR HIGH OR LOW ULTRASONIC BACKFAT DEPTH IN SOUTHDOWN SHEEP

A thesis presented in partial fulfilment
of the requirements for the degree of
Master of Agricultural Science
in Animal Science at
Massey University

JOSE SOLIS RAMIREZ

1988

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ABSTRACT

Divergent selection was employed to establish high and low lines for liveweight-adjusted backfat depth (LABF) assessed ultrasonically in Southdown sheep. The selection lines were initially constituted from several sources with stock brought-in during the first three years of the experiment (1976-1978). These first years were used to evaluate ultrasonic equipment for measuring backfat depth. The lines were closed in 1979. Data analysed in this study were collected over 8 years (1979-1986) representing, approximately 2.66 generations.

Selection was practised in two stages, with a preliminary selection based on the first LABF on the rams and ewes, and a final selection based on an average of all measurements assessed throughout the year for the rams only.

Direct selection for high or low backfat depth resulted in the 1986 born animals in the high line having about 1.69mm (59.6%DEV) and 2.00mm (49.57%DEV) thicker backfat than the low line in the rams and the ewes, respectively. The responses to selection per unit of cumulated selection differential were in most cases high. Due to prior selection and difficulties in assessing the selection pressure, it was concluded that these regressions poorly represented the selection process.

Correlated responses to selection for and against backfat depth were generally small. However, consistent positive correlated response were observed in liveweight-adjusted height and length (LAH

and LAL) over the selection period. These responses imply a negative genetic correlation between these traits and backfat depth. This finding was in agreement with the published literature.

Phenotypic correlations were calculated within-trait between-days and between-traits within-days. Correlations were pooled within-trait following tests of homogeneity. The within trait values were generally moderate to high and they were in agreement with the values reported in the literature. The between-traits correlation values were generally low, but were consistently negative for LABF-LAH and LABF-LAL, and consistently positive for LAL-LAH. Repeatability estimates, using the within-trait combinations, were also in agreement with the literature and suggested a moderate to high repeatability for LABF and LAH. Repeatability estimates for LAL were low to moderate and they were slightly smaller than the values reported in the literature.

Estimates of the heritability of LABF varied with method used. The paternal half-sib method resulted in low values (0.14 to 0.19) while dam/offspring method gave moderate values (0.29 to 0.43). Corresponding heritability estimates for LAH and LAL were about 0.31 and -0.14, respectively. These values were smaller than other results quoted in the literature. It was concluded that truncation selection on LABF reduced the genetic variability of these traits, although not to the same extent as for LABF.

It was concluded that divergent selection for LABF was effective, resulting in lines with significantly different backfat depth at the same liveweight. Furthermore, selection for low LABF led to significantly longer and taller animals.

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