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RESPONSE TO SELECTION FOR OPEN FACE
AND GREASY FLEECE WEIGHT IN ROMNEY SHEEP

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ABSTRACT

Selection responses and genetic parameters were estimated on wool, body and reproductive traits in a New Zealand Romney flock. In 1956 the flock was divided into 3 sub-flocks, each of which has been a closed breeding group (consisting approximately 80 ewes and 4 rams) since 1958. In one group the most open-faced yearlings were retained for breeding, in another, those with heaviest yearling fleece weights, while in the third replacements were chosen at random.

Traits examined included post-shearing live weight (LW), greasy fleece weight (GFW), clean fleece weight (W), quality number (QN), character grade (CHG), staple length (SL), total crimp number (TCN), crimp frequency (CF), clean scoured yield (Y) and mean fibre diameter (MFD) for the ewes and ram and ewe hoggets; number of lambs born (LB) and number of lambs reared (LR) per ewe joined; date-of-birth (DOB), birth weight (BW), weaning weight (WW), medullameter index (MI) and face-cover grade (FC) for the ram and ewe hoggets and the standard deviation of the fibre diameter (SFD) and percent medullated fibres (PMF) for the ewe hoggets.

The average inbreeding coefficient increased by approximately 0.10 in all 3 flocks over the 21 years evaluated. Within years, sheep with the highest inbreeding coefficients generally suffered a depression in the level of performance.

Heritabilities (h^2) and genetic correlations (r_g) were calculated using the paternal half-sib correlation approach. Most h^2 estimates were similar to already published values. Estimates of the h^2 of ram hogget GFW were substantially smaller than corresponding ewe hogget values (0.07 to 0.15 cf 0.28 to 0.34). Face-cover grade h^2 in the face-cover flock appeared to be much reduced, suggesting a possible decline in genetic variation for this trait.

Phenotypic and genetic correlations were calculated amongst all hogget traits and between ewe hogget and ewe average lifetime performance traits. Very high genetic and phenotypic correlations were found between hogget GFW and hogget W. Ewe hogget GFW tended to be positively associated with LB and LR, both genetically and phenotypically. Hogget FC was generally unrelated to other hogget and ewe traits. Ewe hogget performance in LW, GFW, W, QN, SL, TCN, Y and MFD were generally moderately to strongly related with the performance of the same ewe in corresponding traits at older ages. There was often wide variation in the three (one from each group) genetic correlation estimates for each pair of traits. This variation was attributed to either the small number of observations available (about 80 sires per flock with 5 to 7 progeny per sire) or changing genetic variance and covariance components in the selection flocks.

Realized heritability (h^2_r) estimates for FC and hogget GFW ranged between 0.39 to 0.54 and 0.06 to 0.19, respectively. The h^2_r estimates of hogget GFW were in good agreement with the paternal half-sib correlation estimates of h^2 derived from the ram hogget data but were markedly less than equivalent estimates obtained from the ewe hogget

data. The h^2_{FC} estimates of FC were generally higher than paternal half-sib estimates, but were in good agreement with estimates derived by other workers.

In the face-cover flock correlated responses were generally small. Positive correlated responses of about 10% were recorded in LB and LR over the 21 years evaluated. In the fleece weight group the components contributing toward increased GFW all showed positive correlated responses. Lamb production (LB and LR) of the fleece weight group showed an increase of about 30%, relative to the control flock, over the 21 years studied.

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TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
	ABSTRACT	ii
	ACKNOWLEDGEMENTS	v
	LIST OF TABLES	ix
	LIST OF FIGURES	xi
ONE	INTRODUCTION	1
TWO	REVIEW OF LITERATURE	4
	2.1 Introduction	4
	2.2 Fleece weight	4
	2.2.1 Introduction	4
	2.2.2 Selection criteria	5
	2.2.3 Analysis of direct response to selection for clean fleece weight	5
	2.2.4 Analysis of correlated responses to selection for clean fleece weight	9
	2.2.5 Direct response to selection for clean fleece weight	10
	2.2.6 Components through which direct response occurs	16
	2.2.7 Correlated responses to selection for clean fleece weight	17
	2.3 Face cover	19

<u>Chapter</u>		<u>Page</u>
TWO	2.4 The estimation of direct response to selection in domestic animals	24
	2.4.1 Introduction	24
	2.4.2 Selection in one direction without a control	26
	2.4.3 Selection in one direction with a control	28
	2.4.4 Divergent selection	33
	2.4.5 Errors associated with estimating genetic response to selection	33
THREE	MATERIALS AND METHODS	41
	3.1 Materials	41
	3.1.1 The sheep and their environment	41
	3.1.2 The data	46
	3.2 Statistical methods	51
	3.2.1 Introduction	51
	3.2.2 The effect of inbreeding	53
	3.2.3 Phenotypic standard deviations and correlations	53
	3.2.4 Least squares estimates of the genetic response	54
	3.2.5 Estimation of genetic correlations and heritabilities	54
	3.2.6 The use of mixed model equations to estimate genetic response	61
	3.2.7 Calculation of realized responses	62

<u>Chapter</u>		<u>Page</u>
FOUR	NON-GENETIC EFFECTS AND THE EFFECT OF INBREEDING	65
	4.1 Introduction	65
	4.2 The effect of dam age and birth/rearing rank	65
	4.3 The effect of inbreeding on performance	69
FIVE	PHENOTYPIC AND GENETIC CORRELATIONS, HERITABILITIES AND PHENOTYPIC STANDARD DEVIATIONS	74
	5.1 Phenotypic standard deviations	74
	5.2 Phenotypic correlations	82
	5.3 Genetic correlations	86
	5.4 Heritabilities	94
SIX	THE USE OF THE INVERSE OF THE RELATIONSHIP MATRIX IN MIXED MODEL EQUATIONS	100
SEVEN	DIRECT RESPONSES TO SELECTION	103
	7.1 Introduction	103
	7.2 Direct response to selection for open face	105
	7.3 Direct response to selection for high hogget greasy fleece weight	112
EIGHT	CORRELATED RESPONSES TO SELECTION	120
	8.1 Introduction	120
	8.2 Correlated responses to selection for open face	120
	8.3 Correlated responses to selection for high hogget greasy fleece weight	123
NINE	CONCLUSIONS	130
	BIBLIOGRAPHY	136

LIST OF TABLES

<u>Table</u>		<u>Page</u>
2.1	Selection criteria for the various clean fleece weight selection experiments	6
2.2	Numbers of ewes and rams used in the various clean fleece weight selection experiments	11
2.3	Direct responses to selection for high clean fleece weight	12
2.4	Correlated responses to selection for high clean fleece weight	18
2.5	An indication of the size of genetic correlation estimates between clean fleece weight and other traits	20
2.6	An indication of the size of genetic correlation estimates between greasy fleece weight and other traits	21
2.7	Available estimates of the heritability of face-cover grade	25
2.8	Approximate variance equations for the estimators of genetic response	37
2.9	Formula for the calculation of σ_D^2 and σ_E^2	38
2.10	A comparison of h^4/M_{NC} , $h^4/2M_D$ and h^2/L	39
3.1	Some physical aspects of the two areas upon which the experimental flocks were carried	42
3.2	Size of ewe mating flocks and their age composition	44
3.3	Number of ram and ewe hoggets recorded in each sub-flock	47
3.4	Trait abbreviations and years of collection	48
3.5	System of grading for face cover	51
3.6	The combination of dam age, birth rank and rearing rank to give one fixed effect	52
4.1	The effect of dam age and birth/rearing rank on the performance of ewe hoggets	66
4.2	The effect of rearing rank on the performance of ram hoggets	67
4.3	The effect of dam age and birth/rearing rank on ewe average lifetime performance	68

<u>Table</u>	<u>Page</u>
4.4 The number of sires represented by at least one son in the following generation	71
4.5 The effect of 10% inbreeding on performance	73
5.1 Phenotypic and genetic correlations and phenotypic standard deviations from the ewe hogget data	75-76
5.2 Phenotypic and genetic correlations and phenotypic standard deviations from the ram hogget data	77-78
5.3 Genetic correlations between ewe hogget and ewe average lifetime performance traits	79-80
5.4 Phenotypic correlations between ewe hogget and ewe average lifetime performance traits and ewe average lifetime performance phenotypic standard deviations	81
5.5 A comparison of two methods of deriving standard errors for genetic correlations using control ewe hogget information	87
5.6 A comparison of two methods of deriving standard errors for heritabilities using control ewe hogget information	95
5.7 Estimates of heritability and their standard errors from the ewe hogget data	96
5.8 Estimates of heritability and their standard errors from the ram hogget data	97
5.9 Estimates of heritability and their standard errors from the ewe average lifetime performance data	98
6.1 Average yearly sire breeding value estimates for ewe hogget greasy fleece weight with the inclusion of the inverse of the relationship matrix in the mixed model equations	102
7.1 The effect of the magnitude of the σ_E^2/σ_S^2 ratio on solutions to the mixed model equations	104
7.2 Estimates of realized heritabilities and their standard errors for face-cover grade	109
7.3 Estimates of realized heritabilities and their standard errors for greasy fleece weight	115
7.4 Flock average cumulated selection differentials (FACSD) for each sex in the two selection flocks	119
8.1 Correlated responses to selection for open face and their standard errors	121
8.2 Correlated responses to selection for greasy fleece weight and their standard errors	124

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
4.1	The average rate of increase in inbreeding in each of the three sub-flocks	70
7.1	Estimated and predicted rates of response to selection for ewe hogget face-cover grade	106
7.2	Estimated and predicted rates of response to selection for ram hogget face-cover grade	107
7.3	Estimated and predicted rates of response to selection for ewe hogget greasy fleece weight	113
7.4	Estimated and predicted rates of response to selection for ram hogget greasy fleece weight	114