SOURCES OF VARIATION FOR WOOL, BODY WEIGHT AND OESTROUS CHARACTERS IN ROMNEY HOGGETS

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SUMMARY

The effects of sex, birth date, type of birth and rearing, age of dam and year were investigated in two flocks of Romney sheep. The characters studied were weights at weaning (November), February, July and November (15 months of age) together with intervening weight gains, hogget fleece weight (15 months of age) and the number of hogget oestrus detections. Estimates of the environmental effects varied considerably from year to year but on average agreed well with other New Zealand estimates. Estimates of heritability were calculated by the paternal half-sib method. Compared with corresponding estimates for New Zealand Romneys the present values are higher for hogget fleece weight, similar for liveweights up to 12 months of age and for hogget oestrus incidence but lower for hogget (November) liveweight and all liveweight gains.

INTRODUCTION

This communication supplements limited present New Zealand information on the effects of environmental and genetic factors on lamb and hogget characters.

MATERIALS AND METHODS

SOURCE OF DATA

The data were collected during the establishment phase of an experimental selection programme in collaboration with the Lands and Survey Department on their Waikite block about 30 km south of Rotorua. The records relate to hoggets born in 1969-71 in two flocks, one of 800 commercial Romney ewes (Flock 1) and the other of 250 registered Romney ewes (Flock 2).

The rams, totalling about 28 per year in Flock 1 and 10 per year in Flock 2, were drawn from a very wide range of commercial sources and were with a few exceptions used once only as two-tooths. Each ram was paddock-mated with 25 to 30 identified ewes, the ewes being randomized within age groups and genetic origins among the mating groups.

Flock management was designed to ensure as far as possible uniform treatment and hence valid performance comparisons

TABLE 1: ESTIMATES OF ENVIRONMENTAL EFFECTS AND HERITABILITIES FOR SOME CHARACTERS OF ROMNEY HOGGETS

	Liveweight			*Liveweight Gain*					
	Weaning	*Feb.*	*Jul.*	*Nov.*	*Weaning to Feb.*	*Feb. to Jul.*	*Jul. to Nov.*	*Hogget Fleece Weight*	*No. Hogget Oestruses*
Mean (kg)[1]	20.4	30.9	39.4	43.2	10.2	8.5	3.8	3.9	1.7
S.D. (kg)	3.2	3.9	4.2	4.7	2.8	3.0	2.5	0.5	1.4
Year of birth									
1969	1.9	— 2.3	— 0.5	— 0.7	— 4.3	1.7	— 0.2	— 0.6	0.2
1970	— 2.1	— 0.8	1.8	5.9	1.2	2.6	4.1	0.6	— 0.5
1971	0.0	3.1	— 1.3	— 5.2	3.1	— 4.4	— 3.9	0.0	0.3
Age of dam									
Mature — 2-tooth	1.3	1.3	0.9	1.2	— 0.1	— 0.4	0.3	0.0	0.2
Mature — 4-tooth	0.2	0.2	0.1	0.2	— 0.3	— 0.0	0.1	0.0	0.1
Type of birth and rearing[2]									
SS-TT	4.2	3.1	2.1	2.1	— 1.0	— 0.9	0.0	0.1	0.3
TS-TT	1.7	0.8	0.7	0.6	— 0.5	— 0.2	— 0.1	0.1	0.0
Sex									
Ram — ewe	1.9	3.7	4.4	10.8	1.5	0.7	6.4	0.5	—
Regression on age	0.12	0.13	0.08	0.05	0.02	— 0.05	— 0.03	0.01	0.04
Heritability									
Flock 1 (81 sires)	0.18	0.24	0.38	0.22	0.19	0.22	— 0.02	0.29	0.30
Flock 2 (32 sires)	— 0.05	0.24	0.32	0.22	0.38	0.01	— 0.02	0.57	0.49

[1] Total animals analysed: Weaning weight, 2812; No. of hogget oestruses, 1424; all other characters 2061.
[2] SS, singles; TT, twins; TS twins raised as singles.

within flock and sex groups. Lambs were born from August to October and maintained as unculled groups. They were weighed at 4- to 6-week intervals following weaning (mean age 84 days) and were shorn in the summer (about 4 months of age) and as hoggets the following spring (about 15 months of age). Vasectomized rams were joined with the ewe hoggets in April and the occurrence of oestrus observed thereafter at fortnightly intervals. Weighing, shearing and joining dates varied slightly in different years and hence year effects will be partly confounded with age effects.

Methods of Analysis

Analyses of variance and covariance were carried out by least squares to allow for unequal subclass numbers. The model for estimating the environmental effects shown in Table 1 included main effects and all first-order interactions for flocks (2 classes), years (3), age of dam (3), type of birth and rearing (3) and sex (2). Birth date was included as a covariate. Preliminary analyses tested first-order interactions on a within-year basis.

To estimate heritabilities the two flocks were analysed separately. The model fitted now included years, age of dam, type of birth and rearing, sex, regression on age and sires nested within years. Heritability was derived from the between-sire variance component and the residual variance.

RESULTS

Means, residual standard deviations from the analyses of variance and estimates of the environmental effects and heritabilities are presented in Table 1. Estimates of environmental effects were in general statistically significant with the exception of the age of dam effects for the number of hogget oestruses, hogget fleece weight and liveweight gains. Significant year by age of dam and flock by age of dam effects were apparent for all liveweights. The magnitude of the year by age of dam effect can be illustrated for the case of weaning weight. The average difference between mature ewe progeny and two-tooth ewe progeny was 1.3 kg while the values for 1969, 1970 and 1971 were 2.0 kg, 0.2 kg and 1.8 kg, respectively. Flock and sex differences also varied significantly from year to year. These interactions were not unexpected since the sexes were grazed separately following weaning and in the early years the flocks were sometimes grazed separately.

DISCUSSION

The environmental effects presented here are in reasonable agreement with published reports from New Zealand data (Ch'ang and Rae, 1961, 1970; Hight and Jury, 1971). Effects of type of birth and rearing and age of dam declined at older weights providing evidence for compensatory growth. The data from these flocks suggest that greater precision may be obtained in estimating breeding value if age of dam correction factors are calculated separately for each flock year, provided the data contain adequate numbers to provide reliable estimates. The possibility of confounding of genetic differences between groups of ewes born in different years and from different sources and true environmental differences between age of dam groups should not be ignored.

The heritability estimates reported here represent only a preliminary analysis of the data. Because of the greater number of sires involved, the estimates from Flock 1 should be more reliable than from Flock 2; the general consistency of the two sets is, however, reassuring.

Compared with corresponding estimates for New Zealand Romneys published by Rae (1958) and Ch'ang and Rae (1961, 1970), the present values are higher for hogget fleece weight, substantially similar for liveweights up to 12 months of age and for hogget oestrus incidence, but lower for hogget (November) liveweight and all liveweight gains. Covariance adjustment for July body weight had no significant effect on the heritability of hogget oestrus incidence.

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