VARIATION AND COVARIATION IN BIRTHCOAT AND FLEECE TRAITS OF DRYSDALE SHEEP WITH REFERENCE TO EARLY SELECTION AND SAMPLING POSITIONS

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ABSTRACT

Samples from different body regions were obtained from the birthcoat, first, second and third fleeces of sheep in two Drysdale flocks. Fibre type arrays of birthcoat samples were analysed and various wool traits were assessed and measured in samples obtained at three shearings.

Sampling position was the main source of variation in most traits studied. Sex, birth rank, and age of dam generally made little contribution to the total variance. Shearing, flock and sire effects were also important sources of variation for many traits. The interaction of shearing X position and the interactions of sire with each of shearing, sex and birth rank were significant for many traits.

Phenotypic correlations among fleece traits were estimated from shoulder and mid-side positions as well as among fleece averages calculated from all positions. Correlations among fleece averages showed that higher kemp score (KS) was associated with higher bulk; BUL (0.24 to 0.64), resilience; RES (0.03 to 0.48) and tristimulus colour values; X, Y and Z (0.08 to 0.46). Softer handle grade tended to be correlated with lower BUL (-0.22 to -0.66) and RES (-0.16 to -0.53) and higher lustre; LG (0.10 to 0.62). Higher medullation index (MI) was generally associated with higher BUL (-0.15 to 0.49) and tristimulus colour values (-0.01 to 0.60) and lower LG (-0.65 to 0.08). Correlations among tristimulus colour values were the highest between X and Y reflectances (0.93 to 1.00). Greasy and clean wool per unit area (GWA and CWA) were highly correlated (0.93 to 0.96). Heavier first greasy fleece weight (GFW1) correlated positively with GWA (0.59) and CWA (0.56). Staple length (STL) tended to be longer as GWA (0.37 to 0.60), CWA (0.39 to 0.60) and GFW1 (0.64) inceased and as BUL decreased (-0.01 to -0.54). BUL and RES were highly correlated (0.82 to 0.95). LG was negatively correlated with BUL (-0.12 to -0.66) and RES (-0.10 to -0.41).

Very few sickle fibres were found in Drysdale materials; most arrays were plateau. Coarser arrays were associated with higher proportions of hairy-tip curly-tip fibres (HTCT). GFW1 increased as HTCTs increased (0.33 to 0.46). Generally, the correlations among

birthcoat and third fleece traits were not strong which implies that birthcoat traits are not reliable indications to selection for various traits in later fleeces of Drysdale sheep. Higher MI was associated with coarser arrays (-0.07 to -0.55) and higher proportions of super-sickle A fibres (0.22 to 0.41). Finer arrays were associated with higher yield (0.01 to 0.38). In one flock, sheep with a higher proportion of halo-hair (HH) fibres had higher GWA (0.25 to 0.33), CWA (0.17 to 0.30) and heavier third fleece weights (0.09 to 0.33) while sheep with coarser birthcoat arrays showed a slight tendency to have more bulky fleeces (-0.22 to -0.29).

Medullation index of the third fleece (MI3) as well as greasy and clean third fleece weights (GFW3 and CFW3) can be predicted, with limited accuracy (R^2 = 0.50) from the first shearing shoulder (SH1) traits by using the following multiple regression equations:

Within flock-sex groups

$$MI3 = 9.15 + 0.45MI\ (SH1) + 1.84KS\ (SH1)$$

For rams

$$GFW3 = -1.47 + 0.04HH\%\ (SH1) + 0.14X\ (SH1) - 0.09Z\ (SH1)$$

$$CFW3 = -1.53 + 0.03HH\%\ (SH1) + 0.14X\ (SH1) - 0.09Z\ (SH1)$$

It appeared that the shoulder is the best position from which to sample fleeces when a number of traits are to be assessed for ranking Drysdale sheep.

GENERAL INTRODUCTION

Systematic selection and culling of sheep to improve the quantity and quality of wool produced has been practised for many generations. A careful analysis of the fleece is usually first made on the hogget fleece when often many animals have already been culled. Birthcoat fibre type array analyses have been suggested as an early indication of adult fleece traits. The present study investigated the use of birthcoat fibre type arrays as an aid to early selection for various fleece traits. The variations of adult fleece traits were also studied in Drysdale fleeces.

It is important to determine the optimum position for sampling wool traits when assessment of these samples is to be used for selection. Very few studies dealt with that subject. These studies defined the best sampling position as the most representative to the whole fleece. The present study expanded this definition to also consider utility for breeding purposes in an attempt to reach an overall decision of what is the best sampling position for Drysdale sheep.

Phenotypic correlation coefficients among various wool traits were calculated from shoulder and mid-side samples in the three shearings. These correlations were derived to gain some information on the use of these samples to predict the average of the present fleece and later fleeces. These correlations are presented in Appendix 2.

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BK	back
BL	belly
BR	britch
MS	mid-side
RP	rump
SH	shoulder
SP	shoulder patch
WH	withers

2. Shearings

FL1	first shearing
FL2	second shearing
FL3	third shearing
Av	average of the fleece
Av1	average of the first fleece
Av2	average of the second fleece
Av3	average of the third fleece

3. Traits

a) Birthcoat traits

ARY	birthcoat fibre type array
Ch-CT	checked curly-tip fibres
CT	curly-tip fibres (CT1 + CT2)
CT1	the coarsest curly-tip fibres
CT2	the thinnest curly-tip fibres
F-SK	fine sickle-fibres
HH	halo-hair fibres
Hi	histerotrich fibres
HTCT	hairy-tip curly-tip fibres (HTCT1 + HTCT2)
HTCT1	the coarsest hair-tip curly-tip fibres
HTCT2	the thinnest hairy-tip curly-tip fibres
Pre-CT	pre-curly-tip fibres (HH + SS + SK + F.SK)

Abbreviations continued.

SK	sickle fibres
SS	super-sickle fibres (SSA + SSA' + SSB)
SSA	super-sickle A fibres
SSA'	super-sickle A' fibres
SSB	super-sickle B fibres

b) <u>fleece traits</u>

BUL	bulk
CWA	clean wool per unit area
CFW3	clean third fleece weight
GCG	greasy colour grade
GFW1	greasy first fleece weight
GFW3	greasy third fleece weight
GWA	greasy wool per unit area
HG	handle grade
KS	kemp score
LG	lustre grade
MI	medullation index
RES	resilience
SCG	scoured colour grade
STL	staple length
X	tristimulus X value (red)
Y	tristimulus Y value (green)
YLD	yield
Z	tristimulus Z value (blue)