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Wool yield and characteristics of Dorset, Leicester and Suffolk breeds and their 'DLS' cross

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SUMMARY

Greasy fleece weight (12 months growth) and wool samples from hip and shoulder regions were taken on 15 Dorset, 20 Leicester, 20 Suffolk and 17 DLS ewes (a cross of ½ Dorset, ¼ Leicester, ¼ Suffolk obtained by mating DL rams to DS ewes and DS rams to DL ewes). The purpose of the study was to compare wool production and characteristics of the first generation of DLS with that of the three breeds of origin. Wool production of DLS was 3·58 kg, 8·8 and 14 % higher than that of Suffolk and Dorset, but 11 % lower than that of Leicester ($P < 0{\cdot}01$). The percentage of clean wool was highest in Leicester (78·3 %), followed by DLS, Dorset and Suffolk (76·1, 74·3 and 70·5 %, respectively). The average fibre diameter of the DLS and Leicester was 38 μm, 4 μm thicker than that for Suffolk and Dorset ($P < 0{\cdot}01$). Average fibre length was 15 cm in DLS and Dorset, 6 cm shorter than in Leicester, and 3 cm longer than in Suffolk ($P < 0{\cdot}01$). The variability in fibre diameter and length was highest in Leicester, followed closely by DLS.

INTRODUCTION

The DLS is a population of sheep derived from crossing Australian Dorset with Leicester and Suffolk breeds and then crossing the two resulting crosses Dorset–Leicester and Dorset–Suffolk to produce the DLS animals, i.e. ½ Dorset, ¼ Leicester, ¼ Suffolk ancestry. This population was closed in 1968 and has been selected for extended breeding season. The present paper presents wool yield (12 months growth) and some wool characteristics of the first generation DLS and compares them with those of the three parental breeds.

MATERIALS AND METHODS

The animals used in the study were 15 Dorset ewes, from the progeny of 24 pregnant ewes imported from Australia in 1965, 20 Leicester and 20 Suffolk ewes purchased locally, and 17 DLS ewes born in 1968. Except for three Leicester and two Suffolk ewes, which were 2 years old, the ewes were mature (3–5 years of age).

The ewes were shorn in April 1972, and samples were taken in April 1973, just before shearing, from the shoulder and hip regions of the right side of each animal. The wool fibres growing on 2 × 2 cm of skin were separated from the rest of the fibres and clipped as close to the skin as possible (2 cm hairpin callipers were used, Carter, Turner & Hardy (1958)). After the samples were taken, the whole fleece was shorn and weighed.

The traits studied were: (1) clean wool percentage; the clean weight (xylene-washed) of the samples as a percentage of the greasy weight of the sample before dusting and washing; (2) fibre density/cm²: calculated from weighing 200 clean fibres and extrapolating for the total weight of the sample, then dividing by 4 (Ghanem, 1965); (3) fibre diameter (μm): average diameter of 200 fibres (using a projection microscope); (4) fibre length (cm): average length of 100 fibres, measured by stretching the fibres against a rule and (5) variability in fibre thickness and length: expressed as standard deviations.

The data were analysed by the least squares method of fitting constants; the following model was assumed.

$$Y_{ijkl} = \mu + b_i + a_{ij} + l_k + (bl)_{ik} + e_{ijkl}$$

where μ is the overall mean; b_i is the effect of the ith breed of ewe; a_{ij} is the effect of the jth ewe of the ith breed; l_k is the effect of the kth location; $(bl)_{ik}$ is the interaction of breed of ewe by location, and e is a random element. Age of ewe was not included in the model because preliminary analysis showed that its effect was negligible.

Table 1. *Wool yield and characteristics of Dorset, Suffolk, Leicester and DLS ewes*

	Genetic groups						Locations		
	Dorset	Suffolk	Leicester	DLS	Theoretical*	Ratio, DLS/theoretical	Shoulder	Hip	Overall mean (± S.E.)
Number of ewes	15	20	20	17	—	—	—	—	—
Greasy fleece weight (kg)	$3{\cdot}13^a$	$3{\cdot}29^a$	$3{\cdot}97^a$	$3{\cdot}58^a$	3·38	1·06	—	—	3·49 (0·059)
Clean wool (%)	$74{\cdot}3^a$	$70{\cdot}5^a$	$78{\cdot}3^a$	$76{\cdot}1^a$	74·3	1·02	$75{\cdot}4^a$	$74{\cdot}2^a$	74·8 (0·80)
Fibre density/cm²	1680^a	1600^a	1780^a	1740^a	1685	1·03	1890^a	1500^b	1700 (48)
Fibre diameter (μm)	$33{\cdot}0^a$	$33{\cdot}9^a$	$37{\cdot}4^b$	$37{\cdot}9^b$	34·3	1·10	$34{\cdot}9^a$	$36{\cdot}2^b$	35·6 (0·51)
Variation in fibre diameter (μm)	$4{\cdot}7^a$	$5{\cdot}4^{ab}$	$5{\cdot}7^b$	$5{\cdot}5^{ab}$	5·1	1·08	$5{\cdot}1^a$	$5{\cdot}6^b$	5·3 (0·14)
Fibre length (cm)	$14{\cdot}8^b$	$12{\cdot}3^c$	$21{\cdot}2^a$	$15{\cdot}0^b$	15·8	0·95	$15{\cdot}8^a$	$15{\cdot}8^a$	15·8 (0·24)
Variation in fibre length (cm)	$1{\cdot}9^b$	$1{\cdot}3^c$	$2{\cdot}6^a$	$2{\cdot}0^b$	1·9	1·05	$1{\cdot}9^a$	$2{\cdot}0^a$	2·0 (0·08)

* Expected performance assuming additive effect, i.e. ½ D, ¼ L, ¼ S.
a–c, Within breeds and locations means followed by different letters differ significantly ($P < 0{\cdot}01$).

RESULTS

Fleeces from DLS ewes tended to be heavier than those of the Dorset and Suffolk but lighter than those of Leicester ewes (Table 1). The performance of DLS was generally intermediate between that of the Dorset and Suffolk and of Leicester, except for fibre diameter in which the DLS exceeded the Leicester.

The theoretical performance of the DLS, assuming a completely additive effect for the three parental breeds involved, was calculated and compared with the actual estimates found. The fleeces of the DLS were 6 % heavier, yielded 2 % more clean wool, had 3 % more fibres/cm², but the fibres were thicker and shorter than the theoretical values.

The samples from the shoulder and hip regions differed significantly in fibre density and diameter and variability of fibre diameter. The fibres on the shoulder were denser and finer than those on the hip ($P < 0{\cdot}01$) and fibre diameter was more variable. The differences for the other traits were not significant.

DISCUSSION

The purpose of crossing the Dorset, Leicester and Suffolk was to develop a strain of sheep with extended breeding season with wool production being of secondary interest. It was interesting, however, to compare the wool traits of the DLS with those of its three parental breeds in view of the fact that little is known on the wool characteristics in crosses involving a long wool breed (Leicester) and medium-wool breeds (Dorset and Suffolk). It was rather unexpected to find that although the Dorset and Suffolk breeds comprised three-quarters of the ancestry in the DLS, the fleeces of the latter were more similar to those of the Leicester which comprised only one quarter. The only exception was in fibre length in which the DLS was close in performance to the two medium wool breeds. Similar results were also observed by Hunt *et al.* (1952) in a cross between Rambouillet and Black-top Delaine breeds. Berge (1959) working on crosses between Merino and Norwegian breeds and Seoudy, Ghanem & Ghoneim (1969) working on crosses between Merino and Barki found that fibre diameter was intermediate in the first cross and tended to be finer in crosses with higher percentage of Merino ancestry. These results may indicate that the performance of the cross is determined more by the way the breeds were crossed than by the proportions of the various breeds involved.

Sidwell, Wilson & Hourihan (1971) found heterotic effect in various wool traits in crosses

among five breeds. Their average estimates (9 % for grease fleece weight, 2·1 % for fibre diameter and 0·6 % for staple length) compare fairly well with those found for the DLS (ratio DLS/theoretical).

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