VARIATION IN GROWTH CHARACTERISTICS OF DORSET EWES IN A PRODUCTION COMPETITION

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Summary

Eleven Poll Dorset and nine Dorset Horn studs each entered six ewe weaners in a production competition in September 1973. These were run together at Cowra, New South Wales for 12 months.

Significant ($P < 0.01$) variation was found between the Poll Dorset studs for fat depth over the 12/13th rib, but not for growth rates. No significant variation was found for weight gains or fat depth between the Dorset Horn studs. Poll Dorset ewes gained significantly (PC 0.01) more weight than Dorset Horn ewes for first weight gain (approximately four to ten months of age) and total weight gain.

These results and the value and application of information obtained from this competition are discussed.

I. INTRODUCTION

Production competitions compare animals from a number of flocks in a common environment. They are used to create an awareness of and interest in objective measurement of economically important characters.

Merino production competitions have been held for a number of years. Generally wethers have been used to compare characters associated with wool production over a 12 month period (Turner and Young 1969; Beasley 1974). Production competitions for meat sheep breeds such as the Dorset have been initiated only recently. The Dorset is the major sire breed used for prime lamb production in Australia and thus the characters of importance for this role are related to lean meat production.

The Central Western Dorset Production Competition held at Cowra is an annual competition, jointly run by the Cowra Pastoral, Agricultural and Horticultural Association and the New South Wales Department of Agriculture (Fogarty and Harris 1975).

There is a dearth of published information on variation in Dorsets in Australia. This competition provides a unique opportunity to assess variation, between strains (Poll Dorset and Dorset Horn) and between studs, for growth and fat characteristics.

II. MATERIALS AND METHODS

(a) Sheep and location

Eleven Poll Dorset (PD) and nine Dorset Horn (DH) studs each entered six ewe lambs approximately four months of age in September 1973. Each breeder chose his lambs, which were required to be born within a specified six week period; Entries came from a wide area of the state and included a number of important studs. The ewes were run together for 12 months on Cowra Agricultural Research Station, which is located in a prominent Dorset stud area. The ewes grazed perennial ryegrass/subclover and lucerne pastures, which provided a high level of nutrition through out the year.

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Seven ewes died and a further six were not considered in the analysis due to illness or injury affecting their growth.. The 107 ewes included in the analysis were the progeny of 48 different sires.

(b) Measurements .

Fasted liveweights were taken on three occassions, on arrival in September 1973, in February 1974 and at the end of the-12 month period in September 1974.

Fat depth between the 12/13th rib was measured on the live animals using a Scanogram in September 1974. As there was a positive correlation ($r = 0.24$) between liveweight and fat depth, the latter was adjusted to a constant liveweight basis (60 kg) for the competition.

(c) Analysis

Least squares analyses of variance were used to examine the effects of strains, studs within strains and sires within studs for weight gains. Initial liveweight was fitted as a covariate in the analyses to remove the effect of pre-test environment (age and nutrition) on subsequent performance. If it was a non significant source of variation the data was re-analysed without the covariate.

The same variables, excluding initial liveweight, were included in the analysis of adjusted fat depth,

III. RESULTS

(a) First weight gain

Significant ($P < 0.01$) variation was found between the PD studs for first weight gain. When initial liveweight was included as a covariate the variation between the PD studs was reduced to non significance. The ranges in least squares means for the PD and DH studs were 4.3 and 5.5 kg respectively (Table 1). The variation between the DH studs was not significant.

PD ewes gained significantly ($P < 0.01$) more weight than DH ewes (Table 2). Between sires within studs variation was also significant ($P < 0.05$). The inclusion of initial liveweight as a covariate in both these analyses had little effect.

(b) Second weight gain

Variation between PD studs and between DH studs was not significant for second weight gain. PD ewes were not significantly different from DH ewes (Table 2). The variation between sires within studs was not significant. Initial liveweight as a covariate had no effect on any of the analyses.

(c) Total weight gain

There was significant variation between the PD studs ($P < 0.05$), but not between the DH studs. The inclusion of initial liveweight as a covariate reduced to non significance the variation between PD studs, but had little effect on the DH studs.

PD ewes gained significantly ($P < 0.01$) more weight than DH ewes (Table 2). Variation between sires within studs was significant ($P < 0.05$). Neither analysis was affected by the inclusion of initial weight as a covariate.

(d) Fat depth

Between studs variation for adjusted fat depth was significant ($P < 0.01$) in PD ewes and accounted for 52% of the variation, but was

not significant for DH ewes. The range in least squares means for PD studs was considerably higher than the range in DH studs i.e. 5.3 mm v. 1.3 mm (Table 1).

Adjusted fat depths of PD ewes were not significantly different from DH ewes (Table 2). Variation between sires within studs was not significant.

TABLE 1
Ranges of least squares means for PD and DH studs

	PD Studs	DH Studs
First weight gain(kg) +	13.3 to 17.6	11.0 to 16.5
Second weight gain (kg) +	5.5 to 9.3	5.4 to 10.6
Total weight gain (kg) +	20.2 to 26.0	19.4 to 22.9
Fat depth/60 kg (mm)	5.7 to 11.0	7.4 to 8.7

\+ Including initial weight as a covariate

TABLE 2
Least square means for PD and DH ewes

	PD ewes	DH ewes	Difference
First weight gain (kg)	15.6 (0.4)+	13.8 (0.5)	**
Second weight gain (kg)	8.3 (0.3)	7.7 (0.4)	
Total weight gain (kg)	23.9 (0.5)	21.5 (0.6)	**
Fat depth/60 kg (mm)	8.5 (0.2)	8.1 (0.2)	

\+ Standard errors in parenthesis
** $P < 0.01$

IV. DISCUSSION

The lack of variation for growth between studs within strains was not surprising, considering the close relationship that exists between studs. This is due to the very small number of studs supplying rams for stud breeding in New South Wales and the widespread practice of line-breeding to popular animals from these studs (Fogarty, unpublished data).

This widespread use of linebreeding has led to a high level of inbreeding, in the DH breed (Fogarty, unpublished data) and a similar situation probably exists in the PD breed. Thus some expression of heterosis could be expected in progeny of crosses between the strains (Weiner and Hayter, 1974). This could partly explain the superiority of the PD ewes in this competition since some at least were heterozygote progeny of DH ewes. This superiority of the PD ewes for growth could also be due to genetic superiority, however this can't be confirmed due to the limited number of studs and animals represented.

The significant between sires within studs variation for first weight gain may be biased, since it is based on progeny which have been

selected. However it does suggest that selection and use of superior sires in these studs could lead to an improvement in growth rates.

Fat depth is of considerable concern to many Dorset breeders, and some are attempting to select lean animals within their studs. The heritability of fat depth is moderate to high (Carpenter 1968) and selection would be expected to change this trait. The varying ability of breeders to assess fat in live sheep and the importance they place on it both in their breeding programme and selection of entrants could be responsible for the large variation in fat depth of PD ewes.

The design of this 'production 'competition, 'with its limited sampling of ewes and sires within studs cannot be expected to define real differences between studs. The competition was initiated, primarily to promote objective evaluation of growth and fat traits in Dorset sheep. It provides a better alternative to the present system of show ring judging where type and preparation are paramount.

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