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A COMPARISON OF SIRE AND DAM BREEDS FOR THE PRODUCTION OF EXPORT LAMBS SLAUGHTERED AT 3, 4½, AND 6 MONTHS OF AGE

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SUMMARY

A total of 1455 lambs representing the Southdown, Suffolk, Border Leicester and Dorset Down sire breeds and Romney, Corriedale, Dorset (Dorset Horn and Poll Dorset) and all first-cross dam breeds were slaughtered at 3, 4½ and 6 months of age. Gross carcass returns were estimated from carcass weights, grades and the price at the time of slaughter. Price had a marked effect on gross returns between the three years (1973-4 to 1975-6) for which results are reported. The range in carcass returns within years as a percentage of the average return for the three seasons was 25% for slaughter age, 6% for sire breeds, 10% among pure and cross-bred dams and up to 11% among sires within breeds.

INTRODUCTION

The choice of sire or dam breed has commonly been accepted as a means of increasing production, although work with sire breeds at Ruakura has stressed the importance of sire selection within breeds (Carter *et al.*, 1974; Kirton *et al.*, 1974a). Comparative information relating to ewe breeds and crosses for export lamb production in New Zealand is limited mainly to the studies of Kirton *et al.* (1974b) and Rattray *et al.* (1976).

The aim of the experiments reported here has been to compare 4 sire breeds and 9 ewe breeds and crosses for the production of export lambs slaughtered at three ages.

MATERIALS AND METHODS

Over a period of three years, rams representing the Southdown (Sd), Suffolk (Sf), Border Leicester (BL) and Dorset Down (DD) breeds were mated with Romney (R), Corriedale (C) and Dorset (D) ewes and all possible first crosses among the latter three breeds. Rams, selected on performance records, were

paddock mated in single sire groups to approximately 40 ewes representing all breeds and crosses. The numbers of sires used per breed each year are summarized in Table 1.

TABLE 1: TOTAL NUMBERS OF RAMS USED

<i>Sire Breed</i>	1973-4	1974-5	1975-6	Total
Southdown	4	5	5	14
Suffolk	4	5	5	14
Border Leicester		5	5	10
Dorset Down			5	5

Following lambing, ewes and lambs grazed lucerne or ryegrass-white clover pastures and, with the exception of some management-weaning age treatments (balanced across lamb genotypes) imposed in 1973-4 and 1974-5, were weaned at 12 weeks of age. Each year lambs were allocated to 12-, 18- or 24-week slaughter groups, these being balanced for individual sires, ewe breeds and ages. Lambs were weighed and slaughtered in weekly batches at a local freezing works. Individual carcass weights and grades were recorded and, together with the price schedule effective at the time, were used to calculate gross returns from meat.

Seasonal trends in the meat price schedule during the three years of these experiments are shown in Fig. 1. The mean schedule price for prime and Y grade medium-weight lamb

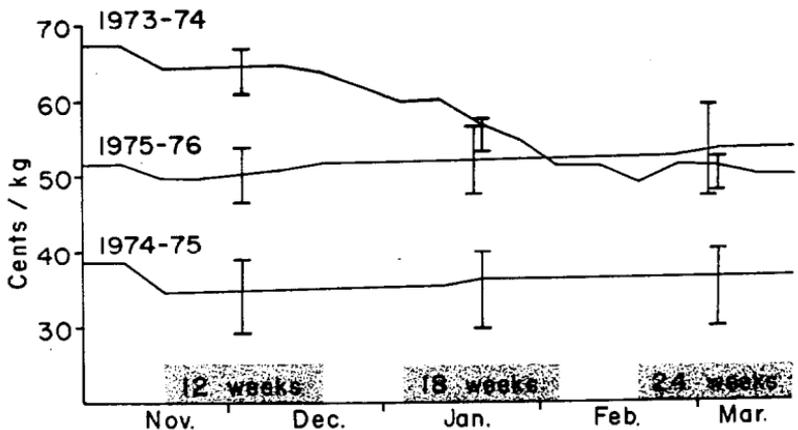


FIG. 1: Seasonal changes in meat price schedule over three years showing variation between light (upper limit), medium (plot) and heavy (lower limit) carcasses at mean of slaughter age dates.

(13 to 16 kg) is depicted by the graph and variation between light (up to 12.5 kg) and heavy carcasses (over 16 kg) at the mean dates of each slaughter age group are shown by the vertical line. The premium paid for prime grade in relation to Y was about 2 to 4 c/kg.

RESULTS AND DISCUSSION

EFFECTS OF DIFFERENT SEASONS

Least squares means for pre-slaughter liveweights (PSLW), carcass weight (CSSW) and gross returns were obtained using a model in which effects for lamb sex, birth and rearing rank, age of dam, sire and dam breed were fitted along with birth day as a covariate. Means for the three seasons are presented in Table 2.

TABLE 2: OVERALL MEANS BY YEARS FOR PRE-SLAUGHTER LIVELWEIGHT (PSLW), CARCASS WEIGHT (CSSW) AND GROSS RETURNS

Year	No.	PSLW (kg)	CSSW (kg)	Returns (\$)
1973-4	167	33.73	15.54	8.55
1974-5	539	34.18	15.66	5.50
1975-6	749	34.80	15.94	7.71
Significance		*	NS	***

Between-year differences in schedule prices had marked effects on mean gross return; during the best season (1973-4) returns were on average 55% higher than during the poorest season (1974-5) and 42% higher than the average return for the three seasons. Annual variation in PSLW and CSSW was comparatively small, the range between years being 3% of the average return.

SIRE BREED EFFECTS

An analysis combining results over the three seasons, using a similar model as previously, was carried out to pool effects found within years. Sire-breed means for weaning weight (WW), PSLW, CSSW and gross returns on this basis are given in Table 3.

Gross returns from Sf and DD sired lambs were 3% higher than BL and 6% higher than Sd lambs ($P < 0.001$). Within years the sire-breed differences followed similar trends but were larger during the years of higher schedule prices. For the 1973-4 season the difference between Sf and Sd lambs was 12% but de-

TABLE 3: SIRE-BREED MEANS FOR WEANING WEIGHT (WW), PSLW, CSSW AND GROSS RETURNS (3 YEARS POOLED)

<i>Sire Breed</i>	<i>No.</i>	<i>WW</i> (kg)	<i>PSLW</i> (kg)	<i>CSSW</i> (kg)	<i>Returns</i> (\$/lamb)
Sd	409	24.64	31.84	14.91	6.99
Sf	484	26.99	35.47	16.19	7.40
BL	368	25.65	34.70	15.70	7.21
DD	194	26.68	34.94	16.06	7.41
Significance		***	***	***	***

creased in 1974-5 to only 3%. Sire-breed means for PSLW and CSSW were also significantly different within individual years ($P < 0.001$) and combined across years ($P < 0.001$). Live-weight differences generally increased slightly from weaning to slaughter.

Carter *et al.* (1974) also ranked Sf, BL and DD ahead of Sd for liveweight in their sire-breed comparisons at Ruakura.

Covariance analysis of CSSW adjusted for PSLW indicates that, at the same pre-slaughter weights, Southdown-sired lambs had higher dressing-out percentages (Sd > Sf, DD > BL; $P < 0.001$). In the Ruakura trial, Kirton *et al.* (1974a) also found that carcass weights of BL-sired lambs were lower than those of Sf- and DD-sired lambs. The lower dressing-out percentages of BL may be due to heavier wool weights.

There were no significant sire-breed differences in gross returns adjusted for CSSW. This confirms that carcass weight was far more important than carcass grade in determining the gross-return differences of the sire breeds as stated by Kirton *et al.* (1974a).

SIRE EFFECTS

Individual sire differences within breeds for carcass returns PSLW and CSSW were significant in 1973-4 and 1975-6 ($P < 0.01$). In 1973-4 the difference in returns between the highest and lowest sire group for the Sd and Sf breeds was 108 (14%) and 80 (11%) c/lamb, respectively. There was a similar percentage difference in CSSW. Sire differences were not as large in 1975-6, being 78 (11%), 38 (5%), 58 (8%), and 33 (4%) c/lamb for Sd, Sf, BL and DD, respectively.

The variation in returns shown by individual sires within breeds was attributable mainly to differences in the mean CSSW of their progeny. The variation in CSSW shown by individual sire group means of up to 1.7 kg in these experiments was

not quite as high as the 2.5 kg of Kirton *et al.* (1974a) for Sd sires. Nevertheless it illustrates the importance of sound sire selection.

SLAUGHTER AGE EFFECTS AND INTERACTIONS

Table 4 indicates the sire-breed \times slaughter age interaction. This interaction was significant for PSLW ($P < 0.001$), CSSW ($P < 0.01$) and gross returns ($P < 0.001$), although sire-breed rankings did not change markedly at different slaughter ages.

TABLE 4: SIRE BREED MEANS FOR PSLW, CSSW AND GROSS RETURNS AT 3 SLAUGHTER AGES

Sire Breed	PSLW (kg)			CSSW (kg)			Returns (\$)		
	12	18	24	12	18	24	12	18	24
Sd	25.16	33.02	37.34	11.91	15.32	17.50	6.18	7.25	7.56
Sf	26.99	37.34	42.08	12.46	16.88	19.22	6.40	7.61	8.19
BL	26.41	36.13	41.55	12.40	16.13	18.57	6.21	7.41	8.01
DD	26.68	36.23	41.91	12.59	16.39	19.21	6.11	7.60	8.52
Breed \times Age Interaction	***			**			***		

Sire breeds were similarly ranked within years although the difference between Sf and DD was less marked and overall levels of significance were generally lower. In the combined analysis, returns were highest for Sf at 12 and 18 weeks of age while DD lambs grossed the highest returns at 24 weeks despite having similar CSSW to Sf. On the basis of these results, the DD and Sf breeds were most successful for heavyweight lamb production, particularly with regard to carcass weights (19.21 and 19.22 kg, respectively). Lambs sired by Sd rams had the lowest PSLW and CSSW at all slaughter ages. Returns were also lowest for Sd lambs at all ages except 12 weeks when they were slightly higher than returns from DD-sired lambs. Lambs sired by DD rams had the lowest return but highest CSSW at 12 weeks of age. It should, however, be remembered that these results include only one year's data for this breed.

In the sire breed by slaughter age analysis, the main factor affecting relationships between PSLW, CSSW and gross returns was again killing-out percentage which was consistently highest (NS) for Sd and lowest (NS) for BL, particularly at 18 and 24 weeks. The net effect was that breed differences were largest for PSLW and diminished for CSSW and gross returns, this being

most apparent during the 1974-5 and 1975-6 seasons when breed interactions were significant only for PSLW.

EFFECTS OF DAM BREEDS AND CROSSES

Dam-breed means, combined across years, for WW, PSLW, CSSW and gross returns are given in Table 5.

Highly significant ewe breed-cross differences in gross returns ($P < 0.001$) were associated with differences in liveweights prior to slaughter ($P < 0.001$) and in CSSW ($P < 0.001$). Lambs from straightbred Dorset ewes grossed the highest returns during each of the three seasons, their superiority over the other two purebreds being 10% on a combined years basis. On average, both purebred and crossbred ewes showed similar carcass returns per lamb. Crossbred ewes containing Dorset genes, however, averaged 5% higher carcass returns than other crossbreds, this being more marked in crosses with the Corriedale. Differences in carcass returns followed a similar trend to differences in PSLW and CSSW, for which the purebred range was 12% and 17%, respectively. The greater range for CSSW was due to a significantly higher ($P < 0.001$) dressing-out percentage for Dorset and Dorset-cross ewes, particularly during the 1975-6 season. In the combined years analysis these genotypes had significantly heavier carcass weights ($P < 0.001$) when adjusted for variation in PSLW by covariance analysis.

TABLE 5: DAM-BREED MEANS FOR WW, PSLW, CSSW AND GROSS RETURNS

<i>Dam Breed</i> (sire × dam)	No.	WW (kg)	PSLW (kg)	CSSW (kg)	Returns (\$/lamb)
RR	81	25.83	32.71	14.78	7.06
RC	192	24.55	33.25	15.05	7.04
RD	130	26.14	34.78	16.02	7.36
CC	137	24.45	32.80	14.73	6.90
CR	236	24.40	32.97	14.92	7.01
CD	154	26.80	35.49	16.46	7.50
DD	96	28.97	36.78	17.43	7.67
DR	182	26.41	34.56	15.91	7.36
DC	247	26.34	34.79	16.12	7.39
Significance		***	***	***	***

Growth rate advantages of Dorset cross lambs have previously been shown (Coop and Clark, 1952; Carter, 1968) and have been associated in straightbred Dorsets with the high milk production

of ewes (Geenty and Jagusch, 1974). Recent experiments at Templeton have suggested that purebred and crossbred Dorset lambs have leaner, meatier carcasses at the same weights than do other pure and crossbred lambs of the type used as dam breeds in the present experiments (unpublished data).

RELATIVE IMPORTANCE OF EFFECTS

Of the factors affecting gross carcass returns examined in this study, variation in the meat price schedule had a major influence. The range in gross returns from meat between the best and the worst season was 42% of the average return over all three seasons. Within seasons, slaughter age had a large effect on gross returns, the range between animals slaughtered at 12 or 24 weeks being approximately 25% of the average meat return at 12, 18 and 24 weeks. While the overall efficiency of lamb meat production must take into account the feed requirements of the lamb and the breeding ewe and is likely to be increased when lambs are carried to heavier slaughter weights (Wallace, 1955; Large, 1970), diversification in this direction will probably require important adjustments in management systems and a reduction in ewe numbers. Any definitive analysis must also consider the relative processing costs and the wool and pelt returns from lambs of different slaughter weights.

Of the genetic effects studied, the choice of sire and dam breeds was shown to be of considerable importance. As a percentage of the average return from meat at 12, 18 and 24 weeks, the range in average gross returns between the best and the worst breeds was 6% among sire breeds and 10% among dam breeds and crosses. Relative sire and dam breed rankings for fertility, twinning rate and lamb survival are, however, also required for a complete assessment of sire and dam breeds. The importance of sound sire selection is highlighted by the range in gross returns among individual sires within breeds (up to 11% of the average returns from meat).

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