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## COMPARISON OF PEN AND Paddock SYSTEMS FOR THE PEDIGREE MATING OF SHEEP

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### INTRODUCTION

During the first year (1971) of establishing performance and pedigree base flocks for selection and crossbreeding studies at the Templeton Research Station, the limited number of small paddocks available dictated the use of a pen mating regime for 9 of the 25 single-sire mating groups. The subsequent lambing rates of the pen and paddock mated ewes were similar, although partial confounding among ewe breed, ram breed, age of ewe, ewe liveweight and nutritional effects precluded a valid comparison. This paper presents results from the 1972 matings which permitted a better comparison of the effectiveness of the two systems.

### MATERIAL AND METHODS

The ewes mated in 1972 belonged to either selection or crossbreeding flocks. The selection flocks comprised mixed-age ewes of the Romney (497), Corriedale (173) and Dorset Horn/Poll Dorset (183) breeds. They were mated to rams of their own breed in single-sire groups balanced for age, source and liveweight of the ewes. In total 14 Romney, 6 Corriedale and 6 Dorset mating groups were involved.

The crossbreeding flock comprised 201 Romney, 206 Corriedale and 187 Dorset ewes of 3 years of age or older, approximately half of the ewes of each breed being at least 6 years of age at lambing in 1972. They were randomly allocated within breed, age and flock of origin to 18 balanced single-sire mating groups, with the aim of generating all possible pure and two-way cross progeny.

The same Dorset and Corriedale rams were used to mate the selection and crossing ewes, the average mating group size being 63 ewes. Six of the 14 Romney rams used in the selection flock were also used to mate one-third of the crossing ewes, the average mating group size being 66 ewes for these rams. The remaining Romney rams received an average of 33 Romney ewes only.

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TABLE 1: AVERAGE LAMBING RATES OF PEN AND PADDOCK MATED EWES CLASSIFIED BY AGE OF EWE AND BREED COMPOSITION OF THE MATING<sup>1</sup>

<i>Ewe Breed</i>	<i>Mating Type</i>	<i>Ram Breed</i>							
		<i>Romney</i>		<i>Corriedale</i>		<i>Dorset</i>		<i>Total</i>	
		<i>2 yr</i>	<i>3+ yr</i>	<i>2 yr</i>	<i>3+ yr</i>	<i>2 yr</i>	<i>3+ yr</i>	<i>2 yr</i>	<i>3+ yr</i>
Romney	Pen	0.52 (62)	0.83 (199)		0.75 (32)		0.82 (33)	0.52	0.82
	Paddock	0.73 (59)	0.85 (197)		0.83 (30)		0.84 (31)	0.72	0.85
Corriedale	Pen		0.85 (33)	0.58 (19)	0.84 (95)		0.85 (33)	0.58	0.85
	Paddock		0.73 (33)	0.41 (22)	0.76 (99)		0.82 (34)	0.41	0.77
Dorset	Pen		0.86 (29)		0.93 (30)	0.83 (36)	0.87 (75)	0.83	0.88
	Paddock		0.75 (28)		0.73 (26)	0.57 (30)	0.79 (80)	0.57	0.77

<sup>1</sup> Number of ewes mated and present at lambing shown in parentheses.

All rams were subject to semen examination by electroejaculation prior to their use over a 6-week mating period commencing March 27. A random half of the rams of each breed were paddock mated in single-sire groups in which the ewes and rams grazed together continuously. The remaining rams were maintained in pens on a diet of grain and lucerne hay, their ewes being introduced for mating as they were marked in oestrus by raddled, vasectomized rams. Oestrus detections were made twice daily round 8.30 a.m. and 4 p.m. The marked ewes remained with their ram for 24 hours before returning to a fresh group of raddled teaser rams. This regime was repeated for ewes returning to service during the 6-week mating period.

### RESULTS AND DISCUSSION

The lambing rate (ewes lambing per ewe mated and present at lambing) averaged 0.80 for pen mated ewes and 0.77 for paddock mated ewes. It was in favour of pen mated Dorset and Corriedale ewes by 0.14 and 0.09, respectively, but in favour of paddock mated Romney ewes by 0.06. These average differences varied somewhat with the age of ewe and breed composition of the mating, as is evident from the ratios presented in Table 1.

With only 13 rams per mating system and the absence of a changeover type of design, chance differences in ram fertility probably contribute to the variation apparent from Table 1. In this light the experiment is hardly adequate for a critical comparison of the effects of the mating regimes upon ewe conception and subsequent lambing rates. About all that can be concluded is that on average no large differences were found. The experimental design is, however, adequate for within-ram comparisons of lambing rates for different age and breeds of ewe.

A larger treatment difference in lambing rate existed for the young 2-year-old ewes than for the older ewes mated to the same rams. The lambing rate was particularly poor for the 2-year-old pen mated Romney ewes, and for paddock mated Dorset 2-year-olds. There were no important age differences apparent among the older ewes.

Breed of ewe responses to mating regimes are best assessed from the crossbreeding flock in which ewes were randomized across the same 6 rams of each of the 3 breeds. The results in this case indicated a lambing rate difference of 0.08 in favour of pen mating for both Corriedale and Dorset ewes, but no difference for the Romneys. Unfortunately no 2-year-

old ewes were available in this flock to permit a critical evaluation of mating regime  $\times$  ewe breed  $\times$  age of ewe effects.

Adjusted for the effects of age and breed, pen mated ewes gained 1.1 kg more than paddock mated ewes over the mating period. The difference was even larger (1.8 kg) for Corriedale ewes and could in part be responsible for the inferior lambing rate of the paddock mated Corriedale ewes which gained only 0.2 kg over mating. However, the pooled within-breed, age and mating regime regression of lambing rate on liveweight gain was effectively zero, and covariance adjustment for variation in liveweight gain and pre-mating liveweight had little effect upon the results presented above.

Differences in submission rate did not entirely account for the variation in lambing rate apparent in Table 1. The proportion of ewes for which no tuppings were recorded over the mating period varied with the age of the ewe and the mating system. As expected it was slightly higher for 2-year-old than for older ewes. It was also higher, by about 10%, for the paddock mated ewes, superior oestrus detection being expected from pen mating for which ewes are exposed to more than one raddled ram.

A large part of the variation in lambing rate was therefore due to variation in conception rate. This was reflected in differences in lambing day, pen mated 2-year-old ewes lambing on average about one week later than paddock mated 2-year-olds and older ewes of both mating regimes.

Analysis of pen mating returns to first service indicated a 10% higher conception rate to pen matings made following the afternoon rather than the morning oestrus detections by teaser rams. It seems likely, therefore, that improved conception rates could be expected if marked ewes were drafted off at more frequent intervals. This is likely to be particularly true for 2-year-old Romney ewes in view of their recognized shorter heat period (Inkster, 1957).

It is interesting to note that 65% of the pen mated ewes were marked for their first time at the morning drafting, this being very close to the 69% expected from the average time intervals involved and on the assumption of no diurnal variation in the onset of oestrus.

A particular advantage of the pen mating system is that by permitting ewes to be grazed in a small number of large mobs it helps avoid the introduction of nutritional and other environmental biases to the genetic interpretation of sire progeny differences. It also assists grazing management through improved utilization of autumn pasture and its conservation as

winter feed. It does, however, require a greater labour commitment and necessitates the prior conditioning to both a pen environment and to concentrate feeding of the rams being used.

## REFERENCE

Inkster, I. J., 1957: *Sheepfmg A.*, 163.