

THE EFFECT OF RAM PERCENTAGE ON THE FERTILITY OF MAIDEN EWES

S.T. DAWE*, W.R. ARCHER, N.W. BENNETT, A. BRUNSKILL,
J.R. CAHILL, F.B. DONNELLY, B.C. ROBERTS, B.I. TRIMMER

Summary

The effect of ram percentage on the fertility of maiden ewes joined in autumn was examined on ten properties in New South Wales. On four of these properties a group of maiden ewes was joined to one per cent of rams and another group to three per cent. On another two properties the design was similar, but a third group containing maiden and mature ewes was also joined to one per cent of rams. On the other four properties two mixed flocks containing maiden and mature ewes were joined to 1 or 3 per cent of rams. Experienced rams were used in all treatments and a total of 4,900 ewes were involved. Raddle marks were recorded fortnightly during a six week joining period, and the number of dry ewes was determined after lambing.

Maiden ewe fertility was reduced at the lower ram percentage in 6 of 10 studies, the incidence of dry ewes being increased by 12-20 per 100 ewes joined. Mature ewes were present in four of the studies in which maiden ewe fertility was reduced, and the fertility of the older ewes was affected in two cases, with an increase of 9-10 dry ewes per 100 being noted. A high incidence of dry ewes was invariably associated with a low number of ewes raddled during the first two weeks of joining.

I. INTRODUCTION

Lightfoot and Smith (1968) found no difference in flock fertility when 2 or 4 per cent of mature rams were joined to maiden ewes. With mature ewes and rams, the results of Haughey (1959) and Edgar (1965) suggested one per cent of rams would be adequate, while Dawe *et al.* (1970) found one per cent sufficient in 11 of 13 flocks.

Connors and Giles (1970) noted that maiden ewes were more affected than older ewes by conditions of apparently low ram fertility. It is possible that maiden ewes are more sensitive to changes in ram percentage than are mature ewes. This paper describes the effects of ram percentage on the fertility of maiden ewes run separate from or in the same joining flock as mature ewes.

II. MATERIALS AND METHODS

Studies were conducted on ten properties in Central and Southern New South Wales during the period 1968-70. The location and number of ewes in each study are shown in Figure 1. Merino ewes were involved on all properties except Albury (Polwarths) and Leeton A (Border Leicester x Merino). All rams used were experienced mature Merinos, Polwarths (Albury), ox Dorset Horns (Leeton A), and had produced semen of high density and motility when examined prior to joining.

At Leeton A and B, Mudgee, Oaklands, Albury and Goulburn, two groups of maiden ewes were joined, one to one per cent and the other to three per cent of rams. On the latter two properties a mixed flock composed of maiden and mature ewes was also joined to one per cent of rams. On the final four properties (Cooma A and B, Leeton C, Parkes) two mixed flocks of maiden and mature ewes were joined to 1 or 3 per cent of rams.

Sheep and Wool Branch, Department of Agriculture, N.S.W.

* Agricultural Research Station, Leeton, N.S.W. 2705

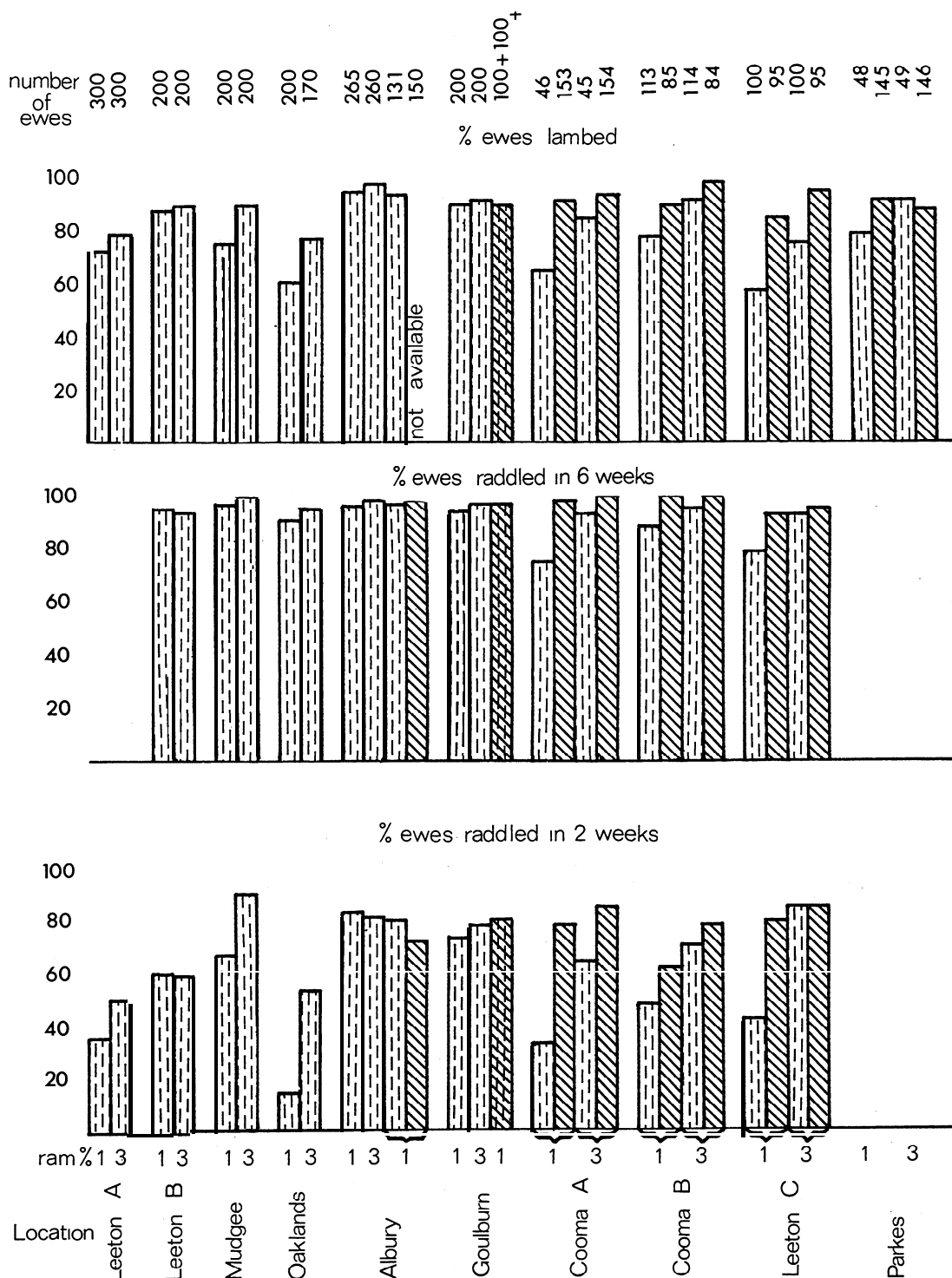


Fig. 1. Reproductive performance of maiden and/or maiden + mature ewe groups joined to 1 or 3 per cent of rams

maiden ewes + combined data for 100
mature ewes maiden + 100 mature ewes

Flocks were joined in autumn (February-April) for six weeks and rotated between paddocks each fortnight to minimise any paddock effects. Rams were fitted with "Sire Sine" harnesses except at Parkes, and ewes were inspected for raddle marks each fortnight. After joining the groups were run together as a single flock. At the end of lambing each ewe was classified as having lambed or as being "dry", according to Dun (1963).

Differences between treatments in joining and lambing data on each property were tested by Chi square.

III. RESULTS

(a) Joining

-With one per cent of rams there were fewer ($P<0.01$) maiden ewes raddled after two weeks of joining on three (Leeton A, Mudgee and Oaklands) of six properties where maidens were joined alone, and on three (Cooma A and B and Leeton C) of five where they were joined in mixed flocks (Figure 1).

The percentage of maiden ewes raddled by the end of joining (Figure 1) was not affected by ram per cent where maidens were joined alone, but was reduced at the lower ram per cent in the mixed groups on three properties (Cooma A, $P<0.05$; Cooma B, $P<0.01$; and Leeton C, $P<0.01$) of the five where data were available. Joining performance of the mature ewes was reduced at one per cent of rams on Cooma B only ($P<0.05$).

Where joining of maiden ewes alone or in mixed groups was compared at one per cent of rams (Albury, Goulburn), there was no difference in raddle data. Data for the separate age groups in the mixed flock at Goulburn were not differentiated.

The percentages of ewes which returned to raddling in the first two weeks of joining are shown in Table 1. Ewes which returned twice were counted as returning once only. Return rates on Oaklands, Cooma A, Cooma B, and Leeton C were extremely high.

TABLE 1
The percentage of the ewes which had been raddled in days 1-14
of the joining period which returned during days 15-42

Ram %	Class of Ewe	Property									
		Leeton A*	Leeton B	Mudgee	Oaklands	Albury	Albury+ (mixed)	Goulburn	CoomaA	Cooma B	Leeton C
1	Maiden	37	16	25	68	13	22	19	60	50	41
	Mature						19		11	43	35
3	Maiden	25	23	27	41	21		13	28	28	31
	Mature								21	21	12

* Leeton A - returns in days 15-28 only - no data for days 29-42

+ Mixed flock joined to 1 per cent of rams

There was a strong negative correlation between the percentage of maiden ewes raddled in the first two weeks (x) and return rate (y) ($y=77.28 - 0.734 x$, $r=0.88$, $P<0.001$). In the mixed groups return rates were consistently higher for maiden than for mature ewes at both ram percentages.

Return rates for ewes raddled in the second two weeks of joining were high (approximately 31 per cent) on Oaklands in both groups, and on Mudgee at the lower ram per cent.

(b) Lambing

Where maidens were joined alone the percentage lambing (Figure 1) was reduced ($P<0.001$) at the lower ram per cent at Mudgee and Oaklands, and to a lesser extent ($P<0.10$) at Leeton A, but not at Leeton B, Albury nor Goulburn. In the mixed groups maiden fertility was lower at one per cent of rams at Cooma A, Cooma B, Leeton C (all $P<0.01$) and Parkes (NS), but not at Albury nor Goulburn. On the last property 89 per cent of the mixed group lambed compared with 90 per cent of the maidens joined to one per cent of rams, so although separate data for the maiden component were not obtained, any effect of the presence of mature ewes would have been small.

The fertility of the maiden ewes at Parkes and Cooma B was similar but the small numbers on the former property resulted in a non-significant effect.

The fertility of mature ewes was affected ($P<0.05$) by ram per cent in two (Cooma B, Leeton C) of the five mixed groups from which data were available. Lambing records of the mature ewes in the mixed flock at Albury were not kept.

A negative relationship was noted between the percentage of dry maiden ewes (y) and the percentage of maiden ewes raddled in the first two weeks of joining (x). ($y=45.98 - 0.48x$, $r=0.92$, $P<0.001$). Data from Leeton C were omitted from this calculation as raddle marks were counted on day 17.

IV. DISCUSSION

When considered in relation to the work of Haughey (1959), Edgar (1965), and Dawe *et al.* (1970), these results indicate that maiden ewes are more sensitive to changes in the ram:ewe ratio than mature ewes.

The lower fertility of maiden ewes joined to one per cent of rams was due to several factors. Fewer ewes were raddled early in the joining period thus reducing the chances of returning to service; a number of ewes were not raddled by the end of joining; and return rates were very high in some cases.

It is obvious that some oestrous maiden ewes were not being raddled in the one per cent groups as compared with three per cent. This was most likely due to their shorter oestrous periods (Lambourne 1956; Blockey and Cumming 1970), and lower intensity of oestrus (Van der Westhuysen 1971). The problem was accentuated when mature ewes were present, resulting in many maidens not being raddled by the end of joining. Although Van der Westhuysen (1971) found that a ram mated the first oestrous ewe with which he came in contact, irrespective of age, the shorter length and lower intensity of oestrus of the maidens, and a greater tendency of mature ewes to seek out the ram (Van der Westhuysen 1971), could have put the maidens at a disadvantage when availability of rams was low.

The high return rates encountered could have been due to insemination failure, fertilization failure or embryonic loss. It is unlikely that embryo survival would be affected by differences in ram per cent, and hence the

higher return rates at one per cent of rams tends to discount embryonic loss as a causative factor. Killeen (1973) suggested that failure of insemination was a major cause of infertility, and fertilization failure was not a problem. In his studies, provided ewes were inseminated fertilization occurred in virtually all ewes. The likely occurrence of failure of insemination highlights the errors possible if raddle marks are assumed to represent service by the ram. Killeen's work substantiates the postulation of Lindsay (1966) that failure of insemination could have severe implications in the joining of maiden ewes which experience short oestrous periods.

The inverse relationship between return rate and raddling activity in the first two weeks cannot be explained. Perhaps efficiency in the one per cent groups was too low to overcome the problem of short oestrus in the maiden ewe, resulting in fewer ewes detected in oestrus and failure of insemination of a large proportion of those detected. This relationship largely explains the correlation between raddling activity in the first fortnight and incidence of dry ewes.

The effect of ram per cent on mature ewe fertility at Cooma B and Leeton C was contrary to the expected result (Dawe et al. 1970) and, with the high return rates, suggests a ram problem on these properties. Despite this possibility, strengthened by the fact that Connors and Giles (1970) suggested maiden ewes would be most affected where ram fertility was limiting, the failure of many maidens to be raddled at all contributed largely to their lowered fertility at one per cent of rams.

It can be concluded that three per cent of rams should be joined to maiden ewes, and the data substantiates the practice of joining maiden and mature ewes in separate flocks. The possible use of a ram percentage intermediate between 1 and 3 cannot be discounted, and requires further study.

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