Development of a self-drafting system for oestrus ewes

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ABSTRACT

An efficient farm AI system for sheep requires ready identification of, and access to, oestrus ewes. It is well known that ewes in oestrus seek out and remain near rams. The present experiment evaluated a variety of systems for trapping oestrus ewes attracted to two decoy rams.

These systems included traps with one or two entrances, and traps sited 1.5 or 6 m from the rams. In each trial, 13 to 16 ewes in a flock of 45 mixed age and mixed breed sheep were artificially induced into oestrus and the proportions of oestrus ewes entering the trap was recorded. In addition, the trapping rate in a flock of naturally cycling $1^1/_2$ yr and $2^1/_2$ yr ewes was assessed.

Over all trials, half of the animals in oestrus were trapped. Trap configuration had no significant effect on catch rate. Trapping rates for two-tooth (*primiparous*) and four-tooth sheep were similar.

A trap system has been developed which attracts and captures a significant proportion of oestrus ewes. The catch rate is sufficiently high for practical use in farm AI programmes.

Keywords Oestrus ewes, ram-seeking, self-drafting, trapping, behaviour, sheep.

INTRODUCTION

Approximately 75% of mature oestrus ewes will migrate towards and remain near tethered rams (Inkster, 1957; Lindsay and Fletcher, 1972; Allison and Davis,1976). The incidence of ram-seeking activity appears to be influenced by several animal and environmental factors. Ewes that are older and heavier (Allison and Davis, 1976), and with direct line of sight (Lindsay and Fletcher, 1972) are more likely to approach rams. Although Dorset rams are more effective than other breeds in stimulating ewes to ovulate early (Tervit *et al.*, 1977), breed of ram does not appear to affect ram seeking by oestrus ewes (Lindsay, 1966). However, Allison and Davis (1976) observed that some individual rams within a breed appear particularly attractive, and ewes seek the most active rams (Lindsay and Robinson, 1961).

More ewes migrate to restrained rams in smaller (about 1 ha) than in larger (about 7 ha) paddocks (Inkster, 1957; Allison and Davis, 1976). In addition, Allison and Davis (1976) reported that uneven and steep topography impedes migration to rams.

A pilot trial by (R. Kilgour *pers. comm.*) demonstrated that while a proportion of oestrus ewes push through batwing gates to approach decoy rams many subsequently escaped. Exploitation of this behaviour should make it possible to develop a self-drafting system for animals in oestrus. Trapped ewes would thus be available for artificial insemination (AI) without the need for artificial oestrus synchronisation and unnecessary handling of the flock.

The present experiment evaluated a new one-way gate design, and the effect of several different trap configurations and age of ewe on trapping success.

MATERIALS AND METHODS

Trial 1

Animals

A flock of 45 mature, mixed breed ewes was used in three experiments conducted at weekly intervals (late March-early April). Each week about one-third of the flock was induced into oestrus using 12 day CIDRs (Carter, Holt, Harvey, Hamilton, New Zealand) plus 400 IU PMSG at CIDR removal ("CIDR ewes"). CIDRs were inserted into the remainder of the ewes to prevent oestrus. Two vasectomised Dorset rams served as

decoys.

Trap configuration

A fence (the trap fence) was erected across one corner of a O.5 ha paddock to form a triangular trap area. The trap gate was set into the centre of the trap fence. The gate forms a funnel 1.3 m wide at the entrance and narrowing to 17 cm (adjustable). Each side of the funnel is comprised of five, white flexible fibreglass rods (1.2 m long and 13 mm diameter). The rods are anchored in a steel frame at the wide end of the funnel. The rams, with ad lib hay and water available, were held in a pen (3.0 m x 3.0 m) within the trap area. In Trial 1(a), one trap gate was set into a hessian-covered trap fence a distance of 1.5 m from the ram pen. In Trial 1(b), two trap gates (1.5 m apart) were set into a netting trap fence 1.5 m from the rams. The configuration for Trial 1(c) was similar to that for 1(b) except that the distance from the trap fence to the ram pen was increased to 6m. To facilitate animal handling, a small race was erected adjacent to the trap area.

Observations

During daylight hours, animals approaching and/or entering the trap were identified and scored for signs of oestrus from 24 h until 72 h after CIDR removal. In addition, the decoy rams were released into the trap area to determine oestrus status of the ewes.

Oestrus was defined as standing in response to courting or mounting, tailfanning or head turning in the vicinity of a ram.

Trial 2

Animals

A flock of 171 ewes (103 2-tooths and 68 4-tooths) was used, all of which had lambed previously. The ewes were grazed as one flock in 1.0 ha paddocks, throughout two consecutive 19-day periods in April-May. Pairs of rams from a pool of six were used as decoys.

Trap configuration

The trap arrangement was the same as that used in Trial 1(c) and was set up in each new paddock during the first 19-day period. The trap was not used in the second period.

Observations

During the first period, trapped ewes were checked for standing oestrus by teasing with vasectomised rams mornings and evenings. In addition, ewes near the trap were scored for indications of oestrus. During the second period, six harnessed, vasectomised rams ran with the flock. Marked ewes were recorded every 2-3 days.

RESULTS

Trial 1

Ewes that had been treated with CIDRs began approaching the trap approximately 24h after CIDR removal. The numbers and proportions of "CIDR ewes" and non-oestrus ewes trapped are shown in Table 1.

TABLE 1 The numbers and percentages of sheep trapped from a flock of 45 ewes (Trial 1).

	Trial		
	1(a)	1(b)	1(c)
No. of "CIDR ewes"	16	16	13
No. (%) "CIDR ewes" trapped	10 (63)	7 (44)	10 (77)
No. (%) non-CIDR ewes trapped	2 (7)	4 (13)	4 (12)

Across all three trials, the proportion of ewes trapped averaged 62% of those potentially in oestrus ("CIDR ewes"). A chi-square analysis of the data in Table 1 showed that trap configuration had no significant effect on proportions of ewes trapped, although there is a tendency for a higher trapping rate in Trial 1(c) where two trap gates were positioned 6 m from the rams. Comparatively few non-oestrus ewes entered the trap area (range 7-13%).

Trial 2

Ewes began entering the trap within 8 h of setting up the apparatus. The number and percentage of oestrus and non-oestrus ewes in each age group (and overall) entering the trap are given in Table 2. The numbers of ewes

observed in oestrus and close to, but outside, the trap at the morning and afternoon inspections are also shown. These ewes (9% of the flock) did not enter the trap during this experiment. Tup marks recorded during the second 19-day period confirmed that all animals in the experiment were cycling.

A chi-square test showed that there was no significant difference between the proportions of oestrus two-tooth (50%) and four-tooth (40%) ewes entering the trap. Over the 19-day trapping period, 46% of the flock pushed through the trap-gate. These animals were confirmed in oestrus. Another 12% pushed through but were not in oestrus.

TABLE 2 The numbers and percentages of sheep trapped from a flock of 171 naturally-cycling ewes (Trial 2).

	Age of ewe		
	2-tooth	4-tooth	Overall
n	103	68	171
No. (%) trapped & in oestrus ("on")	51 (50)	27 (40)	78 (46)
No. (%) trapped & not "on"	15 (15)	6 (9)	21 (12)
No. (%) not trapped but "on" near trap	7 (7)	9 (13)	16 (9)

DISCUSSION

The present experiment has confirmed that oestrus ewes migrate towards rams, and that by utilising a suitable one-way gate oestrus ewes can be self-drafted. Half the animals that came into oestrus in this study were captured using this technique. A further 14% of ewes passed through the trap but were not in oestrus at the time. Of all the animals trapped only five escapes were seen.

The funnel shape of the trap seemed particularly important, as ewes approaching from a distance would enter the opening directly and move forward to the point closest to the decoy rams. Further, the size of the opening at the narrow end is critical. It must be sufficiently wide to encourage entry of oestrus ewes, while discouraging non-oestrus sheep and preventing escapes. The chosen width (17 cm) proved suitable in the present experiment although other dimensions may be more appropriate for sheep differing in size and fleece length from those used here.

Other features of the trap configuration seemed to have less effect on entry rates (Table 1). In Trial 1(a) it was noted that animals would occasionally lie down in the trap entrance and obstruct the passage of other ewes. The use of two traps in subsequent trials did not, however, result in an obvious increase in trapping rate. Similarly, positioning the traps further from the rams (1.5 m vs 6.0m) did not increase the entry rate, although the 6.0 m space provides a larger area to hold large catches.

Earlier work by Allison and Davis (1976) showed that older and heavier ewes are more likely than younger, lighter sheep to approach rams. No difference between the two-tooth and four-tooth ewes in ram-seeking behaviour was apparent from the trapping data in the present experiment. That the two-tooths in the present experiment had been mated as lambs may have contributed to the absence of an age effect on ram-seeking and trapping.

Factors that are likely to enhance trapping rates include the use of very active rams (Lindsay and Robinson, 1961) and a high level of exposure of the ewes to the sight, sound and smell of the rams (Fletcher and Lindsay, 1968). Trapping rates are likely to be adversely affected in large, hilly paddocks as fewer ewes locate rams in such areas (Allison and Davis, 1976), and by the presence of non-decoy rams and male goats in adjacent paddocks. Nearby males will divert some of the ewes away from the trap area. Further, informal observations from the present study indicated that high levels of feed and frequent disturbance by dogs reduces trapping success.

This study has demonstrated the usefulness of a low-labour trapping system for the self-drafting of oestrus ewes. The trap would capture about 30 oestrus ewes/day/1000 sheep. Additional oestrus ewes could be obtained by capturing those animals lying near to but not in the trap (9%, Table 2). Oestrus in the trapped and captured ewes could be confirmed by observation of the females in the presence of the decoy rams.

REFERENCES

Allison, A.J.; Davis, G.H. 1976. Studies of mating behaviour and fertility of Merino ewes. II. Effect of age of ewe, liveweight and paddock size on duration of oestrus and ram-seeking activity. *New Zealand Journal of Experimental Agriculture*

4: 269-274

Fletcher, I.C.; Lindsay, D.R. 1968. Sensory involvement in the mating behaviour of domestic sheep. *Animal Behaviour 16*: 410-414.

Inkster, I.J. 1957. The mating behaviour of sheep. *NZ Sheep-Farming Annual*: pp 163-169.

Lindsay, D.R. 1966. Mating behaviour of ewes and its effect on mating efficiency. *Animal Behaviour 14*: 419-424.

Lindsay, D.R.; Fletcher, I.C. 1972. Ram-seeking activity associated with oestrus behaviour in ewes. *Animal Behaviour 20*: 452-456.

Lindsay, D.R.; Robinson, T.J. 1961. Studies on the efficiency of mating in the sheep. II. The effect of freedom of rams, paddock size and age of ewes. *Journal of Agricultural Science, Cambridge 57*: 141-145.

Tervit, H.R.; Havik P.G.; Smith, J.F. 1977. Effect of breed of ram on the onset of the breeding season in Romney ewes. *Proceedings of the New Zealand Society of Animal Production 37*: 142-148.