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Are rams necessary for the stimulation of anoestrous ewes with oestrous ewes?

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ABSTRACT

In anoestrous ewes that had been primed with progestagens, the introduction of oestrous ewes together with the teaser rams at progestagen withdrawal increased the percentage of ewes exhibiting oestrus over the subsequent 7 days (1.9% teaser rams only v 24.4% teaser rams + oestrous ewes; Experiment 1) and the percentage of ewes ovulating in the subsequent 5 days (7.7% teaser rams only v 21.6% teaser rams + oestrous ewes; Experiment 2). The introduction of oestrous ewes without teaser rams in Experiment 2 failed to stimulate anoestrous ewes to ovulate. When rams were placed with oestrous ewes for 2 days before they alone were introduced to anoestrous ewes, the percentage of ewes ovulating was similar to when rams plus oestrous ewes were present together (38.1% stimulated teaser rams v 35.0% teaser rams + oestrous ewes; Experiment 3). Both of these treatments resulted in more ewes ovulating than in the isolated ewes (0.0%) with the response to unstimulated teaser rams (19.5%) and to oestrous ewes alone (9.5%) being intermediate.

Keywords Rams; anoestrous ewes; oestrous ewes; ram effect; ovulation; social stimulation.

INTRODUCTION

Early in the breeding season the introduction of oestrous ewes can stimulate ovarian and oestrous activity in anoestrous Merino (Oldham, 1980), Romney and Perendale ewes (Welch, pers. comm.). It has been implied that this phenomenon, termed 'social facilitation', was a direct effect of the oestrous ewe on the anoestrous ewes. However these workers had rams present along with the oestrous ewes. The 3 experiments presented in this paper demonstrate that the effect of the oestrous ewes in stimulating anoestrous ewes, acts via the ram.

MATERIALS AND METHODS

Experiment 1

Progestagen pessaries containing 70 mg MAP (medroxyprogesterone acetate) were inserted into the vagina of 315 mature Romney ewes on 20 January and removed on 2 February. The ewes were then divided into 2 groups and 9 fertile rams were introduced to 1 group of ewes, and 9 fertile rams plus 30 oestrous ewes (ratio of oestrous to anoestrous ewes = 1.5) were introduced to the other group. The rams were fitted with harnesses and crayons and the ewes marked over the subsequent 7 days were recorded.

Experiment 2

Two groups of 50 and 2 groups of 20 mature Romney ewes were progesterone primed at the same time as

the ewes in Experiment 1. At removal of the progestagen pessaries, 3 entire rams were introduced to 1 group of 50 ewes and 3 entire rams plus 10 oestrous ewes into the other group of 50 ewes. The 2 groups of 20 ewes remained isolated from rams but oestrous ewes were introduced into 1 group. All ewes were laparoscoped 5 days after the teasing treatments commenced and the ewes ovulating were recorded.

Experiment 3

On the 13 February 1984, 100 mature Romney ewes which had not been primed with progestagens were divided into 5 groups. The treatments were:-

- 1) isolated from rams and ewes;
- 2) 4 oestrous ewes only introduced;
- 3) 3 fertile rams only introduced;
- 4) 3 fertile rams plus 4 oestrous ewes introduced;
- 5) 3 fertile rams which had been mating with 6 oestrous ewes for 2 days before introduction to the ewes ('stimulated' rams). The numbers of ewes ovulating were determined by laparoscopy 5 days later.

All treatment groups in the 3 experiments were separated by at least 200 m. The oestrous ewes were induced into oestrus by priming for 12 days with vaginal pessaries containing 70 mg MAP and injected with 500 i.u. PMS 2 days before pessary removal (Tervit, 1983). The removal of the progestagen pessaries occurred 1 to 2 days before the oestrous ewes were required.

All data were analysed using Chi square analysis.

RESULTS

Experiment 1

More ewes exhibited oestrus in the group with the rams + oestrous ewes (24.4%) than in the group with rams only (1.9%) ($\chi^2_1 = 34.12$; $P < 0.001$).

Experiment 2

Percentage ewes ovulating was 0, 0 and 21.6 for the isolated ewes, the ewes with oestrous ewes but no rams and the ewes with the rams + oestrous ewes ($\chi^2_1 = 5.1$; $P < 0.05$). This latter group also had more ewes ovulating than the group of ewes with rams only present ($\chi^2_1 = 2.95$; $P < 0.1$). There was no difference in the percentage of ewes ovulating between the groups with no rams present and the group with rams only present (Table 1).

Experiment 3

Rams put with oestrous ewes for 2 days before introducing them to anoestrous ewes ('stimulated' rams) were equally effective at stimulating anoestrous ewes to ovulate as rams + oestrous ewes (Table 1). Both of these treatments resulted in more ewes ovulating than in the isolated ewes ($\chi^2_1 = 6.09$; $P < 0.05$). The ovulatory responses to rams only and oestrous ewes only, were intermediate between the isolated ewes and the ewes with rams + oestrous ewes (Table 1).

TABLE 1 The percentage of ewes ovulating in Experiments 1 and 2

| | Treatment of Ewes | | | | |
|--------|-------------------|-------------------|--------------------|----------------------|-------------------|
| | Isolated | Oestrous ewes | Rams | Rams + oestrous ewes | 'Stimulated' rams |
| Expt 2 | 0.0 ^a | 0.0 ^a | 7.7 ^a | 21.6 ^b | - |
| Expt 3 | 0.0 ^a | 9.5 ^{ab} | 19.0 ^{ab} | 35.0 ^b | 38.1 ^b |

Treatments with different superscripts differ significantly.

DISCUSSION

The stimulatory effects oestrous ewes had on the oestrus and ovarian activity of anoestrous ewes early in the breeding season confirm the results of Oldham (1980) and Welch (pers. comm.). Results from Experiment 2 indicate the ram must be present for the oestrous ewes to stimulate the anoestrous ewes, while Experiment 3 indicates the effect is acting via the ram. That is the oestrous ewes stimulate the ram which in turn becomes more effective at stimulating the anoestrous ewes. Pheromones produced by the ram will stimulate anoestrous ewes to ovulate (Knight *et al.*, 1983) and it is possible oestrous ewes were stimulating an increased production and/or release of the pheromones from the ram.

CONCLUSIONS

The implications of these results are that a more effective teasing response can be obtained by integrating social facilitation with the teasing effect. The response is not dependent on a large proportion of ewes being artificially induced into oestrus and may only require 1 to 2 oestrous ewes per ram.

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