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THE INFLUENCE OF RAMS ON THE ONSET OF THE BREEDING SEASON IN EWES

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SUMMARY

Earlier introduction of rams advanced the breeding season and consequently the date of lambing in both young and mature Romney ewes in New Zealand. Vasectomized rams were less successful in this and sometimes had no effect.

INTRODUCTION

IT HAS BEEN SHOWN in Merino ewes in Australia (review by Radford and Watson, 1957) and in presumably Merino type ewes in U.S.A. (Smith, *et al.*, 1958) that the joining of vasectomized teaser rams will stimulate breeding activity if the ewes are in the transitional period from the non-breeding to the breeding season.

Schinckel (1954) and Radford and Watson (1957) found that, if the rams join the ewes when the latter are approaching their breeding season but before they experience the ovulation without heat (silent heat) which often precedes their first heat, many of the ewes are stimulated to ovulate within about five or six days and come into heat about 17 days later, that is, approximately 22 days after joining the rams. Once the ewes have commenced their own breeding cycles, the presence of the ram cannot affect them in this way.

In 1960 at Ruakura, E. D. Fielden, by turning out teasers in February, showed that the breeding season of Romney ewes could be advanced. This paper reports the results of further studies of this phenomenon.

EXPERIMENTAL

In 1961, 300 five-year-old Romney ewes at Ruakura were equally divided into three matched flocks. Flock A joined fertile rams on February 10; Flock B, from the adjacent paddock, joined Flock A and the rams on February 20, and Flock C, from one paddock further away, joined Flocks A and B and the rams on March 2, about the usual time for this area.

The onset of the breeding season was clearly influenced by the treatments (Fig. 1). The mean date of the onset of

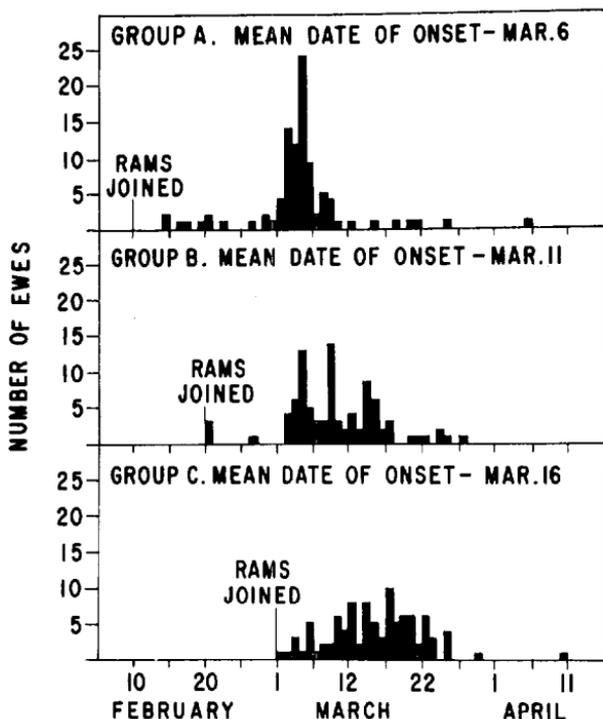


Fig. 1: The effect of the time of joining rams on the onset of the breeding season in mature ewes at Ruakura in 1961.

the breeding season in Flock A was March 6, in Flock B March 11 and in Flock C March 16.

The fertility of all flocks was the same, and the mean date of the first successful tupping in the three flocks was March 10, 15 and 20, respectively.

Although there was little activity in the ewes of Flock C in the same paddock at the same time, the peak of tupping in Flock A, about 22 days after joining with the rams, is clearly shown. This leads to both an earlier and relatively concentrated lambing.

Flock B is interesting in that the ram effect is evident sooner than the expected 22 days after joining. This is perhaps due to the ewes being in the paddock next to the rams from February 10; the stimulus having a diluted effect compared with Flock A. Watson and Radford (1960) have shown that the sound and/or smell of rams, without sight or contact, stimulates ewes. It seems likely that the smell

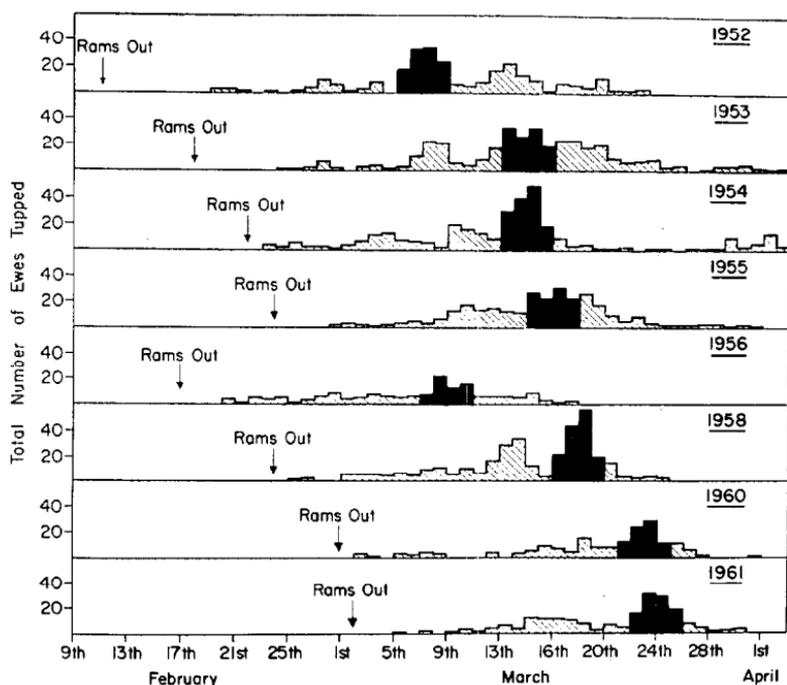


Fig. 2: The peak of tupping which regularly occurred in the ewes at Manutuke about 22 days after the joining of the rams.

of the rams may be important as Bruce and Parrott (1960) have shown in mice that the smell of the male influences reproduction in the female.

It appears that, to advance the breeding season by joining the ewes and rams earlier than usual, it is best to keep them separated by at least one paddock before joining to gain the maximum effect of the stimulus of turning out the rams.

D. Sinclair has kindly supplied figures for the onset of the breeding season in mature ewes during eight years at Manutuke (Fig. 2). It will be seen that the time of joining the rams varied from February 11 to March 2 and that in each year, at about 22 days after joining, approximately 40% of the ewes were mated for the first time within a period of four days. Even when the rams were joined relatively late, there were apparently enough ewes which were just approaching their breeding season and were consequently still susceptible to stimulation, to give a peak of first tupping.

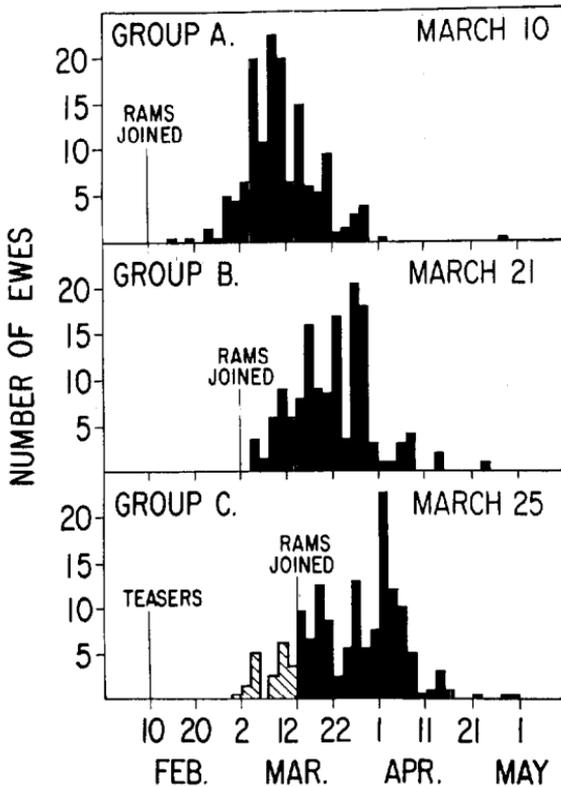


Fig. 3: The effect of the time of joining rams and teasers on the onset of the breeding season in two-tooth ewes at Hautu in 1962.

It seemed clear then that the onset of the breeding season in mature Romney ewes in New Zealand is influenced by the joining of the rams. It was, however, desirable to determine if young ewes were susceptible, what was the optimum time to join the rams for maximum effect, and if vasectomized teaser rams were equally effective.

A study with two-tooth ewes was carried out in 1962 at the Hautu Prison Farm, where 900 two-tooth Romney ewes were divided into three equal flocks, each of which was kept separated from rams or teasers by at least one paddock before joining. Groups A and B were joined each with eight rams on February 10 and March 2, respectively. Group C was joined with three teasers on February 10 and these were replaced by eight rams on March 12. From Fig. 3 it can be seen that the breeding season of the two-tooth Rom-

ney ewes in Group A (mean date of onset March 10) has been advanced when compared with Group B (mean date of onset March 21), by the earlier joining of the rams. In this experiment, however, the teasers introduced to Group C on February 10 have had no effect in advancing the breeding season in the group of ewes, although they tupped some which came in heat, as the mean date of the onset of the breeding season was delayed until March 25. The peak of tupping in each of the three groups falls about 22 days after the introduction of rams.

In 1962 at Ruakura, four groups of 100 ewes were each joined by one ram on January 10, February 1, February 10 and March 2, respectively, one group of 100 ewes was joined by one teaser on January 10 and a group of 200 ewes by two

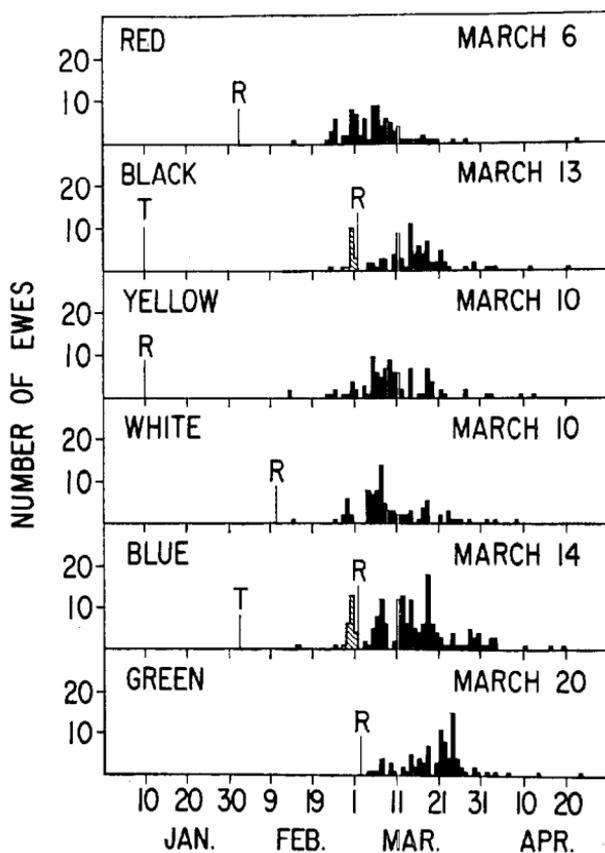


Fig. 4: The effect of the time of joining rams and teasers on the onset of the breeding season in mature ewes at Ruakura in 1962.

teasers on February 1. All the ewes were five-year-old Romneys, and rams replaced the teasers in the last two groups on March 2.

The results are shown in Fig. 4. Compared with the control group, Green, joined with the ram at the usual time at the beginning of March and with a mean first tupping date of March 20, the greatest advance in the breeding season was obtained by joining the ram on February 1 with Group Red in which the mean onset of the breeding season was March 6. A smaller advance in onset was obtained by joining the ram earlier on January 10 (Yellow Group), and later, on February 10 (White Group). The optimum time appears to be about the beginning of February, perhaps when most of the ewes are susceptible, or when all the ewes are most susceptible to stimulation by the rams, and when few of them have initiated their own breeding season by experiencing their silent heat.

The teasers which joined Groups Black and Blue on January 10 and February 1 respectively have influenced the onset of the breeding season but to a lesser extent than the rams joined on the same dates.

On a third property, in 1962, four teasers introduced on February 10 to 700 mixed age Romney ewes had no effect on the breeding season. The onset in this group was stimulated by rams joined on March 12 and was later than in the similar control group joined with the rams on March 1.

As in 1961, the order of lambing of the groups in the 1962 experiments at Ruakura was the same as the order of first tupping, the mean lambing dates ranging from August 1 for Group Red to August 17 for Group Green. The lambs from these ewes were weighed at fortnightly intervals and slaughtered at a set weight. The earlier lambing groups retained their advantage, 75% of Group Red being slaughtered by December 20, compared with January 10, 1963, for the same proportion of Group Green, the other groups falling between these extremes. This situation may alter with variations in pasture growth between seasons, but, if generally true, is probably of considerable economic importance.

All the differences to which attention has been drawn in the results of the experiments in both 1961 and 1962 are statistically significant at the 1% level, as assessed by *t*-tests.

DISCUSSION AND CONCLUSIONS

In considering possible explanations for the sometimes partial success and sometimes complete failure of teasers, it seemed that recently vasectomized teasers were the more successful and observations suggested some loss of libido

in teasers vasectomized for one year or longer. The simple surgical interference of vasectomy may cause in the ram unexpected effects which increase with time. Further experiments are in progress to compare teasers with rams and to compare teasers vasectomized one year with others vasectomized one month, in stimulating activity in ewes approaching the breeding season.

As mentioned earlier, teasers have been used satisfactorily to advance the breeding season in Merino sheep in Australia and the U.S.A., although Smith *et al.* (1958) in the latter country, report that at one location in both years of the experiment, no difference was obtained between control and teased groups of ewes. Perhaps the teasers used on this property had been vasectomized a longer time.

It is of interest to consider the possible mechanisms whereby the presence of rams stimulates susceptible ewes to ovulate. As already mentioned, it seems likely that the scent of the rams may be an important factor. It has been shown that, near their breeding season, ewes will ovulate in response to stress, such as trucking (A. Braden, *pers. comm.*) and rectal electrical stimulation (Edgar, 1958). This latter stimulus similarly affects cows (Hays and Carlevaro, 1956), and the interval of up to 5 or 6 days between stress and ovulation in all these examples is similar to that following the introduction of rams at about the optimum time. One hesitates to make the suggestion, but it appears that the presence of the male may represent a stress factor to the susceptible female, the effect of which is transmitted from the adrenal gland via the pituitary to the ovary.

It appears that the following conclusions can be drawn from the results of the experiments here reported:

- (1) The presence of the ram influences the time of onset of the breeding season of Romney ewes in New Zealand.
- (2) Both young and mature ewes are so influenced.
- (3) The maximum advance in the onset of the breeding season is obtained by joining rams and ewes at about the beginning of February.
- (4) The fertility of the ewes is not affected, so that an advance in the time of onset of the breeding season is followed by an advance in mean lambing date.
- (5) Teasers are less effective than rams, and sometimes have no effect, in stimulating ovulation in susceptible ewes.
- (6) In the one season in which it was studied, earlier mean lambings resulted in earlier slaughtering of lambs.

ACKNOWLEDGEMENTS

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DISCUSSION

Q: *Are the hatched portions in Dr Edgar's Fig. 3 included in the calculation of mean tugging date? Since they represent tugging by teasers it would seem logical that they should be included.*

DR D. G. EDGAR: Tuggings by teasers were in every case included in the calculation of mean first tugging date.

Q: *Could the teaser tugged ewes in the experiment with two-teeth at Hautu Prison Farm not have been stimulated by the presence of teasers?*

DR EDGAR: It is possible that a few of the ewes were stimulated by the teasers in this experiment but the latter can have had little effect, as the mean onset of the breeding season in Group C, where teasers were joined on February 10, was later than that in Group B where the rams were not put out until the beginning of March.

Q: *In the experiment at Hautu Prison Farm, was the number of teasers introduced on February 10 the same as the number of rams introduced on the same date?*

DR EDGAR: Three teasers were introduced to Group C on the same day as 8 rams were introduced to Group A. For making a direct comparison between rams and teasers, that represents a weakness in the experiment. The proportion of teasers used (1%) was, however, the same as that used at Ruakura where teasers affected the onset of the breeding season in ewes but to a less extent than rams.

Q: *Since teasers are generally less well fed than rams, was it possible that the teasers used in these experiments lacked sexual vigour?*

DR EDGAR: These teasers were in good bodily condition and had been running with the rams prior to the experiment.

Q: *The experiment at Ruakura in 1962 indicates that the optimum date for joining with the rams varies with season, but the Manutuke data show a quite consistent time lapse over many years between the turning out of the rams and the onset of the breeding season.*

Were seasonal variations taken into account in some fashion at Manutuke when deciding on the date to turn out the rams?

DR EDGAR: We have little or no information on the effect of the season on the optimum date for joining the rams, so that this could not have been taken into account when deciding the date to turn out the rams at Manutuke.

Q: If the number of ova shed per heat period follows a cyclic pattern of increase and subsequent decrease, and the onset of the breeding season is brought forward by stimulation of the sort discussed, what is likely to be the effect on the cyclic pattern of ovum shedding?

DR EDGAR: The answer to this question is not known but the problem is under study.

Q: Would Dr Edgar comment on the practice of turning out entire rams for about 5 days, withdrawing them and then putting them out again after the estimated time of the first oestrus? Further, would it be profitable to consider the concentration of ewes on a small area during this 5-day period when the rams are turned out?

DR EDGAR: It may be possible to use rams to stimulate the onset of the breeding season, to withdraw them during the period of peak first oestrus and to re-introduce them in time to tup most of the ewes at their second oestrus. Concentrating ewes and rams in a small area may assist the rams to stimulate a higher proportion of ewes.

Q: Is it possible to put any figure on the degree of concentration of lambing achieved by putting the rams out early?

DR EDGAR: The advance in the breeding season is probably the more important effect but some concentration of the peak of lambing does occur. For example, in the 1961 experiment at Ruakura, about 60% of ewes were tupped in a period of 4 days in the group to which the rams were joined early compared with 11 days for the same proportion of ewes in the group joined later, and the distribution of lambing followed a similar pattern.

Q: Can we any longer be sure that there is a spontaneous "silent" heat period in ewes if such a peak of heat periods occurs 22 days after joining with the rams?

DR EDGAR: Spontaneous onset of the breeding season does occur, as some ewes are tupped less than 17 days after joining the ram and must have experienced their silent heat before the ram was put out.