

AN EXPLANATION FOR THE REDUCED FERTILITY IN MERINO EWES
AT THE FIRST OESTRUS OF THE BREEDING SEASON

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Summary

Laproscopy was used in 400 ewes from 3 commercial flocks to study the difference in fertility of ewes mated in the first vs. second 2 weeks of the joining period. Examination of the ovaries of the ewes at joining and 14 days after joining revealed that 23% of the ewes did not experience a 'quiet ovulation' at the beginning of their breeding season but ovulated and displayed oestrus simultaneously - both for the first time after the introduction of rams. The percentage of these ewes failing to lamb was significantly higher than for the remaining ewes mated in the first 2 weeks of joining (66% vs. 38%; $P < 0.01$), or for those ewes experiencing a 'quiet ovulation' in the first 2 weeks and a normal ovulation plus oestrus in the second 2 weeks of joining (66% vs. 36%; $P < 0.01$). The proportion of ewes of this type, mated in the first 2 weeks of joining was sufficient to cause an 8% difference in ewes failing to lamb between ewes mated for the first time in the first vs. second 2 weeks of joining. The low fertility of these ewes strongly suggests that a prior progestational phase is necessary for reasonable fertility at the beginning of the breeding season.

I. INTRODUCTION

The fertility of ewes is often lower during the first 2 weeks of joining than later in the joining period. This lowered fertility is particularly apparent in October and November but is still seen to a lesser degree as late as February-March (Knight et al. 1975). This difference in fertility was not due to changes in ram fertility.

In the period October to January many ewes are not cycling naturally (Fletcher and Geytenbeck 1970) but will begin to cycle after the rams have been introduced (Knight et al. 1975). In a routine study of consecutive ovulations in sheep, C.M. Oldham (unpublished data) has noted that about 25% of ewes ovulating for the first time after anoestrus also come on heat. This is contrary to the widely published concept that the first ovulation of the breeding season is unaccompanied by oestrus (so called 'silent heat' or 'quiet ovulation'). It suggests that some ewes, at least in the first 2 weeks of joining, would be ovulating and in oestrus, both for the first time. This experiment examined the fertility of ewes in this category and compared their fertility with that of ewes which were already cycling when the rams were introduced.

II. MATERIALS AND METHODS

The experiment was performed on commercial farms in south Western Australia. The environment and reproductive performance of sheep in this region has been described (Knight et al. 1975).

(a) Ovulation

The ewes' ovaries were examined by laparoscopy as described by Oldham, Knight and Lindsay (1975). They were kept off feed and water for

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24 hours prior to the operation and were said to have begun the breeding season when there was visual evidence of either past corpora albicantia (C.A.) or current corpora lutea (C.L.). Where these structures were not present the ewes were judged to be still in anoestrus.

(b) Oestrus

The rams were fitted with 'sire-sine' harnesses and crayons, and the colours of the crayons were changed every 14 days, at which time markings were recorded.

(c) Relative Return Rates

Relative return rates as described by Knight et al. (1975) were calculated from the oestrous data.

(d) Ewes Failing to Lamb

Ewes failing to lamb following mating for the first time in any fortnight of the joining period include both the ewes returning to service at any stage after mating and the ewes not returning to service but failing to lamb. At tailing, the ewes were classified as having lambed or not by the method of Dun (1963).

(e) Experimental Procedure

On each of 3 commercial farms random samples of 150, 124, 126 ewes were drawn from flocks of 281, 269 and 270 mature Merino ewes. The three flocks were joined to the rams on 11th, 20th and 21st November, -1974, and in each case joining lasted 8 weeks. On day zero of joining (the day the rams were introduced) the reproductive tracts of the selected ewes were examined by laparoscopy. On the basis of this examination the ewes were classified as cycling (C.L. present) or anoestrous (C.L. absent).

On day 14 of joining the ewes classified as having been in anoestrous prior to contact with the rams were re-examined by laparoscopy and the presence of corpora lutea was recorded. The information on ovarian activity coupled with the oestrous and lambing data allowed the deduction of the information shown in Table 1. For the purposes of this study the fertility of 3 categories of ewes from Table 1 are of interest.

1. A. Ewes. Those ewes which were cycling when the rams were introduced. Most of the ewes mated in the first 2 weeks of joining were in this category.
2. AA.BB.C. Ewes. Those ewes that ovulated and displayed oestrus simultaneously, both for the first time after the introduction of rams. These ewes were mated only in the first 2 weeks of joining.
3. AA.BB.CC.D. Ewes. Ewes which ovulate after the introduction of rams, but which do not display behavioural oestrus until the next cycle.

III. RESULTS

Of the 400 ewes selected for laparoscopy 327 were successfully examined and had a complete mating history. The numbers in each category are shown in Table 1. Thirty eight ewes out of 168 (23%) showed oestrus at their first ovulation of the breeding season.

From Table 1 can be calculated the figures for Table 2 which shows

the relative return rates and ewes failing to lamb in each of the three categories A, AA.BB.C. and AA.BB.CC.D. as well as the overall performance of all ewes mated in the first 2 weeks of joining (A + A.BB.CC.). This shows that the ewes which began the breeding season by ovulating and displaying oestrus simultaneously were highly infertile and differed from ewes in categories (i) and (iii) in both their relative return rates ($P < 0.01$) and in the number of ewes which failed to lamb ($P < 0.01$).

TABLE 1
Key to ewe classification based on their reproductive history

Ewe Categories	No. Ewes
A. CL present day 0	130
B. Mated day 1-28 and <u>held</u> to service	91
C. Lambed	81
CC. Failed to lamb or missing at lambing	10
BB. Mated day 1-28 but <u>returned</u> to service in the following 14 days	39
AA. CL absent day 0	197
B. CL absent day 14	17
BB. CL present day 14	180
C. Displayed oestrus day 1-14	38
D. <u>Held</u> to service	17
E. Lambed	13
EE. Failed to lamb	4
DD. <u>Returned</u> to service in subsequent 14 days	21
CC. Failed to display oestrus day 1-14	142
D. Mated day 15-42 and <u>held</u> to service	103
E. Lambed	91
EE. Failed to lamb or missing at lambing	12
DD. Mated day 15-42 but <u>returned</u> to service in subsequent 14 days	39

TABLE 2
Relative return rates and percent ewes failing to lamb
for four categories of ewes

Category of Ewe (for explanation see Table 1)	Relative Return Rate (%)	Ewes Failing to Lamb (%)
(i) A.	30	38
(ii) AA.BB.C.	55	66
(iii) AA.BB.CC.D. (ewes mated in 2nd 2 weeks of joining)	27	36
(iv) A. + AA.BB.C. (all ewes mated in 1st 2 weeks of joining)	36	44

The influence of these highly infertile ewes on the overall performance of ewes mating in the first 2 weeks of joining can be seen from the fourth row of Table 2. The relative return rate was 9% higher and ewes failing to lamb 8% higher than in ewes mated for the first time in the second 2 weeks of joining (row three, Table 2).

IV. DISCUSSION

In this experiment 23% of ewes did not experience a 'quiet ovulation' at the beginning of their breeding season and only 34% of these had lambs. The proportion of ewes in this category and their low fertility are sufficient to cause most of the difference in the fertility between ewes mated in the first and second 2 weeks of joining, observed by Knight et al. (1975). In this study the difference was 8% for ewes failing to lamb compared with 19.2% in October-November and 5% in December found by Knight et al. (1975).

The importance of progesterone prior to oestrogen to induce behavioural oestrus in ovariectomised ewes has been shown by Robinson (1959). Robinson extrapolated that 'quiet ovulation' at the beginning of the breeding season is due to a lack of progesterone from a previous corpus luteum. The low fertility of the 23% of ewes which experience 'quiet ovulation' strongly suggests that a prior progestational phase is also necessary for reasonable fertility.

The importance of teasing-ewes prior to the joining period is highlighted in this paper. If ewes are induced to cycle before the fertile joining, most display oestrus in the first 2 weeks after joining begins and those which do will be normally fertile because of the influence of the progestational phase of at least one previous cycle. Both factors will contribute to an early and compact lambing.

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