THE INDUCTION OF OVULATION IN THE POST-PARTUM EWE

P.E. GEYTENBEEK*, C-M, OLDHAM**, and S.J. GRAY**

SUMMARY

The introduction of testosterone treated wethers (TW) to post-partum autumn lambing Merino ewes induced ovulation within four days unaccompanied by oestrus.

The percentage of ewes which had ovulated after four days association with the 'teaser' wethers was 0, 35, 52 and 73 percent for groups of ewes joined with rams 15, 27, 32 and 43 days post-partum respectively.

Ewes isolated from the 'ram effect' showed a low level of spontaneous ovulation which increased to a maximum of thirteen percent 52 days post-partum.

The first oestrus was recorded in the seventh week after lambing and was not related to the time of introduction of TW.

INTRODUCTION

The occurrence of oestrus at the commencement of the breeding season following the introduction of rams is well documented (Underwood et al. 1944; Schinckel 1954). If the frequency of lambing is to be increased then fertile oestrus must be induced in the lactating ewe soon after lambing (Hunter 1968).

The introduction of rams to seasonally anovular ewes induces many to ovulate within three days (Oldham et al. 1978). A similar response to the 'ram effect' has been reported in lactating, anovular Prealpes ewes, 21 days after lambing during their normal breeding season (Poindron et al. 1980).

This paper reports an experiment designed to test the hypothesis that the 'ram effect' could be used to induce ovulations in lactating Merino ewes as early as 21 days post-partum in April and hence induce their first oestrus within 17-24 days of introducing rams or 38-45 days of lambing.

MATERIALS AND METHODS

One hundred and seventy five aged Merino ewes in store condition which lambed over a 10-day period in early April 1982 grazed dry pasture residues supplemented with oat grain at a daily rate of 400 grams per ewe at the Allandale Research Farm, Bakers Hill, Western Australia. All ewes suckled single lambs and were isolated from rams by at least 500 metres at all times.

Ewes were allocated to one of five groups, A, B, C, D and E with mean lambing dates of April 9, 11, 13, 15 and 14 respectively. As far as possible the spread of lambing in each group was restricted to three days-

* Dept. Animal Sciences, University of Adelaide, SA

** Dept. Animal Science and Production, University of Western Australia, WA

On April 26 ewes in group B were removed to a paddock 700 metres from the flock and joined with six testosterone treated wethers (TW - Fulkerson et al. 1982) equipped with sire-sine harnesses and crayons. Four days later the number of ewes ovulating and the age of their corpora lutea (CL) were determined by laparoscopy (Oldham et al. 1976) in the ewes of group B and of group A (controls) which remained isolated from the 'ram effect', Ewes were recorded in one of three classes,

1. No CL (anovular)
2. CL <= 4 days old
3. CL > 4 days old

The procedure was repeated with groups C, D and E being joined with TW on May 10, 17 and 27 respectively. In each instance group A remained isolated from the 'ram effect'. Finally group A was joined with TW on June 4 and underwent laparoscopy on June 8.

The ewes marked by the TW and therefore assumed to have been in oestrus were recorded at least each seven days from April 30 to June 30.

RESULTS

In analyzing the data it was assumed that all ewes with CL in Group A were ovulating spontaneously. This included the small proportion with CL <= four days old depicted in the lower regression line in Figure 1. The proportion of ewes in groups B, C, D, and E with CL <= four days is shown in the upper line and by difference the derived regression depicts the true proportion of ewes stimulated to ovulate by the presence of TW in groups B, C, D and E. The derived equation was of the form:

$$Y = 2.1 x - 33.5$$

where Y = the proportion of ewes with "ram" induced ovulations and,

x = the interval (in days) between parturition and laparoscopy.

TABLE 1 The effect of time post-partum of first contact with testosterone treated wethers on occurrence and proportion of ewes exhibiting oestrus

Group	B	C	D	E	A
Day PP of first contact with TW	14	28	35	45	56
Interval TW to first oestrus - days	32	17	10	5	2
Range of oestrus - days PP	49-79	48-78	46-76	50-78	55-82
Ewes exhibiting oestrus† to Day 82 PP - %	50	60	53	69	71

† Differences between groups are not statistically significant

Some lactating ewes, ovulated spontaneously within 19 days of lambing (3/71 ewes in groups A and B had CL > four days old at laparoscopy on April 30). The

proportionshowing spontaneous ovulation increased marginally to 10/76 by 52 days post-partum (groups A and E, laparoscopy May 31). By contrast the dramatic: increase in the responsiveness of anovular ewes to the 'ram effect' is shown in Figure 1.

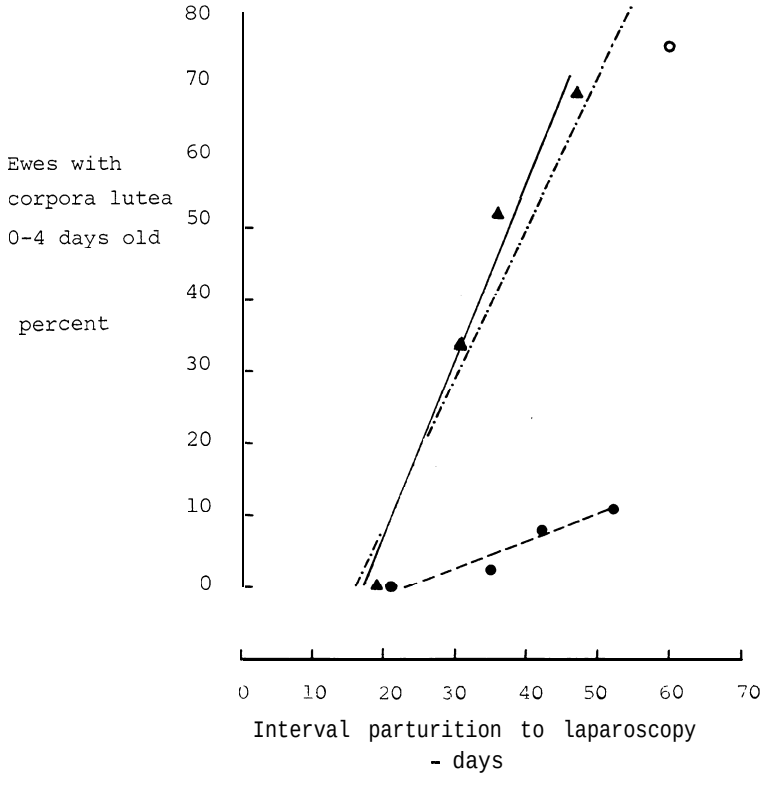

Fig. 1 The effect of interval from parturition on the proportion of ewes with corpora lutea 0-4 days old in groups isolated from males (●) or associated with testosterone treated wethers (A, o) for four days prior to laparoscopy

The increase in the percentage of ewes ovulating four days after introducing TW as the time from lambing increased (0, 35, 52 and 73 for groups B, C, D and E respectively) was not associated with any advance in the onset of oestrus activity or the proportion of ewes exhibiting oestrus by 82 days post-partum (Table 1).

Ewes lambed over the period 5-18 April and oestrus was recorded for 61.1 percent (107/175) of the flock from 31 May to 29 June.

The response of Group A ewes when finally exposed to the "ram effect" and their subsequent level of oestrus activity indicates they were a normal sample of the flock and were unaffected by repeated laparoscopy.

DISCUSSION

This experiment shows conclusively that Merino ewes with a body condition score of approximately 2, suckling a single lamb in April - May experience an extended period of anovulation and anoestrus. Equally it shows that the ability of these ewes to ovulate in response to the 'ram effect' increases dramatically after Day 21 post-partum but this is not associated with any advance in the first occurrence of behavioural oestrus-

Hunter and Van Aarde (1973) studied the influence of lactation, level of' nutrition and presence of rams on the incidence of oestrus in Mutton Merinos lambing in November, March/April or July in South Africa, In their study they concluded that season of lambing was important but that within any one time of lambing the level of nutrition determined when ewes recommenced cyclical oestrus activity. Their experimental design did not allow them to closely follow the ovarian activity of their ewes but they suggested that many ewes ovulated without oestrus for some time before being marked by rams. Our results also strongly suggest this possibility. The absence of oestrus in our study may have been a direct outcome of the low nutritional status of the ewe, the stress of lactation or the entry of some ewes into seasonal anoestrus.

The level of oestrus activity in this study was similar to that reported by Wright et al. (1980) - 61.9% (166/268) for Merino ewes lambing in April-May in South Australia and exposed to rams at either day 1 PP or from 3 June.

Delay in the expression of oestrus may have been a consequence of the lack of an adequate progesterone phase (Robinson 1954). The possible interaction between progesterone conditioning and the 'ram effect' requires investigation if the latter is to be effectively used to induce an early resumption of cyclic activity in the lactating ewe.

ACKNOWLEDGEMENTS

This project received financial support from the Australian Meat Research Committee. We wish to thank J. Beezley, T. Boyes, S. Colgrave, H. Geytenbeek, J. Murtagh and D. Turner for competent sheep handling and technical assistance.

REFERENCES

FULKERSON, W.J., ADAMS, N.R. and GHERARDI, P.B. (1981). Appl. Anim, Ethol. 7: 57.
HUNTER, G.L. (1968). Anim- Breed- Abstr. 36: 347.
HUNTER, G.L. and VAN AARDE, I.M.R. (1973). J. Reprod. Fert. 32: i.
OLDHAM, C.M., KNIGHT, T.W. and LINDSAY, D.R. (1976). Aust. J. Exp. Agric. Anim. Husb. 16: 24.
OLDHAM, C.M., MARTIN, G-B. and KNIGHT; T.W. (1978). Anim. Reprod. Sci. 1: 283.
POINDRON, P., COGNIE, Y., GAYERIE, F., ORGEUR, P., OLDHAM, C.M. and RAVAU'LT, J.P. (1980). Physl. Behav. 25: 227.
ROBINSON, T.J. (1954). J. Endocr. 10: 117.
SCHINCKEL, P.G. (1954). Aust- Vet. J. 30: 189
UNDERWOOD, E.J., SHIER, F-L. and DAVENPORT, N. '(1944). J. Agric. W.A. 11: 135.
WRIGHT, P.J., GEYTENBEEK, P.E., CLARKE, I.J. and FINDLAY, J.K. (1980). J. Reprod. Fert. 60: 171.