

Effect of Ram Introduction on Post-Partum Resumption of Ovarian Activity in Merino and Merino × Ossimi Ewes

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FORTY-NINE ewes ; 23 Merino and 26 crossbreds ; (1/4 Merino, 3/4 Ossimi) were divided randomly into three groups. Ewes in the first group (8 Merinos and 9 crossbreds) were exposed to the ram for only 3 consecutive days starting from the 21st day post-lambing. Those in the second group (8 Merinos and 9 crossbreds) were exposed to the ram for 45 days from the 45th day to 90th day post-lambing. Ewes of the third group (7 Merinos and 8 crossbreds) were not exposed. All ewes were allowed to nurse their lambs during the entire experimental period, except those of the second group where lambs were weaned when they reached 8 weeks of age. Blood progesterone for all ewes was determined by RIA prior to ram introduction through the end of the experiment to monitor ovarian activity.

Ewes of the second group showed a higher ovulation in response to ram introduction than that observed in other groups. Merino ewes in the first group responded to ram introduction more than the crossbreds of that group. Ewes of the third group showed ovarian inactivity throughout the experimental period. In the second group, both Merino and crossbred ewes responded to ram introduction, with percentages of 37.5% and 66.6%, respectively.

In the first group, the Merino ewes that responded to ram introduction (25%) possessed a short lived corpus luteum within 14 days after ram introduction. In the second group, the responding ewes ovulated normally 11 days after being in contact with the ram.

Key words : Sheep, ram effect, ovarian activity, progesterone profile.

The success of ewes to lamb three times per two years depends on the length of post-partum ovulation interval. Several factors affect this period, particularly season of mating and length of nursing period. To get an adequate conception rate under this accelerated lambing system, ewes must ovulate and show oestrus during the first 60 days after lambing. In a previous study carried out by Barghout *et al.* (1986) Merino ewes did not show ovarian activity during the first 60 days post-lambing. Aboul-Naga *et al.* (1985) reported that Merino ewes possessed a very low ovarian activity in spring, which is the period for remating ewes to lamb during January and February. This finding is postulated to the extended length of the post-partum anoestrous period in such ewes, consequently increasing the required service period by more than three months. Furthermore, the common rearing system under Egyptian farm conditions which allows the dams to nurse their lamb for 8 to 10 weeks represents another obstacle for ovarian activity resumption, since suckling has antigonadal action (Hunter, 1968). These two aspects together may decrease the efficiency of this accelerated lambing system in Egypt.

Oldham and Pearce (1983) reported that the introduction of the ram to ewes in the post-partum period may contribute effectively in enhancing the pituitary and ovarian function and consequently shorten the post-partum ovulation interval.

The present work was carried out to test the effect of ram introduction to Merino ewes and their crosses with the subtropical Ossimi (Egyptian breed) on enhancing the ovarian function within 90 days post-partum during the spring mating season.

M a t e r i a l a n d M e t h o d s

Forty-nine ewes (23 Merino and 26 crossbreds, 1/4 Merino, 3/4 Ossimi) gave birth to their lambs during January and February were used in the present work. Animals were housed in a semi-shaded pen and were maintained on a concentrate mixture, rice straw and Egyptian clover (*Trifolium alexandrinum*) according to their live body weight. All ewes were completely isolated from the rams since the preceding mating season.

To study the effect of ram presence on the resumption of the ovarian activity within 90 days post-lambing, ewes were randomly divided into three groups. The first group included 14 ewes (8 Merinos and 9 crossbreds), these ewes were exposed to the ram for only 3 consecutive days starting on the 21st day post-lambing as recommended by Oldham and Pearce (1963) and Folch *et al.* (1985). The second group included 8 Merino and 9 crossbred ewes which were exposed to the ram from day 45 through day 90 post-lambing. The third group, considered as control, comprised 15 ewes (7 Merinos and 8 crossbreds) never exposed to the ram during the experimental period. Ewes of the first and control groups were allowed to nurse their lambs during the entire experimental period (90 days). Lambs of the second group were weaned at 8 weeks of age to simulate the management routine usually practiced on the farm.

Blood samples were collected in all groups two times per week (3-4 days apart) from day 21 post-lambing until the end of the experiment. The samples were collected from the jugular vein without adding any anticoagulant and were incubated at room temperature for 1/2 hour before being centrifuged for serum separation. Serum was kept at -18°C until the hormonal assay was carried out.

Assessment of progesterone was performed by direct radioimmunoassay technique (RIA) using Kits of Diagnostic Products Corp. (DPC) Los Angeles, USA. At approximately 50% binding, the cross reaction of progesterone antiserum was 1% with 11 deoxycorticosterone and below 0.5% with all other steroids. Intra and inter assay coefficients of variation were 3.9% and 9.3%, respectively. The standard curve of progesterone (prepared in male sheep serum) ranged between 0.0 and 20.0 ng/ml. Sensitivity value when assaying 25 ul of serum was 0.27 ng/ml. Ovulation was considered to have occurred when serum progesterone reached 1.0 ng/ml or more and remained at this level for at least two consecutive samples. Ovulation date was estimated by subtracting 3 days from the time at which progesterone concentration reached 1.0 ng/ml.

Results

Joining ram with ewes of group 1 for three consecutive days after the first 3 weeks post-lambing (Fig. 1) induced ovarian response in two Merino ewes out of eight (25%) (no. 14 and 15). Showing ovarian cycles within a period ranging from 1 to 7 days after ram introduction. These cycles were short since the level of progesterone (≥ 1.0 ng/ml) did not stay for more than 2 successive samples before declining again to its basal level. It is worthy to notice that these two Merino ewes, failed to show regular ovarian activity throughout the rest of the experimental period. The other 6 Merino ewes exposed to the ram as well as the 9 crossbred ones in this group (Fig. 1) had a low progesterone level (≤ 0.5 ng/ml) except temporal elevations where the progesterone level ranged from 0.6 to 2.7 ng/ml reflecting no ovarian activity.

In the second group, two Merino ewes (no. 17 and 18) out of eight (25%) and six crossbred ewes out of nine (66.6%) ovulated within 11 days after ram introduction. Serum progesterone of the ewes continued at a high level (1.3 to 4.6 ng/ml) for two weeks reflecting a normal CL. Progesterone concentration declined to basal levels (0.2 ng/ml) until the end of the experiment. The remainder of the ewes did not show any ovarian activity, and no progesterone spikes were observed after ram introduction as occurred in the first group (Fig. 2).

In the control group, where the ram never introduced to the ewes (Fig. 1), no ovulation was observed throughout the 90 days post-lambing period, neither in Merino ewes nor in the crossbreds. Short standing temporary elevations in progesterone level were found, however, the level soon decreased to the basal level (≤ 0.2 ng/ml) in case of three ewes (5, 6 and 8, figure 1).

Discussion

In the present work, the percentage of ewes that ovulated after ram introduction for three days starting on 21 days post-lambing (25%) is less than the 40% reported by Folch *et al.* (1985). Oldham *et al.* (1978) reported that ovulation occurred within 50 hours from ram-ewe contact. For similar treatment of Merino, Martin *et al.* (1980) and Pearce and Oldham (1985) found

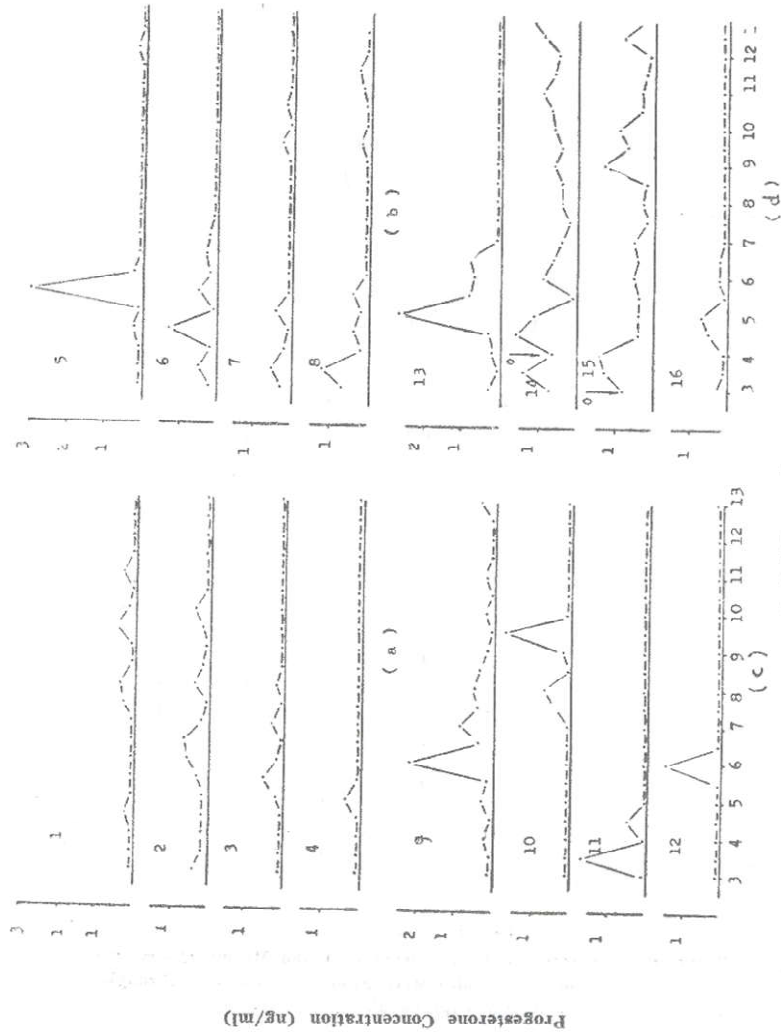


Fig. 1. Progesterone concentration of Merino (a) and Merino x Ossimi crossbred ewes of controlgroup and of Merino (c) and Merino x Ossimi crossbred ewes (d) of those which exposed to the ram for 3 consecutive days throughout the experiment.

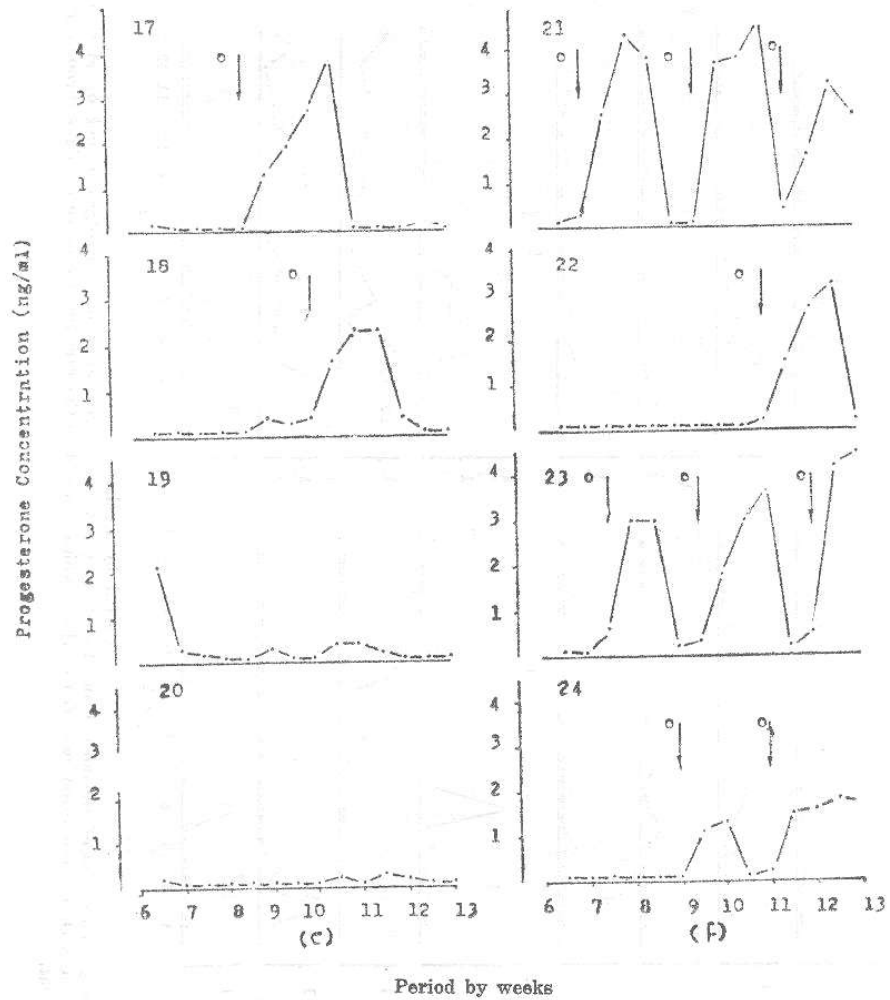


Fig. 2. Progesterone concentration of Merino (e) and Merino Ossimi cross-bred ewes (f) of those which were exposed to the ram throughout. The last 45 days of the experiment.

that introducing ram to anoestrous ewes induced an increase in the frequency of LH pulses followed by a preovulatory LH surge after 11.5-37 hours. This LH surge is expected to cause an early preovulatory increase in progesterone concentration, as found in the present study in the case of Merino ewes no. 14 and 15 (Fig. 1).

The rapid regression of corpora lutea within 5-6 days in most of the cases agrees with that reported by Martin (1979) and Pearce and Oldham (1985). This phenomenon may be due to inadequate follicular development, either because of the low level of the folliculotropic hormone (LH, FSH and oestradiol) or that the follicular phase induced by ram effect is too short (Martin *et al.*, 1986).

In the present study, the inability of ewes to exhibit regular ovarian activity after ram withdrawal, in the first group, may be because the brain has probably returned to the anoestrous condition by reducing the secretion of LH pulses as a response to the decrease in follicular oestradiol (Martin *et al.*, 1986). Oldham and Pearce (1986) suggested that the continuation of ram presence with ewes results in high rates of LH secretion and plays an effective role in therapy of ovulation cessation, the case found in the second group in this study. However, some of the Merino ewes which showed normal ovulation in the second group did not continue to cycle normally although being in contact with the ram for the last 45 days of the experimental period (90 days).

The absence of ovulation in the control group, not exposed to the ram, all through the period of nursing lambs (90 days) confirms the results already obtained by Barghout *et al.* (1986) on the same Merino flock. When suckling period was shortened to 8 weeks (second group) the response of Merino ewes to the ram stimulation was not as efficient as in crossbred ewes. These results clarify that the system of getting three lambing per two years in Merino sheep and their crosses with ossimi is not fully successful. The low ovarian activity in the spring (Aboul-Naga *et al.* 1985) is another handicap of this breeding scheme.

Further studies on the duration of ram-ewe contact and on the effect of reducing the suckling period on post-partum ovarian activity are required to get earlier ovarian function and to segregate the effect of ram and suckling.

References

- Aboul-Naga, A.M., Aboul-Ala, M.B. and Hassan, F. (1985) Oestrous activity of suffolk, Mutton Merino and their crosses with subtropical ossimi sheep. *J. Agric. Sci. Cam.*, **104**, 27.
- Barghout, A.A., Abdelaal, A.E. and Barkawi, A.H. (1986) Progesterone pattern during two months post-lambing in Merino ewes. In : 7th Conference of Animal Production, Cairo, 16-18 September, pp. 382.
- Folch, J., Cognie, Y. and Signorel, J.P. (1985) Use of the ram effect for manipulation of the timing of onset and establishment of regular cycles and pregnancy in the ewe. In : 36th Annual Meeting of European Association for Animal production. Kallithea-Kassandra, Halkidiki, Greece : 30 Sep. 3 Oct.
- Hunter, G.L. (1968) Increasing the frequency of pregnancy in sheep. *Anim. Breed. Abst.*, **36** : 347.
- Martin, G.B. (1979) Ram-induced ovulation in seasonally anovular Merino ewes : Effect of oestradiol on the frequency of ovulation, oestrous and short cycles. *Theriogenology*, **12** : 283
- Martin, G.B., Oldham, C.M., Cognie, Y. and Pearce, D.T. (1966) The physiological response of anovulatory ewes to the introduction of ram. *Live-stock Production Science*, **15**
- Martin, G.B., Oldham, C.M. and Lindsay, D.R. (1980) Increased plasma LH levels in seasonal anovular Merino ewes following the introduction of ram. *Animal Reproduction Science*, **3** : 125.
- Oldham, C.M., Martin, G.B. and Knight, T.W. (1978) Stimulation of seasonally anovular ewes by ram. 1. Time from introduction of rams to the preovulatory LH surge and ovulation. *Animal Reproduction Science*, **1** : 283.
- Oldham, C.M., and Pearce, D.T. (1983) Mechanism of ram effect, *Proceeding of the Australian Society for Reproductive Biology*, **15** : 72.
- Pearce, D.T. and Oldham, C.M. (1985) The ram effect, its mechanism and application to the management of sheep.
- Cited In : *Reproduction in Sheep*, pp. 26-34. Edited by D.R. Lindsay, and D.T. Pearce. Published by Cambridge University Press, England.

تأثير الكباش على الفترة اللازمة لعودة النشاط المبيضي في نماج المرينو وخليط المرينو والاوزيمي

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استخدم في هذه الدراسة ٤٩ نعجة منها ٢٣ مرينو و ٢٦ من خليط المرينو والاوزيمي ($\frac{1}{2}$ مرينو ، $\frac{1}{2}$) وقد قسمت الحيوانات الى ٣ مجاميع . المجموعة الاولى وشملت (٨ نماج مرينو و ٩ نماج خليطة) وقد تم تعريض نماج هذه المجموعة الى الكباش لمدة ٣ ايام متتالية فقط بداية من اليوم ٢١ بعد الولادة والمجموعة الثانية وقد شملت (٨ نماج مرينو و ٩ نماج خليطة) فقد تعرضت للكبش بداية من اليوم ٤٥ بعد الولادة وحتى نهاية التجربة (٩٠ يوم بعد الولادة) اما المجموعة الثالثة وشملت (٧ نماج مرينو و ٨ نماج خليطة) فلم تتعرض للكبش طول فترة التجربة كمجموعة مقارنة . وقد تركت النماج فى المجموعة الاولى والثالثة لترضع صفارها طوال مدة التجربة (٣ شهور بعد الولادة) اما المجموعة الثانية فلم يسمح للنماج برضاعة حملانها اكثر من ٨ اسابيع . وقد تم جمع عينات دم من جميع الحيوانات طول فترة التجربة لتقدير مستوى هرمون البروجسترون فى الدم المحيطى للنماج باستخدام طريقة الناعة الاشعاعية كوسيلة للتعرف على بداية النشاط المبيضى .

تباينت استجابة النماج لتأثير الكباش حيث كانت اعلى نسبة لاستعادة النشاط المبيضى فى المجموعة الثانية ثم الاولى ثم الثالثة على التوالى . وكان للنوع تأثير واضح حيث كانت نسبة الاستجابة للنماج المرينو هى ٢٥% و ٣٧% و صفر% للمجموعة الاولى والثانية والثالثة على التوالى بينما كانت النسبة المقابلة للنماج الخليطة هى صفر% ، ٦٦% ، ٤٠% صفر% على التوالى .