

## RESPONSE OF LACTATING KARAKUL EWES TO TWO LEVELS OF EXOGENOUS ESTRADIOL 17-B ALONG WITH PROGESTERONE AND PREGNANT MARE SERUM (PMS) FOR INDUCTION OF FERTILE ESTRUS AT EARLY POSTPARTUM

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### ABSTRACT

On May 3, 1969, thirty, aged Karakul lactating ewes were allotted into three groups of 10, at an average period of 16 days (range 6 to 30 days) postpartum. The animals in the three groups were treated as follows: Group (I) received seven progesterone injections of 20 mg each on alternate days and one injection of 4.0 mg estradiol 17-B at the time of last injection of progesterone; Group (II) same as group (I) except that they received 8.0 mg of estradiol. Group, (III) control, received no treatment. Two treated groups also received two injections of 1000 IU PMS at 17 days interval, the first one was injected 36 hour after the last progesterone treatment.

Estrous synchronization was very good in the treated groups (100% in group I and 90% in group II) as compared to (30%) in control group, ( $P < .01$ ). There was also a tendency for increasing the lamb crop percentage in the treated groups (70% in group I and 80% in group II) as compared to (40%) in the control group, but the difference was not significant. The results indicate that high induction of estrus with fair fertility could be obtained in spring lambing lactating Karakul ewes, using either the high or the low level of estradiol 17-B along with progesterone and PMS.

### INTRODUCTION

There is limited information concerning the role of endocrines upon reproductive changes following lambing or calving. Injections of cows with both progesterone and

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estradiol after calving tended to decrease the variations of the lengths of postpartum estrus, ovulation and conception (2, 5).

To initiate fertile estrus in lactating anestrus ewes at early postpartum, administration of progesterone, estradiol, and PMS was reported by Hulet and Foote (4), using two levels (.75 mg and 3.0 mg) of estradiol, and their data indicated that high level had better response in fall lambing ewes. The same tendency was observed in the spring lambing ewes, by the use of estradiol, progesterone and two injections of PMS at one estrous cycle interval by Sefidbakht *et al.* (6). They found that a better response was achieved by the high level of estradiol (4.0 mg) as compared to its low level (2.0 mg) although the difference was not statistically significant. Donovan and Van der Werff Ten Bosch (1) reviewed a dose-response relationship between ovarian follicular development and estrogen. They concluded that in laboratory animals the response could be accelerated by an appropriate amount of estrogen when applied either systemically or locally.

The purpose of this work was to study the response of Karakul ewes to two levels of exogenous estradiol when used along with progesterone and PMS for induction of fertile estrus at early postpartum.

#### MATERIALS AND METHODS

Thirty, aged Karakul lactating ewes were allotted into three groups of 10, in such a way that the average postpartum period was approximately equal for all groups (average 16 days, range 6 to 30 days). The following treatments were applied to the different groups on May 3, 1969: Group (I) received seven intramuscular progesterone injections of 20 mg. each on alternate days and one injection of 4 mg. estradiol 17-B at the time of the last injection of progesterone; Group (II), same as group (I), except that they received 8 mg. of estradiol. Group (III) serving as control, received no treatment. Two treated groups also received two injections of 1000 IU PMS. The first dose was administered intramuscularly about 36 hours after the last progesterone injection, and the second dose subcutaneously, 17 days later. Three Karakul rams were placed with the ewes within 12 hours after the first PMS injection. Ewes showing estrus were observed during day time and were recorded by their ear tag numbers. If any incidence of estrus was missed as judged by lambing ewes, conception dates were verified at lambing using gestation period of 150 days. The lambs were weaned at approximately 3 months of age. The data obtained were analyzed by Chi-squares method.

#### RESULTS AND DISCUSSION

The patterns of estrus for the three groups are shown in Table 1. Nine ewes (90%)  
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## RESPONSE OF LACTATING KARAKUL EWES

TABLE 1. SUMMARY OF INDUCTION OF ESTRUS AFTER THE FIRST AND THE SECOND INJECTIONS OF PMS

Group No.	Treatment	No. of ewes per group	% of ewes mating after PMS		Total No. of ewes mated after Both PMS <sup>4</sup>
			Days 1 16-18	Days 1 31-35 <sup>2</sup>	
			New	Return	
I	Progesterone <sup>3</sup> + 4 mg estradiol	10	90	10	100 <sup>a</sup>
II	Progesterone <sup>3</sup> + 8 mg estradiol	10	90	-	90 <sup>b</sup>
III	Control	10	-	30	30 <sup>c</sup>

$$X^2 = 14.5$$

$$df = 2$$

$$(P < .005)$$

1. Starting day of injecting progesterone was considered day 0.
2. In case of control group one ewe showed estrus on day 26, is also included.
3. Seven injections of 20 mg each on alternate days.
4.  $\underline{a}$  vs  $\underline{c}$   $X^2 = 10.7$  ( $P < .005$ )  
 $\underline{b}$  vs  $\underline{c}$   $X^2 = 7.5$  ( $P < .01$ )

in each of the treated groups exhibited estrus by May 20, within 3 days after the first PMS injection. Incidence of estrus was increased in the treated groups as compared to the control group. This result is in agreement with the data obtained by Hulet and Foote (4) and Sefidbakht *et al.* (6), who reported that the incidence of estrus was increased in estradiol treated groups as compared to a control group.

Comparison of the percent of ewes showing estrus in the present experiment (90%) with the collateral group which received 4.0 mg estradiol (18%), as reported by Sefidbakht *et al.* (6) in a previous study, indicates a large difference. The lower estrus incidence in the previous experiment might partly be attributed to the emergency vaccination against foot and mouth disease two days after the first PMS injection, and partly to the seasonal effect. In the present experiment the hormone treatment was started at such a date so that the onset of estrus in the ewes would coincide with the peak of spring seasonal activity, whereas the previous experiment was started 28 days earlier. It must also be considered that in the present experiment the ewes were kept and fed in the barn which might have also been effective in increasing the incidence of estrus.

The sequence of conceptions is shown in Table 2. In both treated groups at the first induced estrus, 3 out of 9 ewes which had shown estrus conceived. In the group receiving high level of estradiol, one ewe lambed twin and one lambed triplet while all the ewes in the group receiving low level of estradiol and the control group lambed single. The multiple births might have been due to the action of high level of estradiol causing follicles responsive to gonadotrophin, as noted by Meyer and Bradbury (3) in rats. It also might be due to the stimulation of follicular growth as a result of the larger dosage of estradiols as reported by Smith and Bradbury (7) in case of hypophysectomized rats.

At the second induced estrous period 2 out of 10 and 1 out of 9 in groups I and II conceived, respectively. At the spontaneous estrus following the second induced estrus one ewe in either of the two treated groups conceived.

There was a tendency for increasing the lamb crop in the treated groups as compared to the control group; but the difference was not significant. The average interval between two lambings was also shorter in the treated groups as compared with the control group; however the difference was not statistically significant.

The data indicated that high induction of estrus with fair fertility could be obtained in lactating spring-lambing Karakul ewes by using either, a low level (4.0 mg) or a high level (8.0 mg) of estradiol 17-B.

## RESPONSE OF LACTATING KARAKUL EWES

TABLE 2. HORMONAL INDUCTION OF FERTILE ESTRUS IN  
LACTATING EWES

Group No.	Treatment	No. of ewes treated	% Ewes lambing during first 9 days of lambing		% of ewes lambing		% Lamb crop		Average lambing date		Average interval between two lambing	
			Treated	Bred	Treated	Bred	Treated	Bred	Mean	S.D.	Mean	S.D.
I	Progesterone + 4 mg estradiol	10	30	33.3	70 <sup>a</sup>	70	70	70	Nov. 4	17.2	201	15.5
II	Progesterone + 8 mg estradiol	10	30	33.3	50	55.5	80	88.8	Oct. 28	18.0	197	13.6
III	Control	10	-	-	40	100	40	100	Nov. 11	7.8	206	15.2

a. One ewe, frightened by cat on August 11, 1970 is excluded.

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