

**EFFECT OF SEASON OF LAMBING AND SUCKLING ON
OVARIAN ACTIVITY AND POST-
PARTUM CONCEPTION**

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ABSTRACT

Two experiments were conducted, under seasonal conditions of fall and spring. For the fall trial (trial I), thirty ewes lambing between November 1 and November 20 were used. They were randomly divided into four groups and treated as follows: Group 1, nursed their lambs for about 48 hours, and laparotomized at 23 days postpartum to observe ovarian activity. Group 2, nursed their lambs as in group 1, but left to be laparotomized at 44 days postpartum. Group 3, reared their lambs for 60 days and laparotomized on the 23rd day postpartum. Group 4, was similar to group 3 in regard to period of nursing the lambs but left to be laparotomized at 44 days postpartum. Since ovarian observations of groups 1 and 3 showed that almost all ewes in both the early and late weaned groups had ovulated, therefore laparotomy at 44 days postpartum was not performed in groups 2 and 4.

For the spring trial (trial II), thirty-seven ewes lambing during May 16 to June 11, were used. They were assigned randomly to four groups and treated similar to trial I, except that due to the low frequency of ovulation at 23 days postpartum, laparotomy was also performed at 44 days postpartum. All ewes in both trials had access to fertile rams 48 hours after lambing.

There were no significant differences among different groups in trial I or trial II, on the interval between parturition and conception; percent of ewes conceived; and percent of ewes ovulated. Comparison of pooled data in trial I and II showed that: the percent of ewes conceived in trial I was higher ($p < 0.001$) than trial II (93.3% vs 16.2%); incidence of postpartum ovulation in fall-lambing ewes also was higher ($p < 0.005$) than in spring-lambing ewes (93.7% vs 35.5%).

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INTRODUCTION

It is suggested that lactation anestrus in ewes becomes shorter if lambing occurs within the breeding season (1, 5, 7). There are also some indications of earlier estrus (1, 7, 10, 11) and higher percentage of conception (2, 5) for ewes whose lambs are weaned early.

Under Bajgah conditions (near Shiraz), 32 out of 39 fall lambing Karakul ewes showed estrus during 8 to 86 days after parturition (11). In the same study the mating of 13 ewes, which exhibited their first estrus between 31 to 40 days postpartum, resulted in 10 conceptions. Since there is evidence that the first visible estrus of the breeding season of sheep is preceded by an ovarian cycle; puberal ovulation (3), aged ewes (4 and 8) and postpartum estrus of fall lambing lactating ewes (9); in the present study it was hypothesized that, there should be some ovarian activity about 15 to 23 days postpartum. This hypothesis was tested experimentally by the number and size of follicles, and corpora lutea (CL) in both right and left ovaries, 23 and 44 days postpartum. The present experiment also investigated the effect of suckling on these phenomena.

In a previous study November and June were shown to be two peaks of breeding activity in the area for Karakul sheep (Makarechian, personal communication, 1964). The present work was also an attempt to study the ovarian activity and first postpartum fertile estrus during these two peaks of reproductive activity in Karakul sheep.

MATERIALS AND METHODS

This study was conducted at Bajgah (Shiraz) which is located at 29° 43'N latitude and at 52° 35' E longitude. The elevation for the area is 1641 meters.

Trial 1, From among a group of ewes which had been bred in the spring of 1970, 30 ewes lambing between November 1 and November 20 were chosen for this trial. They were randomly distributed into four groups so that the average postpartum interval was approximately equal and treated as follows:

- Group 1, eight ewes nursed their lambs for about 48 hours, and were laparotomized at 23 days postpartum.
- Group 2, seven ewes nursed their lambs as in group 1, but were left to be laparotomized at 44 days postpartum.
- Group 3, eight ewes reared their lambs for 60 days and were laparotomized on day 23 postpartum.

Group 4, seven ewes nursed their lambs the same as group 3 but were left to be laparotomized at 44 days postpartum.

Since ovarian observations on groups 1 and 3 showed that almost all ewes in the early and late weaned groups had ovulated, laparotomy at 44 days postpartum was omitted in groups 2 and 4.

Trial II. From among a group of ewes which had been bred in the late fall and early winter, 37 ewes lambing between May 16 and June 11, in 1971 were used for this trial. They were randomly assigned to four groups so that the average postpartum intervals were approximately equal and were treated the same as trial I, except due to the low frequency of ovulation at 23 days postpartum, laparotomy was also performed at 44 days postpartum.

In both trials all ewes had access to fertile rams 48 hours after lambing. This was continued until 80 and 88 days from last lambing in trials I and II, respectively. Date of fertile estrus was estimated at lambing using a gestation length of 150 days.

The ewes were maintained under open shed conditions on a fairly well balanced ration about two weeks before lambing and through the breeding period. At all other times they were maintained on range and fed the by-products of the farm which were occasionally supplemented, if it was considered necessary.

The ewes were not fed about twelve hours before the operation. The ewes were weighed immediately before laparotomy. The incision was made near the midline in front of mammary gland and the ovaries brought to exterior for inspection. The number and size follicles and corpora lutea in both right and left ovaries were recorded during laparotomy.

Statistical analysis involved comparisons within each trial and between trials. Analysis of variance was used to test the effect of treatments on data involving intervals. The Chi-square test was used for data involving frequencies.

RESULTS AND DISCUSSION

Because of similarities in experimental design and procedure, the results of trials I and II are presented jointly in Tables 1 and 2.

Data concerning percent of ewes conceived, interval between parturition and conception in the trials I and II for different groups are shown in Table 1.

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TABLE 1. Mean interval between parturition and conception (days) in fall-lambbed and spring-lambbed (early weaned and late weaned) ewes

Group No.	No. of ewes	Date of parturition		Date of laparotomy		Weight at laparotomy (kg)		Interval between parturition and conception (days)	Ewes lambbed		
		Mean	SD	Mean	SD	Mean	SD				
Trial I (Fall 1970)											
1	8	Nov. 11.	7.8	Dec. 3.	7.8	51.5 ^a	8.4	49	21	7	87.5
2	7	Nov. 10.	10.2	—	—	—	—	43.8	5.8	7	100
3	8	Nov. 14.	5.5	Dec. 7.	5.5	43.6 ^b	3.9	48.8	20.2	7	87.5
4	7	Nov. 14.	5.6	—	—	—	—	53.6	13.7	7	100
Trial II (Spring 1971)											
1	9	May 24.	12.6	June 17.	12.6	49.5	6.9	47.5	—	2	22.2
2	9	May 23.	10.3	July 6.	10.3	53.4	9.8	45	—	1	11.1
3	10	May 25.	11.2	June 18.	11.2	50.4	6.8	52	—	2	20.0
4	9	May 27.	11.2	July 10.	11.2	47.4	4.9	60	—	1	11.1

a. Mean weight of 4 ewes

b. Mean weight of 5 ewes

TABLE 2. Follicular activity in fall-lambed and spring-lambed (early weaned and late weaned) ewes.

Group No.	No. of ewes	Ewes with follicles				Total No. of follicles, CA&CL							
		3-6 ^{mm}	7-10 ^{mm}	Corpus albicans (CA)	Corpus luteum (CL)	3-6 ^{mm}	7-10 ^{mm}	CA	CL				
Trial I (Fall)													
1	8	6	75	5	62.5	7	87.5	8	100	10	5	7	8
2	7	-	-	-	-	-	-	-	-	-	-	-	-
3	8	8	100	3	37.5	6	75.0	7	87.5	13	3	7	8
4	7	-	-	-	-	-	-	-	-	-	-	-	-
Trial II (Spring)													
1	9	8	88.8	5	55.5	5	55.5	4	44.4	11	5	7	4
2	9	9	100	6	66.6	8	88.8	4	44.4	32	8	12	4
3	10	8	80	6	60.0	5	50.0	2	20.0	12	7	5	3
4	9	8	88.8	6	66.6	7	77.7	3	33.3	18	6	7	3

Effect of suckling and season on percentage of conception and interval between parturition and conception. In trial I percentage of ewes conceived in groups 1, 2, 3 and 4 were 87.5% (7/7), 100% (7/7), 87.5% (7/8) and 100% (7/7), respectively. No significant differences were found among these groups. In trial II; 22.2% (2/9), 11.1% (1/9), 20% (2/10) and 11.1% (1/9) in groups 1, 2, 3 and 4 conceived following spring lambing, respectively. There were also no significant differences among these groups. Comparison of pooled data from trials I and II showed a highly significant difference in this respect ($p < 0.001$).

The average intervals between lambing and conception in trial I, were 49.0 ± 21 (range 25-80), 43.8 ± 5.8 (range 37-56), 48.8 ± 20.2 (range 35-79) and 53.6 ± 13.7 (range 40-81) days for groups 1, 2, 3 and 4, respectively. No significant differences were found among these groups. The average intervals in trial II were 47.5 (range 40-55), 45, 52 (range 41-63) and 60 days for group 1, 2, 3 and 4, respectively.

Several reports suggest that suckling probably has an important effect on postponing reproductive activity of ewes (1, 7, 10) and on lowering percentage of conception (2, 5). The results of the present study do not support the above suggestions, since there were no significant differences among groups in either of the two trials with respect to either the interval between parturition and lambing or percentage of ewes conceived. However, the present trials support the results obtained by Wagner and Veenhuizen (12). These differences might be explained on the basis of nutritional status which was fairly good in the trials reported here and *ad lib.* in that of Wagner and Veenhuizen's (12) report.

The data also clearly show that reproductive activity, as judged by percent of ewes conceived following parturition, was significantly higher in fall-lambing ewes than in spring-lambing ewes ($p < 0.001$). This is in agreement with the reports of those investigators (2, 6, 7) who suggested that time of year at which lambs are born might have an important bearing on reproductive activity following lambing.

Effect of suckling and season on follicular activity and incidence of first post-partum ovulation. The follicles were classified as 3-6^{mm}, and 7-10^{mm} in diameter. The 3-6^{mm} follicles were considered as a measure of sub-ovulatory ovarian activity, and 7-10^{mm} as ovulatory size. Results are shown in Table 2.

In trial I significant differences did not occur between proportion of suckling and non-lactating groups bearing follicles in any of the size categories. Since there were also no significant differences in these respects among the 4 groups in trial II, the data from

each trail were pooled for further analysis. No statistical differences were found in the pooled data either.

The frequencies of the first postpartum ovulation are also shown in Table 2. In trial I, 100% (8/8) and 87.5% (7/8) of ewes examined by laparotomy, had ovulated by the 23rd day postpartum as shown by the presence of CL in groups 1 and 3, respectively. The one which had not ovulated at this time had an ovulatory size follicle and when she was checked again 21 days later, the presence of a new corpus albicans (CA) indicated that this ewe had probably ovulated shortly following the first laparotomy. However, excluding this ewe there were no significant differences between suckling and non-lactating ewes in percent of ewes which ovulated in trial I.

Considering ovulation in trial II; 44.4% (4/9), 44.4% (4/9), 20% (2/10) and 33.3% (3/9) had ovulated in groups 1, 2, 3 and 4, respectively. Since there were no significant differences in percent of ewes ovulated among the 4-groups, the data were pooled [35.1%; (13/37)] in order to be compared with pooled data in trial I, [93.7%; (15/16)]. Incidence of postpartum ovulation was higher ($p < 0.005$) in fall-lambded ewes as compared with spring-lambded ewes. The occurrence of ovulation in trial I, however, automatically reduced the number of follicles that had developed in the fall-lambded ewes. Therefore, if those ovulating follicles were also considered it may be suggested that follicular activity was also higher in fall-lambded ewes.

The higher percentage of conception in trial I, may also be related to higher follicular activity resulting in higher incidence of early postpartum ovulations, which facilitate expression of estrus at the subsequent ovulations (4, 8, 9).

The results of this experiment suggest possibilities of rebreeding at the early postpartum of fall-lambded ewes, for the production of more than one lamb crop per year in this area.

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