

## Resumption of Ovarian Cyclicity During Postpartum in Winter-Lambing Ouled Djellal Ewes in Algerian Semi-Arid Area

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**Abstract:** The objective of the present study was to determine the time of postpartum ovarian cyclicity resumption in ewe using serum progesterone assay. Five multiparous, suckling Ouled Djellal ewes lambing in the winter were used in this study. Ovarian cyclicity resumption was monitored by measuring serum progesterone levels weekly starting one week postpartum for ten week period. Blood samples were collected for analysis of serum progesterone using ELISA test. The results obtained in this study showed that the first rise of the mean progesterone level greater than 1ng/ml was appeared at sixth week post lambing and the postpartum anoestrus interval differs between individual ewes. In one of the five ewes studied until tenth week, ovulation (first progesterone increase) did not occur. In conclusion, progesterone levels showed that there was cyclic ovarian activity resumption soon after lambing in winter-lambing Ouled Djellal ewes indicating that Ouled Djellal ewe's reproduction in semi-arid area tends to be non-seasonal.

**Key words:** Algeria • Ouled Djellal ewe • Non-seasonal • Ovarian activity resumption • Postpartum anoestrus • Progesterone

### INTRODUCTION

In Algeria, sheep raising is concentrated in the steppe. The Ouled Djellal (OD) breed is the most dominant in this region representing nearly 60% of the 19.6 million heads [1-3]. Breeding season of OD breed extends from early April to the end of November, with greater concentration between June and August [4].

All farm animals undergo a period following parturition when they are not in a position to become pregnant. The delay in resuming reproductive activity is nature's way of ensuring that the mother has sufficient resources to meet her own needs and those of her new born offspring [5]. The postpartum period is characterized by uterine involution and restoration of ovarian functions, since both should occur to establish a new pregnancy [6]. The ability to achieve maximum reproductive efficiency in ewes depends upon understanding postpartum changes of uterus and ovaries [7].

Several factors influence the resumption of ovarian activity in postpartum ewes, such as the lambing season, lactation, frequency and intensity of suckling, nutrition and breed [8].

Blood concentration of progesterone is a good indicator of luteal function during the postpartum period since progesterone is the major steroid synthesized by the corpus luteum [9]. The physiological status (anovulatory anoestrus, ovulatory cycles, pregnancy) of females of the main species of farm animals can easily be defined by analysis of progesterone in blood (or milk) samples [10]. It has also been shown that progesterone secretion is affected by the stage of the ovulatory season in ewes, with higher serum progesterone concentrations detected in the middle than at the beginning or end of the season [11, 12].

The objective of this study is to determine the time of cyclic ovarian activity resumption during postpartum in winter-lambing Ouled Djellal ewe.

## MATERIALS AND METHODS

**Animals:** This trial was carried out in Tarmount town department of Msila (north-central Algeria with a Mediterranean climate type continental semi-arid, latitude 35° 49' N, longitude 4° 17' W and altitude 586m). Five clinically healthy multiparous Ouled Djellal ewes lambed during the winter (December) were used (3-4 years old /weighing between 40-50 kg) without any gynecological diseases, free from internal and external parasites, kept on one farm and each ewe was suckling one lamb. The present study was performed during the seasonal anoestrus for ewes, which extends from December to March [4]. During the trial, all ewes were kept under natural photoperiod and ambient temperature. Ewes were allowed to drink and to feed freely, the ration consisted of hay and concentrate throughout the experiment period.

**Blood Sampling and Hormonal Analysis:** Blood samples (5 ml) were taken weekly by jugular venipuncture into vacutainers starting one week postpartum for ten weeks (December -February). The samples were centrifuged for 10 min at 2000×g, the serum was aspirated and frozen at -20°C, until assayed. Concentrations of progesterone were measured by ELISA test.

**Statistical Analysis:** Data were presented as the means (±S.D) and to find the mean and the standard deviation for each week, we used SPSS 20.

## RESULTS AND DISCUSSION

The obtained results are resumed in the following table and graph.

Many research works studied the postpartum resumption of ovarian cyclicity and the variation in estrous seasonality in temperate areas [13-15]. However there is lack of information with regard to semi-arid areas.

It is well known that systemic progesterone concentrations greater than 1ng/ml are associated with presence of a corpus luteum [9, 10, 16] or a luteinized follicle [9]. According to Thimonier, [10] an interval of 7 to 11 days between two blood samples allows to characterize the physiological state of most females of domestic species.

The obtained results in individual ewes showed that 80% (n=5) of the ewes showed an ovarian activity determined by elevated progesterone level more than 1ng/ml during 10 weeks post lambing. However, 20%

(n=5) did not show any ovarian activity during the same period (Table 1). According to the observations of Gonzalez et al. [17] cited by Hayder and Ali, [16] follicles are present on the ovaries in the majority of ewes 10 days postpartum and corpora lutea were observed in 67% and 75% of the ewes by day 20 and day 30 postpartum, respectively.

As shown in Figure 1, the mean progesterone level started to increase (more than 1ng/ml) at 6<sup>th</sup> week. However, Medan and El-Daek, [6] found that the mean progesterone level started to increase at 117<sup>th</sup> and at 94<sup>th</sup> day in Barbary ewes that lambed during January and February respectively. According to Mukasa-Mugerwa and Ezaz, [18] in Menz ewes, the mean post-partum anoestrus interval was 76.1 days. In sheep and goats originating from high and mid-latitudes that exhibit seasonality in their reproductive activity, the length of postpartum anoestrus also depends on the time of year of parturition [5].

The prolonged postpartum anoestrus interval in winter-lambing Ouled Djellal ewes could be due to an overlapping of postpartum and seasonal anoestrus. According to Lahlou-Kassi, [19] in North African breeds, all breeds except D'Man and Rahmani have a prolonged breeding season, generally from May to January (240 to 300 days). The anoestrus season lasts from February to April. According to Madani et al. [4] and Benyounes and Lamrani, [20] the anoestrus season of Ouled Djellal ewe extends from December to March and from February to June respectively.

The current study showed that the duration between parturition and resumption of ovarian activity differs between individual ewes, this could be explained by own effect of each animal on the hypothalamic-pituitary-ovarian-uterine axis. Several factors involved in the postpartum anoestrus interval including time of uterine involution and delay of restoration of ovarian function [15]. According to Kiracofe, [21] cited by Hayder and Ali, [16] uterine involution is not a fertility barrier in ewes up to five to six weeks postpartum unless the process is delayed due to inflammation or infection. Clarke et al. [13] and Rubianes and Ungerfeld, [15] found that the basis of acyclicity in postpartum ewes is probably due to their inability to generate LH pulse frequencies similar to that in the follicular phase of the estrous cycle. According to Hanzen, [22] in cow, the pulsatile release of LH and GnRH and the pituitary sensitivity to GnRH increase gradually after calving. They are inhibited by suckling, which acts more on LH and GnRH release than on their synthesis.

Table 1: Variations of postpartum progesterone levels in individual ewes

P <sub>4</sub> * (ng/ml)										
Postpartum (weeks)	1	2	3	4	5	6	7	8	9	10
Ewe 1	0.25	0.45	0.62	0.45	0.91	0.67	0.46	0.70	0.80	0.89
Ewe 2	0.33	1.07	0.86	0.57	0.71	0.8	1.54	0.26	1.17	4.05
Ewe 3	0.53	0.50	0.62	0.60	0.87	0.83	1.36	1.31	1.49	1.80
Ewe 4	0.86	0.57	1.28	0.42	0.60	0.60	0.68	0.84	0.72	0.37
Ewe 5	1.44	1.54	1.48	1.79	0.90	3.75	0.99	1.61	0.66	0.62
Average of P <sub>4</sub>	0.68±0.48	0.82±0.46	0.97±0.39	0.76±0.57	0.79±0.13	1.33±1.35	1.00±0.45	0.94±0.52	0.96±0.35	1.54±1.5

\*P<sub>4</sub>: Progesterone

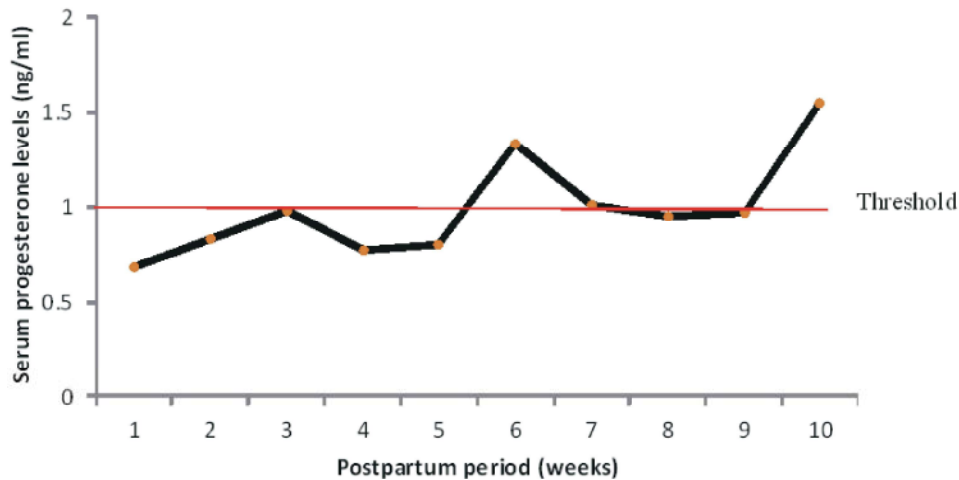


Fig. 1: Mean progesterone levels in postpartum ewes

Poor body condition inhibits the secretion of pituitary LH or reduces its pulse frequency [23]. Elevated milk yields at the beginning of lactation may delay luteal function, due to a negative energy balance [16].

According to Pope *et al.* [24] cited by Medan and El-Daek, [6] indicated that there are large breed differences on the extent of the postpartum anoestrus prior to a fertile estrous, reflecting a strong genetic component in addition to seasonal influences.

### CONCLUSION

These findings indicated that there is a resumption of ovarian activity during postpartum in winter-lambing Ouled Djellal ewes and this breed returned to reproduction also in seasonal anoestrus. Future trials will be conducted to corroborate these findings and to determine whether the duration of postpartum anoestrus in Ouled Djellal ewes is influenced by the time of year when parturition occurs.

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