



# ULTRASONOGRAPHIC EVALUATION OF UTERINE INVOLUTION AND POST-PARTUM RESUMPTION OF CYCLICITY IN ATTAPPADY BLACK DOES

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## Abstract

*With the objective of studying uterine involution and resumption of first post-partum cyclicity in Attappadi Black does, transrectal B-mode ultrasonography was performed on alternate days from day seven post-partum onwards. The mean number of days required for involution of uterus and cervix in the present study was 27 and 17 post-partum respectively. The mean±SE day of first post-partum ovulation was observed as 45.15±2.66.*

**Key words:** Attappady Black does, Post-partum, Uterine involution, Ultrasonography, resumption of cyclicity, Progesterone

Attappady Black goats are an endangered breed of goat native to Kerala and mainly seen in Attappady hills of Western Ghats of Palakkad district. The goats are known for their valuable meat and skin. This district is home to the Irula, Muduka and Kurumba tribal communities, whose economy is mainly dependant on rearing of these goats along with few other agricultural activities. Even though poor milk producers these animals are reared mainly by women and elderly for meat and manure. The animals are resistant to most of

the diseases and can survive under relatively simple and extensive production system with a low level of managerial skills. Since no scientific data regarding post-partum reproductive performance of this breed is available, the present study was designed to evaluate and characterize the follicular dynamics and resumption of postpartum ovarian activity in this breed.

## Materials and methods

Thirteen pluriparous (parity 2-4) Attappady black does, in their last month of gestation with a body condition score of 2.5-3.5 (AIGR,2013) and weighing 35-40 kg were selected from University Sheep and Goat Farm, Mannuthy for the study.

Examinations of cervix and uterus were performed by transrectal B-mode ultrasonography on alternate days from day 7 post-partum using ultrasound scanner (Mylab Gamma, Esaote SpA, Italy) equipped with 5-10 MHz frequency linear array trans-rectal transducer (SV3513, Esaote Eyrope B.V, Netherland).

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On ultrasonography the cervix was more echogenic than vagina due to its fibrous composition. The uterus was a muscular structure that gave a grey image on screen. Follicles were detected as black anaechoic circumscribed area (Griffin and Ginther, 1992) and the corpora lutea were detected as hypoechoic grey structures with poorly distinct borders.

Transverse diameter of the uterine horns and cervix were recorded for determining post partum involution of uterus and cervix. Serial examinations were done till no further significant reduction in diameter of uterus and cervix was observed in two consecutive examinations.

The onset of follicular wave was identified by first observation of at least one follicle with a diameter of more than or equal to 3 mm, followed by a growing follicular wave resulting in a follicle with a minimal diameter of 5mm in the following 3 day period (plate 5). The disappearance of follicle of diameter 5 mm or more, detected in the previous ultrasound examination was considered as day of ovulation.

The serum progesterone level in the serum samples were analysed by competitive enzyme linked immuno sorbent assay (ELISA) using commercial ELISA kits (Pathozyme Progesterone, Omega Diagnostics Ltd.). The kit is designed for the quantitative analysis of total progesterone in human serum or plasma and consists of 96 wells coated with goat anti rabbit IgG.

Data were expressed as mean $\pm$ SD and time of uterine involution was assessed by repeated measures using SPSS Software version 1. A P value of < 0.001 was considered to be statistically significant.

## Result and discussion

### Involution of Cervix

In the present study, a significant reduction in diameter of cervix was observed as days progressed until day 17, beyond which

**Table 1.** Diameter of Uterine horns and Cervix in Attappady black does from day 7 to 29 post-partum as observed by transrectal B-mode ultrasonography

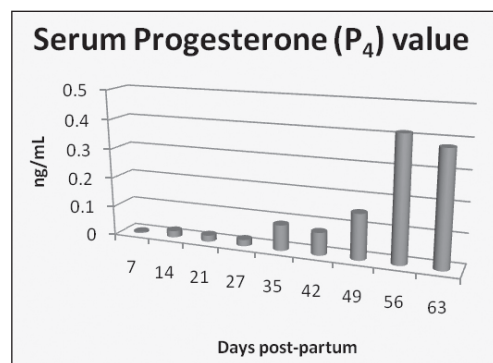
Days postpartum	Uterine horn diameter (mm) Mean $\pm$ SE	Diameter of Cervix(mm) Mean $\pm$ SE
7	32.29 $\pm$ 0.58 <sup>A</sup>	18.84 $\pm$ 0.16 <sup>a</sup>
9	28.25 $\pm$ 0.63 <sup>B</sup>	17.06 $\pm$ 0.19 <sup>b</sup>
11	24.45 $\pm$ 0.58 <sup>C</sup>	15.86 $\pm$ 0.21 <sup>c</sup>
13	20.72 $\pm$ 0.54 <sup>D</sup>	15.08 $\pm$ 0.22 <sup>d</sup>
15	18.35 $\pm$ 0.49 <sup>E</sup>	14.39 $\pm$ 0.20 <sup>e</sup>
17	16.42 $\pm$ 0.36 <sup>F</sup>	13.92 $\pm$ 0.20 <sup>f</sup>
19	15.11 $\pm$ 0.31 <sup>G</sup>	13.63 $\pm$ 0.18 <sup>f</sup>
21	14.18 $\pm$ 0.31 <sup>H</sup>	13.52 $\pm$ 0.17 <sup>f</sup>
23	13.27 $\pm$ 0.28 <sup>I</sup>	13.51 $\pm$ 0.19 <sup>f</sup>
25	12.82 $\pm$ 0.24 <sup>J</sup>	
27	12.39 $\pm$ 0.23 <sup>K</sup>	
29	12.21 $\pm$ 0.22 <sup>K</sup>	

Means with different superscripts within a column differ significantly (P<0.001)

there was no further significant reduction (Plate 1 & Plate 2). Hence the earliest day by which involution of cervix was completed observed as day 17 post-partum. Similar results were reported in a slaughter study of Boer goats by Greyling and Van Niekerk (1991) who found that the external diameter of the cervix was 2.0 cm on day 4 post-partum and attained complete theoretical reduction on mean days 20.7 after kidding.

### Uterine involution

In the present study, the mean time required for complete involution of uterus in Attappady black does was 27 days. The



**Fig1** Post-partum serum progesterone level in Attappady Black goats (n=13)

statistical analysis of the data showed that uterine diameter had significantly decreased from day 7 to day 27 post-partum, (Plate 3 & Plate 4) but thereafter the reduction was not significant (Table 1). The present study was in agreement with the findings of Greyling (2000) in Boer goats who reported that uterine involution was completed by day 28 after parturition. However, it was slightly higher as compared to the values reported by Ababneh and Degefa (2005) in Balady goats (19 days) and by Badawi *et al.* (2014) in Nubian goats ( $22 \pm 3.3$  days). The observed difference could be due to the multiple factors such as parity, lactation status, nutrition, breed and season.

In this study, rapid reduction in diameter of uterus was noticed upto day 13 post-partum, beyond which reduction was in a steady state. Similarly, Badawi *et al.* (2014), in Nubian goats, found that that 50 per cent of reduction in uterine diameter had been attained within two weeks after kidding. However most of the researchers recorded that a rapid reduction in diameter of uterus takes place during the first week post-partum (Hussain *et al.*, 2016; Ioannidi *et al.*, 2017). The variation could be attributed to parity, lactational status, breed, environment and nutritional status of these animals.

The complete uterine involution in the present study was recorded when no further reduction in the uterine diameter was observed for two consecutive ultrasound observations and absence of luminal fluid (plate2). The course of uterine regression followed a decreasing logarithmic scale, as observed in

uterine involution in the Sahelian goats of West Africa (Zongo *et al.*, 2014).

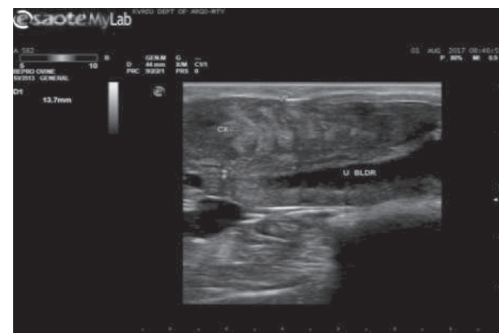


Plate 2 Cervix-Day17



Plate 3 Uterus-Day 7

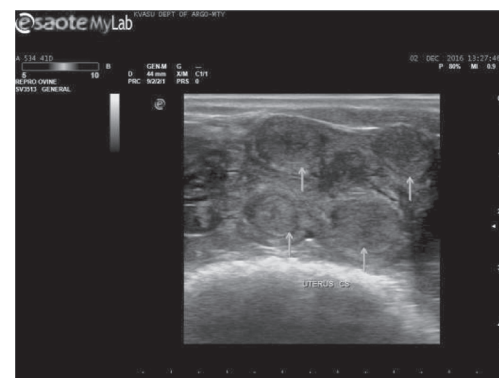


Plate 4 Uterus-day 27



Plate1 Cervix-Day 7

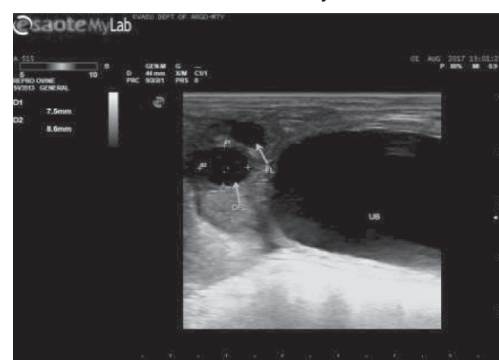


Plate 5 Dominant follicle in ovary

### **Follicular activity in puerperium**

Follicles of size between 2 to 4 mm were present on day 7 itself, however they did not attain a size more than 5mm and the mean day of emergence of first follicular wave was 29.15, varied between 21-39 days. Similarly Zongo *et al.* (2015) reported that, in West African Sahelian goats the ovarian activity started on first week after kidding itself but emergence of first wave occurred later.

Out of thirteen does, eight (61.54 per cent) showed a three wave pattern of follicular development during early post-partum period. However, five out of thirteen goats (38.46 per cent) showed short cycles. This was similar to the findings of Freitas *et al.* (2004), who reported that the first post-partum oestrous cycle was observed as abnormal and characterized by short cycles in Anglo-Nubian and Saanen goats.

In this study, the mean duration of short cycle was 8.4 days (7-11 days) which ovulated from wave one. Similar results were reported by Camp *et al.* (1983) and Simoes *et al.* (2006) who reported that the average duration of short cycles was  $6.51 \pm 0.50$  days (3-15 days) in Nubian does and 5-11 days in Serrana does respectively.

The occurrence of short cycle in the present study could be due to premature regression of corpora lutea as observed by Simoes *et al.* (2006). However, in these animals the second cycle was of normal duration.

### **First post-partum ovulation**

Mean day of first post-partum ovulation was  $45.15 \pm 2.66$ , which varied from 31 to 61, This finding was in agreement with Rubianes and Ungerfield (1993) who observed that the first post-partum ovulation occurred after 18 to 25 days of kidding in Corridale ewes

### **Progesterone profile**

The mean progesterone value was at basal level on first week post-partum ( $0.05 \pm 0.004$  ng/mL) and showed a progressive

increase to reach a maximum level on eighth week ( $1.94 \pm 0.42$  ng/mL), indicating resumption of post-partum ovarian cyclicity ( Fig 1) This result was in general agreement with Hussain *et al.* (2016) who reported that, progesterone concentration remained at basal levels in postpartum anoestrous period and showed an increase with resumption of post-partum cyclicity in goats.

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