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MS and RK conceived the study; MS and RK designed the study; MS analysed data; MS wrote the manuscript; RK revised the paper.

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Resumption of Ovarian Cyclicity in Postpartum Beetal X Dwarf Goats

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Abstract:

The resumption of postpartum (pp) ovarian activity was assessed based on serum progesterone (P₄) concentration and reproductive behavior in crossbred (Beetal x Dwarf) goats. Fourteen multiparous goats were observed for evident reproductive activities, such as placental expulsion, lochia clearance, tightness of the sacrosciatic ligament, restoration of ovarian activity, and the onset of the first pp ovulation immediately after parturition. For P₄ analysis, serum samples were obtained every third day till day 60 pp. A fertile buck was used to confirm the commencement of estrus in pp goats. The average duration of fetal membrane expulsion was 118.5 ± 66.7 mins. On day 3.4 ± 1.08, the sacrosciatic ligament underwent full constriction. Lochia was cleared entirely in 4.9 ± 3.8 days pp. Twenty-one percent of the goats had estrus signs preceding to ovulation at a mean interval of 50.6 ± 1.5 days, whilst the other goats ovulated silently (no estrus signs) within 60 days. Concentration of serum P_4 depicted that ovarian cyclicity restarted on day 55.9 ± 5.7 pp. On days 12, 24, and 30, three P₄ peaks were observed prior to ovulation. Moreover, the average baseline and peak P₄ concentrations were 0.62 and 3.15 ng/ml, respectively. According to our investigation, normally the pp for Beetal x Dwarf goats under the conventional faming conditions is not more than two months.



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INTRODUCTION

Goat farming is a comparatively unpretentious, easy-to-manage, and low-input business. The majority of Pakistani farmers are landless and may simply opt goat farming to meet their financial necessities (Muhammad et al., 2015). Unfortunately, our traditional farming system is inefficient and low-yielding, making it impossible to meet rising market needs. In order to fulfill the escalating demand for mutton, the goat farming must switch from conventional to intensive system. Similarly, to bridge the demand-supply gap, it is necessary to adopt an accelerated kidding program (Ahmad et al., 2014). However, long kidding interval is the most infamous limitation affecting the reproductive performance of local goats (Kausar et al., 2009). Accelerated kidding may be achieved in goats by using hormonal strategies various (estrus synchronization) during postpartum (pp) anestrous (Schneider and Stanko, 2005). A shorter gap between consecutive parturitions is crucial to achieve optimum reproductive performance from does (Greyling, 2000). Similarly, identifying the right goat for the programme and knowing how its reproductive characteristics function are also essential for accelerated kidding to succeed.

Crossing Beetal and Dwarf goat breeds resulted in acceptable prolificacy and production enabling sustainable characteristics goat production (Moaeen-ud-Din et al., 2006). Due to its dual characteristics, this crossbred goat may be a promising option for accelerated kidding. Furthermore, timely detection of ovarian cyclicity in Beetal x Dwarf goats may enable early rebreeding of does and decrease the gap between two consecutive parturitions, hence increasing the number of kids born each year. Re-establishment of pregnancy after kidding is contingent upon the normalization of the reproductive tract's anatomy and function (involution). However, there has been inadequate research on the reproductive aspects of the Beetal х Dwarf doat. Progesterone (P₄) is effectively used as a hormonal probe to determine the ovarian activity or reproductive status of animals (Khanum et al., 2008). The serum P₄ level stays below 1 ng/ml throughout the pp anestrous phase, but quickly rises following ovulation (Khanum et al., 2007). Till now, limited studies have been undertaken in Pakistani goats to investigate pp anestrous by P₄ hormonal detection. Proper exploitation of techniques mav aid endocrine in the comprehension of the different reproductive aspects in Beetal x Dwarf goat. Consequently, the present research was planned to estimate the normal pp anestrous interval in native crossbred (Beetal x Dwarf) goats using P_4 hormone estimation within the context of the local farming practices. The findings will help in the development of a successful management plan for the reproductive success of this profitable goat.

MATERIALS AND METHODS

Fourteen pre-partum, pluriparous goats having more than 2.5 body condition score (BCS 1-5 scale) were randomly selected from the herd maintained at NIAB, Faisalabad farm (31°23'43.9"N 73°02'11.7"E) during October to December. Goats grazed on seasonal grasses and fodder like Trifolium Alexandrium. They were also provided with common crop residues like pulses, wheat and oat grain mixture etc. The feeding regimen was kept traditional to provide the field conditions as per practiced by local Soon after parturition, goats were farmers. observed continuously after a regular interval. Borne kids were allowed to suckle their dams freely. Furthermore, fetal membrane expulsion time was observed in each goat shortly after parturition. Likewise, time for sacrosciatic ligament constriction and lochia clearance were visually recorded on every third day up to day 60 pp. A fertile buck was introduced every day for four hours to detect the onset of estrus in goats. Blood samples were collected for P₄ hormone analysis on every third day till day 60th of pp period. Blood samples were collected in uncoated, clear glass tubes and serum separation was performed at room temperature. The serum samples were centrifuged at 2000 x g for 10 min and then kept frozen at -20 ° C until analysis. Moreover, the serum P₄ concentration was determined using solid-phase

radioimmunoassay kits (Beckman Coulter, Inc). The intra and inter assay coefficient of variance (CV) were $\leq 11.2\%$ and $\leq 7.2\%$ respectively, whereas the analytical sensitivity of the assay was 0.03 ng/ml.

Statistical analysis

All the data were arranged using Microsoft[®] Excel office 2007. Statistical Package for the Social Sciences (SPSS) version 18 was used to analyze the data. In addition, results were displayed as mean \pm standard deviation (m \pm SD). The average P₄ level with standard error bar relative to the pp days was shown graphically.

118.5 ± 66.7 min post parturition. Complete constriction of the sacrosciatic ligament was palpated on day 3.4 ± 1.08. Complete expulsion of blood tinged vaginal discharge (lochia) observed on day 4.9 ± 3.8. Furthermore, the appearance clear vaginal mucus discharge was noticed on days 12.2 ± 6.7. Among the experimental animals, 21 % of goats showed visual estrus signs on an average interval of 50.6 ± 1.5 days, whereas the remaining did not show visual estrus signs within 60 days postpartum. Analysis of serum P4 revealed that ovarian cyclicity resumed on day 55.9 ± 5.7 , where the mean P₄ level was raised above 1 ng/ml as an indicator of first pp ovulation (Figure 1). Three P₄ peaks were observed on days 12, 24 and 30 pp (figure). The basal level and peak P₄ concentrations were 0.62 and 3.15 ng/ ml, respectively.

RESULTS

Referring to the table 1; the mean fetal membranes expulsion time was observed as

Table 1. Resumption of postpartum ovarian cyclicity in Beetal x Dwarf goats.

Parameters	Mean ± SE	Range
No of goats (n)	14	
Fetal membranes expulsion (h)	1.9 ± 1.1	0.75 - 4
Fetal membranes expulsion (min)	118.5 ± 66.7	45-240
Sacrosciatic ligament constriction (d)	3.4 ± 1.08	3 - 6
Lochia clearance (d)	4.9 ± 3.8	3 - 15
Vaginal mucus appearance (d)	12.2 ± 6.7	3 - 27
Goats showed visual estrus till 60 days (%)	21	3/14
Onset of visual estrus (d)	50.6 ± 1.5	49 - 52
Raise in progesterone level above 1ng/ml (d)	55.9 ± 5.7	42 - 60

Values are mean ± S. D



Fig. 1. Serum progesterone concentration during the postpartum period in Beetal x Dwarf goats (mean ± SE).

DISCUSSION

Pertinent pp events include placental expulsion, vaginal discharge transformation, tightening of sacrosciatic ligament, resumption of ovarian activity, and commencement of first pp estrous cycle. Due to the paucity of knowledge about these events, our preliminary investigation may aid in understanding pp reproductive cyclicity in the Beetal x Dwarf crossbred goat. Our findings suggest that the average length of placenta expulsion was 118.5 ± 66.7 min pp. Other research on the Beetal goat and its crosses with Alpine and Saanen goats demonstrated the expulsion time as 149 mins (Das and Tomer, 1997). In Jampuri goat, it is around 144 mins (Hassan et al., 2010) and 33.5 to 158 minutes in Norduz goats, as described by Yilmaz et al. (Yilmaz et al., 2012). Lochia is consistently expelled out shortly after parturition owing to uterine contractions. According to our research results, lochia in this goat was eliminated between days 3 and 15 pp. Comparable interval has been found by macroscopic (Degefa, 2003) and ultrasonographic observations in Balady goats (Ababneh and Degefa, 2005). Serum P_4 level exceeding 1 ng/ml is a very well indicator of pp anestrous termination or ovulation induction (Berardinelli et al., 2001). Based upon serum P₄ pp ovulation was recorded on 55.9 ± 5.7 days, while in previous studies on Dwarf goats at same farm was reported on 27.9 ± 14 days pp (Khanum et al.,, 2007). Numerous breeds adopted different pp anestrous intervals, such as the Black Bengal goat exhibits 60 days (Rehman, 1977), and 84 days in West African Dwarf goat (Otchere and Nimo, 1975), 68-172 davs in Saanen and Toggenburg goats (Carmenate, 1977), whereas, the Katjang goat has 89 - 106 days (Banomathi, 1981). Based on the investigation, it has been shown that the timing of the first pp ovulation or the end of the pp anestrus phase relies on several variables. including environmental and genetic factors (Pope et al., 1989). The variation may be attributable to a negative energy balance during early pp, which delays the first ovulation (Butler, 2000). Consequently, variance in pp ovulation may be consistent with the notion that various breeds have differing energy demands. In this investigation, the first pp estrus was recorded on day 50.6 \pm 1.5, which was comparable to the Jamunapari goat's reported as 50.9 days by Hassan et al., (Hassan et al., 2010). The visual signs are equally vital for detecting estrus on the farm. In our research, just 21% of goats had visible estrus signs, while the rest ovulated silently. This result demonstrated that after 50 days postpartum, Beetal x Dwarf crossbred goats became naturally cyclic to bear their next pregnancy under conventional farming conditions. The absence of behavioural estrus and silent ovulation may result from insufficient ovarian steroid production or the absence of a P₄-secreting corpus luteum following parturition (Ascari et al., 2016). Lowered P₄ peaks before the active peaks were detected, which may be linked to short living luteal tissues (Donaldson et al., 1970; Troxel et al., 1984). It has been theorized that the limited secretion of GnRH and LH and the low number of LH receptors on follicles are accountable for the short life span of luteal tissues during early pp (Troxel and Kesler, 1984; Troxel et al., 1984). This result agrees with existing literatures on pigs, sheep, and goats with the low level of P_4 during the early pp periods (Gereš, 2000; Kawu et al., 2007; Mukasa-Mugerwa and Viviani, 1992).

CONCLUSION

On the basis of existing evidence, it can be inferred that under the traditional farming system, pp in Beetal x Dwarf crossbred goats does not exceed two months (42 - 60 days). These results will also aid with the early pp breeding plans for this crossbred goat. Further research is required to reduce this gap by using various hormonal or dietary techniques for accelerated kidding.

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CONFLICT OF INTEREST

Authors declare have no conflicts of interest.

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