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SHORT COMMUNICATION

Ovarian Follicular Dynamics around Estrus in Beetal and Teddy Goats

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ABSTRACT

Due to higher fecundity rate over Beetal goats, it is assumed that Teddy goats have higher ovarian activity. Therefore, the current study tested the hypothesis that ovarian follicular population i.e. number of small (2-4 mm), medium (>4-6 mm) and large follicles (>6 mm), size of the ovulatory follicle, and ovulation rate (No. of CL/No of ovulated goats), using transrectal ultrasonography are different between Beetal and Teddy goats of Pakistani origin. Beetal (n=6) and Teddy (n=8) does were synchronized using double PGF2a injections 10 d apart and were scanned on Days -2, 0 (estrus) and +2. The onset of estrus was assessed by aproned bucks. Mean number of small follicles were higher ($P<0.05$) in Beetal goats, compared to Teddy goats, on days -2, estrus and +2. The ovulatory follicle diameter, and ovulation rate were found non-significant between Beetal and Teddy goats. It is concluded that Beetal goats have greater population of small follicles around estrus compared to Teddy goats. Future studies can be based on the follicle recruitment and atretic factors in Beetal goats to enhance the production.

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INTRODUCTION

The significance of small ruminants in South Asian economy is indicated by their economic traits especially the goats. They are admired among poor masses due to their capacity of acclimatization under diversified conditions. They participate to boost the rural economy where, things are not favorable for large ruminants. Among other competitive species, goats have the highest annual growth rate in Pakistan. This may be due to maximum consumption of goat meat for sacrificial slaughter on the Eid-ul-Azha (Iqbal *et al.*, 2008).

In Pakistan, the population of Beetal and Teddy goats are scattered around the area of Central Punjab. Beetal goat is highly preferred due to its dual capability of dairy characteristics and mutton production. On the other hand, Teddy goats are reared due to early maturity, fast growing rate and higher fecundity. Earlier studies on the Teddy goats reported the manipulation of estrous cycle and estrus synchronization (Khanum *et al.*, 2006) however, these studies lack information about ovarian status of these goats.

From the past years, ultrasonography turns out to be the sole non-invasive method for detection of ovarian structures in farm animals. In small ruminants, transrectal ultrasonography facilitates the diagnosis of early pregnancy and scanning of the ovarian structures. In order to enhance the reproductive efficiency, this aids in successful estrus and ovulation synchronization program (Bukarl *et al*., 2012). The objective of the present study is to characterize the ovarian status of Beetal and Teddy goats around estrus and hypothesize the difference in terms of ovarian follicular population (number of small, medium and large follicles), size of the ovulatory follicle, and ovulation rate, between them, using transrectal ultrasonography.

MATERIALS AND METHODS

The present study was conducted at Livestock Production Research Institute, Bahadurnagar, Okara situated between the latitudes of 30°18'-31°18' north and longitudes 73°145' and 74°09' east. The experiment was performed on 14 pluriparous does (6 Beetal and 8 Teddy does) of 3-6 years of age and weighing 52.2±5.8 and 27.7±3.2 kg, respectively, during the natural breeding season (September to October; autumn). All does were synchronized using two i.m. injections of 37.5 µg d-cloprostenol (Dalmazin®, Fatro, Italy) 10 d apart. Estrus detection was performed twice daily with two

vasectomized bucks (one of each breed), 24h after the second prostaglandin injection until the termination of apparent estrus. The day of standing heat was indicated as Day "0".

Follicular and luteal activity was monitored by transrectal ultrasonography (ALOKA, SSD 900 Japan), using 7.5-MHz linear array transducer, twice daily starting after 2nd $PGF_{2\alpha}$ injection, until the disappearance of large follicle (apparent ovulation). Does were mostly scanned in the standing position. The procedure was followed as described by Kiihholzer *et al.* (1998) in ewes. Briefly, after lubrication with gel, ultrasound probe was inserted into the rectum until the appearance of uterine horns. Then, the probe was turned around the whole reproductive tract to make contact with ovaries. After scanning, all examinations were recorded on video and analyzed afterwards. The numbers and diameters of the ovarian structures were counted and measured. Follicles were categorized as small (2-4 mm), medium (>4 to 6mm) and large follicles (>6 to 8mm). The disappearance of large follicle was described as the ovulatory diameter.

All values obtained were expressed as the mean±standard error of the mean (SEM). All the statistical methods were analyzed on SPSS Version 13.0 for Windows; SAS Institute, Cary, NC, USA while, statistical significance was set at $P<0.05$. The estrus duration, ovulatory follicle size and ovulation rate were analyzed using the Student's t-test to compare the breed differences whereas, estrus response was found out using the Chi-square test (SPSS Version 13.0 for Windows; SAS Institute, Cary, NC, USA).

RESULTS AND DISCUSSION

A brief outline of the data regarding follicular population in Beetal and Teddy goats is presented in Table 1. The Beetal goats had significantly higher population ($P<0.05$) of small follicles compared to Teddy goats. There was non significant difference between breeds in terms of the growth and population of medium and large follicles (Fig. 1). These results also indicate the phenomena of follicular dominance as described in cattle (Ginther *et al.*, 2002). In Beetal goats, there was more population of small follicles compared to a dominant follicle which makes out it as a monovular breed. In cattle, selection and dominance of antral follicles are correlated with series of events including an increase in systemic FSH, a transient elevation and balance in follicular-fluid hormones and growth factors respectively (Ginther *et al.*, 2002). Further investigations can elucidate the factors contributing in lesser recruitment of follicles in goats.

The summary of the data regarding size of ovulatory follicle and ovulation rate is presented in Table 2. In short, differences in the ovulatory diameter (7.3±0.3 vs 6.9±0.5mm), and ovulation rate (1.8±0.7 vs 1.8±0.4) were not significant ($P>0.05$) between the Beetal and Teddy goats respectively. In previous studies, the average ovulation rate in Teddy goats varied from 1.6 to 2.3 based on abattoir material (Anwar and Ahmad, 1999). In a recent study, ovulation rate was estimated by transrectal ultrasonography on day-7 after natural breeding and ranged 1.6-2.0 in synchronized Beetal and Teddy goats (Riaz *et al.*, 2012).

Table 1: Average No of small, medium and large follicles population on ovaries in Beetal and Teddy goats around estrus (day 0) after the administration of 2nd $PGF_{2\alpha}$ injection

Day	Small follicle (2-4mm)		Medium follicles (4-6mm)		Large follicles (>6mm)	
	Beetal	Teddy	Beetal	Teddy	Beetal	Teddy
-2	6.7±2.0[a]	3.7±0.8[b]	1.3±0.6	1.0±0.8	0	0
0	6.0±0.9[a]	2.7±0.5[b]	0.8±0.5	1.5±0.8	1.0±0.6	1.5±0.8
2	4.0±2.8[a]	0.1±0.6[b]	0	1.0±0.6	2.5±0.7	2.5±0.7

[ab] Different superscripts in the same row indicate a significant difference ($P<0.05$).

Table 2: Comparison of size of ovulatory follicle and ovulation rate between Beetal and Teddy goats

Variables	Beetal	Teddy
Weight (kg)	52.2±5.8	27.7±3.2
Size of the ovulatory follicle (mm)	7.3±0.3	6.9±0.5
Ovulation rate	1.8±0.7	1.8±0.4

The preovulaory follicles were present around one day before estrus, thereafter, they achieved maximum growth rate, reaching the maximum diameter of 7.3 mm and 6.9 mm in Beetal and Teddy goats respectively. This size of the ovulatory follicle depends on the goat

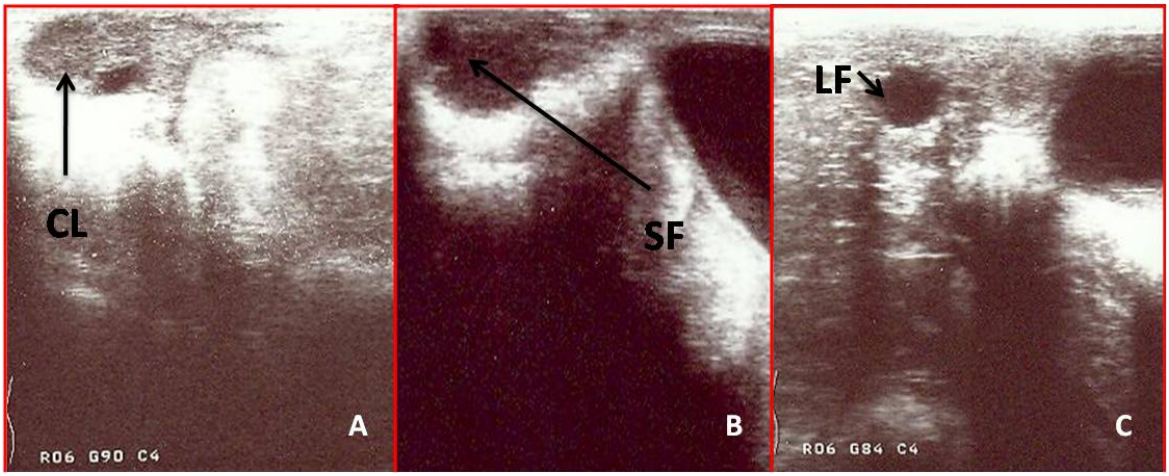

Fig 1: Trans-rectal ultrasonography showing **A:** CL on the ovary, **B:** small follicle (SF), **C:** Large follicle on the ovary (LF).

breeds as 9.7mm in Saanan (Ginther *et al.,* 1989), and 6.3mm in Neuquen-Criollo goats (Cueto *et al.,* 2006). In ruminants, dominant follicle has a dynamic role in regression and atresia of other follicles, thus inhibiting the appearance of new large follicles (Fortune, 1994; Isani *et al*., 2012).

In conclusion, it can be stated that Beetal have a higher population of small follicles compared to Teddy goats. This study also revealed similar ovulation rate between these breeds. Thus, the future studies can identify the factors inducing ovarian atresia in Beetal goats which may be helpful to increase the prolificacy rate and overall production of these animals.

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