

Follicular development and functional ovarian activity in cyclic Jakhrana goats

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Monitoring of ovarian follicular growth and dynamics to understand ovarian physiology helps in making effective use of biotechnological tools. Such studies are desired to select dominant follicular wave for increased embryo production in superovulated goats and also for aspiration of goat oocytes through ultrasound guided technique for *in-vitro* maturation and fertilization (Pawshie and Totey 2003). This particular aspect has not been extensively studied in goats as in sheep (Ravindra *et al.* 1994). Present study was therefore aimed to assess the ovarian changes in terms of follicular growth and ovulation in an important goat breed of semi-arid zone of India (Rai and Singh 2004).

Adult (2 to 3½ years of age) normal cycling (nulliparous and parous) Jakhrana goats (59) were used to study follicular development and functional ovarian activity. They were checked for oestrus at sixth interval with the aid of a vasectomized teaser buck. Time of onset of oestrus in goats was taken as mid-way between the last negative and first positive acceptance by teaser buck, like wise the end of oestrus was taken as mid-way between last positive and first negative acceptance. Goats identified for follicular and ovulation studies were laparotomized 20, 28 and 36 h and 28, 36 and 48 h following natural oestrus, respectively.

Follicular activity was determined by identifying and counting of visible follicles on ovarian surface in goats laparotomized at 20, 28, and 36 h following oestrus. Follicles were classified as small (1–3 mm), medium (3–6 mm) and large (>6 mm) as per Chakraborty (1986). A hand lens and a scale of 1 millimeter sensitivity were used to measure surface diameter of different sized follicles present on the ovarian surface.

Ovarian activity was assessed by observing and counting of ovulation points on ovarian surface in 38 laparotomized goats. Presence of blood oozing or cherry red spots protruding from the ovarian surface were considered as the base for ovulation counts (Greyling and VanNiekerk 1990). Considering the hormonal picture and ovulation time in

Jakhrana (Goel and Agrawal 2003) goats which ovulated during different periods (28, 36 and 48 h) following natural oestrus were observed for ovulation in right or left ovaries.

All observations on follicular and functional ovarian activity were statistically analyzed by 't' test and chi square (χ^2) test, respectively (Snedecor and Cochran 1989).

The results of follicular activity are presented in Table 1. Total follicular count decreased with advance in oestrous period ($P>0.05$). Mean number of small and medium sized follicles remained almost constant ($P>0.05$) between 20 to 36 h after the onset of oestrus, while large sized follicles decreased with advance in oestrous period ($P<0.05$). The number and size of follicles observed at different periods after the onset of oestrus in present study are in line with the findings of other workers (Chakraborty *et al.* 1993 and Kalita *et al.* 2003). In a study of follicles at different stages of oestrous cycle of non-descript goats, Khillare *et al.* (2004) reported nearly similar number of follicles per ovary. Decrease in total follicular count at different hours after the onset of oestrus is in agreement with the findings of Chakraborty *et al.* (1993) in Assam local goats. A decrease in large sized follicles from 20 to 28 h post-oestrus ($P<0.05$) was presumably due to conversion of large sized (>6 mm) follicles into ovulatory follicles, keeping in view the ovulation time in Jakhrana goats (Goel and Agrawal 2002,

Table 1. Follicular count at different periods after the onset of natural oestrus in goats

Follicular size (mm)	No. of follicles (mean±SE) post-oestrus onset time (hr)		
	Group 1 (7) 20 hr	Group 2 (7) 28 hr	Group 3 (7) 36 hr
Small (1–3 mm)	6.14±1.69 ^a	5.57±1.00 ^a	5.00±1.17 ^a
Medium (3–6 mm)	6.57±1.99 ^a	6.42±1.29 ^a	6.57±2.26 ^a
Large (>6 mm)	3.42±1.08 ^a	1.00±0.53 ^{bc}	1.41±0.71 ^{bc}
Total Follicular count	16.14±2.60 ^a	12.42±0.66 ^a	12.71±2.50 ^a

Figures with different superscripts in a row differ significantly ($P<0.05$)

Figures in parentheses indicate no. of animals

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2003). On comparing the relative number of large sized follicles than to small and medium sized follicles, our results are in close concurrence with Pretorius (1971) who reported temporarily cessation of Graafian follicles development between the day 12 and 18 of oestrous cycle in Angora goats. These quiescent Graafian follicles then quickly develop during pro-oestrus and oestrus of the next cycle. Probably similar phenomenon occurs in Jakhana goats.

Out of 38 Jakhana goats examined, 24 (63.15%) had ovulations in their right ovaries; 9 (23.68%) in their left ovaries; and in 5 (13.15%) goats both ovaries equally participated in ovulatory process. Right ovary was functionally more active ($P < 0.01$) than left ovary. Present findings distinctly indicated difference in activity of right and left ovary i.e. right ovary was more active than left ovary. Our findings are in concurrence with those reported earlier both in Jamunapari goats (Wani 1982). Similarly Andurkar *et al.* (2002) while studying follicular system of ovaries of non-descript goats found significantly greater activity of the right than the left ovary. On the contrary Prasad *et al.* (1980) in Barbari and Rao and Bhattacharya (1980) in Black Bengal goats reported both ovaries to be equally active. This difference could be breed specific considering prolificacy of these breeds.

SUMMARY

The present study aimed to assess the ovarian changes in terms of follicular growth and ovulation in goats. Follicular population in Jakhana goats decreased 20 h after the onset of oestrus and became constant at 28 h (time of ovulation in Jakhana goats). Ovulation occurred in large sized (>6 mm) follicles. Right ovary was more functional than left ovary.

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