Ovulation in Black Bengal nanny goats

V. H. Rao and N. K. Bhattacharyya

Division of Physiology and Climatology, Indian Veterinary Research Institute, Izatnagar, U.P., India

Summary. Normally cycling primiparous Black Bengal nannies were studied by laparotomy at 8-h intervals between 24 and 48 h after the onset of oestrus. The ovulation rate was 4.00 and ovulation occurred between 32 and 48 h after the onset of oestrus. The activity in the two ovaries was equal.

Introduction

For the most meaningful utilization of an artificial insemination technique in goats, it is essential to know the characteristics and sequence of ovulation in the particular breed. The Black Bengal breed of goat (*Capra hircus*) is common in Bengal, Bihar and Orissa states of India. Direct information on ovulation in these dwarf but prolific nannies is meagre, although some indirect data on ovulation characteristics have been given by Ali, Hoque & Hasanah (1973). We have therefore studied the characteristics and sequence of ovulation in these goats.

Materials and Methods

The nannies were 18–24 months old and had been bred on the experimental farm at the Indian Veterinary Research Institute, Izatnagar. All 20 had littered once and were exhibiting regular oestrous cycles. Separated from bucks, the animals were housed in clean sheds and fed a concentrate mixture (about 15 g/kg body weight/day) and green chopped fodder (oat, maize or berseem) with wheat straw (1:1) and water *ad libitum*.

Vasectomized goats were run with the flock under supervision at 8-h intervals to detect the onset and cessation of oestrus.

Five of the nannies were subjected to laparotomy at 24, 32, 40 and 48 h after the onset of oestrus during October (monthly means of temperature and vapour pressure 25.8°C; 18.2 mmHg) and November (monthly means 21.3°C; 12.2 mmHg). The puncture was at the site of the right sub-lumbar fossa and local anaesthesia (Planocaine 4% w/v; M&B India (P) Ltd.) was used.

The follicles in the ovaries were distinguished and counted as small (1–2 mm in diameter), medium (3–5 mm), preovulatory (≥ 6 mm), and ovulated (ruptured follicles).

The relative performance of the right and left ovaries was assessed by χ^2 tests and various interactions were compared by analysis of variance according to the methods described by Snedecor & Cochran (1968).

Results and Discussion

The rupture sites of the Graafian follicles were characterized by a fossa with a cherry red or blood-oozing spot which was slightly elevated from the surface. All the nannies showed ovulations at 32, 40 and 48 h after onset of oestrus but the maximum number of follicles

ovulating was found only at 48 h, being about 50% at 32 h and 80% at 40 h. As shown in Table 1, the number of medium-sized Graafian follicles steadily increased between 24 and 48 h after the onset of oestrus while the number of small follicles remained fairly constant. A decrease in the number of preovulatory follicles correlated with an increase of those which had ovulated. Most ovulations had occurred by 48 h after oestrus. The type $\times$ hour interactions was significant ($P < 0.01$).

Table 1. Counts (mean $\pm$ s.e.m.) of the different types of Graafian follicles in Black Bengal nannies after the onset of oestrus (5 animals at each time)

Graafian follicles	Time after onset of oestrus (h)			
	24	32	40	48
Small (1–2 mm)				
Total	53	44	54	52
Per nanny	10.60 $\pm$ 0.73	8.80 $\pm$ 0.77	10.80 $\pm$ 1.38	10.40 $\pm$ 0.98
Medium (3–5 mm)				
Total	37	50	58	73
Per nanny	7.40 $\pm$ 1.14	10.00 $\pm$ 1.22	11.60 $\pm$ 0.78	14.60 $\pm$ 1.39
Preovulatory ($\geq$ 6 mm)				
Total	9	16	17	1
Per nanny	1.80 $\pm$ 0.27	3.20 $\pm$ 0.43	3.40 $\pm$ 0.45	0.20 $\pm$ 0.00
Ovulated				
Total	0	11	17	20
Per nanny	0	2.20 $\pm$ 0.62	3.40 $\pm$ 0.28	4.00 $\pm$ 0.20

In this study, follicles less than 1 mm in diameter could not be conveniently counted at laparoscopy, but it can be assumed that such follicles were continuously growing for transfer to the pool of small follicles which remained constant. According to Pretorius (1971), further development of Graafian follicles in goats temporarily ceases between Days 12 and 18 of the oestrous cycle (Day 1 = day of oestrus) and these quiescent Graafian follicles then develop quickly during pro-oestrus and oestrus of the next cycle. Most of the medium-sized Graafian follicles present in one oestrous cycle presumably develop and rupture early in the next cycle in polytocous breeds of goats (Bhattacharyya & Prasad, 1974).

From the ovulation counts at 48 h after the onset of oestrus (4.00), it is obvious that the nannies of the Black Bengal breed have an ovulation rate higher than that known in any other caprine; 1.20 in Angora nannies (Shelton, 1960), 1.07 in non-descript Indian goats (Basu, Goswami & De, 1961), 1.28 in Norwegian goats (Lyngset, 1968) and 1.43 in Barbari nannies (Bhattacharyya & Prasad, 1974).

Both the ovaries appear to take part equally in the process of reproduction in Black Bengal nannies ($\chi^2 = 1.98$; not significant), as they do in goats of the Barbari breed (Prasad, Das & Bhattacharyya, 1979). The published evidence for monotocous breeds of goats is, however, in favour of greater activity in the right ovary (Lyngset, 1968; Achutankutty & Raja, 1971).

Nalbandov (1964) suggested that ovulation in the goat occurred between 9 and 19 h, and Salama (1972) reported that in local Egyptian goats ovulation occurred at about 27 h after onset of oestrus. Bhattacharyya & Prasad (1974) found that only 23.4% of ovulations took place at 20 h after onset of oestrus in nulliparous Barbari nannies.

A high ovulation rate is considered to be an important characteristic, as shown by the result of selection of sheep with this trait in recent years in Australia and New Zealand (Bindon & Piper, 1977). Pashmina goats in India rarely produce twins. Since the heritability of the multiple birth trait is high (Bindon & Piper, 1977), it is possible that the high ovulation rate of the Black Bengal breed can be incorporated into monotocous breeds of goats which are bred for their hair and undercoat.

We thank Dr C. M. Singh, Director, Indian Veterinary Research Institute, Izatnagar, for providing the necessary facilities.

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Received 5 March 1979