02/0027/31

นิพนธ์ต้นฉบับ

Behavioral Estrus and Ovarian Activity in Goats *(Capra hircus)*

อาการสัดและการทำงานของรังไข่ในแพะ *(Capra hircus)*

J. Eiamvitayakorn[1] *E.M. Rigor*[2]

บทคัดย่อ : **จุรีย์รัตน์ เอี่ยมวิทยากร และ อี. เอม. ริกอร์. 2531. อาการสัดและการทำงานของรังไข่ในแพะ *(Capra hircus)*. วารสารวิจัยวิทยาศาสตร์การแพทย์ 2(2) : 85-90**

ใช้แพะเพศผู้ที่ตัดท่อนำน้ำเชื้อแล้ว 2 ตัว เพื่อตรวจจับการเป็นสัดของแพะเพศเมีย และศึกษาการทำงานของรังไข่ด้วยการเปิดผ่าช่องท้องในชั่วโมงที่ 60 หลังการเริ่มแสดงการเป็นสัด พบว่าแพะส่วนใหญ่มีอาการเป็นสัดคล้ายคลึงกัน และแสดงอาการอยู่นานตั้งแต่ 0.5 - 3 วัน การทำงานของรังไข่ข้างขวามีแนวโน้มสูงกว่าข้างซ้าย (52.9% VS. 47.1%) พบการตกไข่ใบเดียว 55.1% ตกไข่ 2 ใบ 40.9% และ 3 ใบ 2% ในการเป็นสัดครั้งหนึ่ง ๆ โดยมีค่าเฉลี่ย 1.4 ± 0.1 ใบ/ตัว และการตกไข่เกิดขึ้นภายหลังการเป็นสัดไม่เกิน 60 ชั่วโมง

Abstract : **J. Eiamvitayakorn, and E.M. Rigor. 1988. Behavioral estrus and ovarian activity in goats *(Capra hircus)*. Thai J Hlth Resch 2(2) : 85-90**

Behavioral estrus and ovarian activity were studied. Two vasectomized bucks were used in heat detection. Laparotomies were performed approximately 60 hours after the onset of estrus to determined the ovarian activity. The common signs of estrus were observed with the duration of 0.5 - 3 days. The right ovary appeared to be more active than the left (52.9% VS. 47.1%). Single ovulation occurred 55.1%, twin 40.9%, and triplets 2% in each estrous cycle. The mean number of ovulation per doe was 1.4 ± 0.1. All ovulation occurred within 60 hours after onset of estrus.

1 *Veterinary Service Division, Dept of Livestock Development, Bangkok 10400.*
งานรักษาสัตว์ กรมปศุสัตว์ กระทรวงเกษตรและสหกรณ์ กทม. 10400

2 *Institute of Animal Science, UPLB, Philippines.*
สถาบันวิทยาศาสตร์การสัตว์ มหาวิทยาลัยแห่งประเทศฟิลิปปินส์ ลอสบานยอส ฟิลิปปินส์

Introduction

Goats *(Capra hircus)* are among the most important domestic farm animals in the world as a source of meat, milk, hide and wool and in recent years a marked increase in the number of goats has been associated with an interest in goat research. In comparison with other production ruminants, however, there is a shortage of information available on reproductive characteristics of the goats (Moore, 1984). Estrus or heat is defined as a period of proper psychological and physiological state during which copulation is permitted (Nalbandov, 1976) or a period when a doe shows sexual interest and allows the buck to serve her (Anon, 1985). Little data on ovulation rate has been reported (Shelton, 1978). Data relating to kidding rate was summarized by Devendra and Burns (1970).

With a view to provide a sound basic data for successful application of artificial means in manipulating the reproductive performance, the present study aimed to obtain more decisive evidence of the functional activity of the ovaries and related reproductive phenomena in goats.

Materials and Methods

Behavioral estrus and ovarian activity were studied in a group of 26 cyclic native does, age 3-5 years. Two aggressive vasectomized bucks were used to aid in heat detection. The signs of estrus were closely observed twice daily for 6 months.

Laparotomy was performed approximately 60 hours after the onset of estrus. To determine whether estrus was accompanied by ovulation and to observe other ovarian activities, the following criteria were used (Hafez, 1980 ; Camp *et al.*, 1983) :

1. Ovulation point - a newly erupted follicle with oozing blood-tinged intrafollicular fluid at the point of rupture.
2. Corpus haemorragicum - an opaque, reddish colored structure with extravasated blood.
3. Corpus luteum - a solid, highly vascularized structure 8 to 13 mm in diameter and pinkish in color, reaching mature stage at about 5 days after onset of estrus.
4. Preovulatory follicle - a blister - like structure protuding from the ovarian surface with a diameter of greater than 5 mm.
5. Tertiary follicle - a visible follicle measuring lesser than 5 mm in diameter.
6. Corpus albican - a white fibrous mass about 2.5 mm in diameter or less.

The doe that did not come into heat within 30 days after the last heat was also subjected to laparotomy to see if there was silent ovulation.

Results

Estrus Cycle

Of 26 does that were cycling, 5(19.2%) had a normal pattern of estrous cycle throughout the experiment, ranged from 19-23 days. The rest (21 does) exhibited a combination of short, normal and/or long cycles. The occurrance of short or long estrous cycles was not specific to anyone goat in the experiment. The length of estrous cycles had a mean of (mean ± SEM) 21.1 ± 1.3 days with a range of 4-79 days and a mode of 20 days (23.3%). Some of these results have been published in a preliminary report (Eiamvitayakorn *et al.*, 1988).

Signs of Estrus and Estrous Duration

The signs of estrus commonly found were :-

1. Mounting other does.

2. Shaking of tail from side to side especially when the buck was around.
3. Bleating.
4. Swelling and redness of the vulva.
5. Mucous discharge from the vulva.
6. Frequent urination.
7. Showing great interest and trying to come near the buck.
8. Standing still when the buck mount.

The signs of estrus might be observe at any time of the day but the degree of behavioral estrus could be seen obviously during the presence of the buck. The does showed signs of estrus ranged from 0.5 to 3 days with a mean of 1.6 ± 0.1 days. Silent estrus or quiet ovulation contributed to 50% of abnormal long cycles.

Ovarian Activity

Laparotomy at 60 hours after estrus found that all but one had ovulation (98%). Single ovulation occurred 55.1%, twin 40.9% and triplets 2% of the time (Table 1). No ovulation was found at second estrus of one long cycle in one doe but 2 big graffian follicles (ϕ > 1 cm) were found in the left ovary.

From 9 (42.8%) out of 21 multiple ovulations, corpus luteum were found on the same ovary. The right ovary appeared to be more active than the left (52.9% VS. 47.1%). The mean number of ovulations per doe was 1.4 ± 0.1 with the range of 0-3 ovulations (Table 2). The difference was not significant. Mean number of follicles was 6.6 ± 0.6 on the right ovary and 5.7 ± 0.5 on the left ovary with the total mean of 12.2 ± 0.9 follicles per doe.

Table 1. *Ovulation rate in does*

Ovulation per doe	No. of laparotomies	%
0	1	2
1	27	55.1
2	20	40.9
3	1	2
Total	**49**	**100.0**

Table 2. *Ovarian activity of the right and the left ovaries*

	Right	Left	Total
No. of ovulations	37	33	70
	(52.9%)	(47.1%)	
Mean ± SEM	0.8 ± 0.1	0.7 ± 0.1	1.4 ± 0.1
No. of follicles	324	277	601
	(53.9%)	(46.1%)	
Mean ± SEM	6.6 ± 0.6	5.7 ± 0.5	12.2 ± 0.9

Discussion

Report on length of estrous cycles in goat showed a very wide range of variation. There were some percentage of both short and long estrous cycles which when included made a mean length of cycles seem

to be normal. Several workers believe that the occurrence of short and long estrous cycles in goats is a normal physiological phenomenon though the reasons are obscure (Warbritton, 1934 ; Sahni and Roy, 1967 ; Corteel, 1975 ; Prasad, 1979 ; Armstrong *et al.*, 1983). The occurrence of abnormal estrous cycles found in this experiment were not entirely confined to any specific time throughout the observation. Corteel *et al.* (1982), Gonzales and Bury (1982) and Camp *et al.* (1983) noted that abnormally short estrous cycles have been observed at the initiation of the breeding season, but the causes are poorly understood. Shelton (1978) who studied in Angora goat suggested that the reason for abnormal cycles could be explained on some basis other than genetic variance in cycle length.

Estrus duration was not differ from other reports in the Philippines (Villegas, 1959 ; Mangalindan, 1984 ; Abilay, 1984 ; Sah and Rigor, 1985 ; Anon, 1985). Strong heats under the best environment, social and nutritional conditions may last 2-3 days and weak or nearly silent heats may last for only a few hours as suggested by Guss (1977). The long cycles probably were the result of unobserved heats due to a silent ovulation or less frequent observations for heat (Sahni and Roy, 1967). However, in this study only 50% of long cycles had quiet ovulation in between.

All does that showed estrus had common signs with some degree of variations but the most reliable sign of estrus was the doe being receptive to mounting.

The functional activity of the ovaries implies the frequency of the ovulation in the two ovaries (Lyngset, 1968). In several species, one ovary has been found to be more active than the other. Many publications indicate greater activity in the right ovary than the left in goats (Lyngset, 1968 ; Wani, 1982 ; Camp *et al.*, 1983 ; Sah and Rigor, 1985). Rowlands and Barbara (1984) and Rao and Bhattacharyya (1980) found that ovulation was distributed equally between the two ovaries. In our finding, the right ovary appears to be more active than the left, however, the difference is not significant. Multiple ovulations found on the same ovary was 42.8% of observations. This is differ from the earlier mention by Hulet and Shelton (1980) who found a marked tendency to develop 2 mature follicles in the same ovary in the same follicular phase. Almost 100% of does, ovulations took place within 60 hours. This supports the finding of Sah and Rigor (1985) who found ovulation took place not later than 54.4 hours after onset of estrus. Only one doe had no ovulation but 2 cystic follicles at the time laparotomy was performed.

Goats is considered to have high heritability for multiple births (Rao and Bhattacharyya, 1980), however, this high fertility rate was often potential rather than actual (Anon, 1984). There is a definite tendency to lose one egg when two were shed from the same ovary (Lyngset, 1968). This may be due to the time elapses between the first and second ovulation and the timing of ovulation in relation to mating. This study could lead us to a better understanding of reproductive characteristics of goats and a greater awareness in heat checking, timing for AI or other means in attempts to increase productivity of goats.

REFERENCES

Abilay T A. 1984. The national goat program for chevon and dairy production in the Philippines. In : Goat Production in Southeast Asia, FFTC. Extension Bulletin No. 206.

Anon. 1984. Goat Production in Southeast Asia. Food and Fertilizer Technology Center. Extension Bulletin No. 206.

Anon. 1985. The Philippine Recommends for Goat Farming. Philippine Council for Agriculture and Resources Research and Development. Technical Bulletin Series No. 24-A. Los Banōs, Laguna, 101p.

Armstrong DT, Pfitzner AP, Warnes GM, and Seamark RF. 1983. Superovulation treatments and embryo transfer in Angora goats. J Reprod Fert 67 : 401-403.

Camp JC, Wildt DE, Howard PK, Stuart L, and Chakraborty PK. 1983. Ovarian activity during normal and abnormal length estrous cycles in the goat. Biology of Reproduction 28 : 673-681.

Corteel JM. 1975. The use of progesterone control of the estrous cycle of dairy goat. Ann Bio Ani Biophs 15 : 252.

Corteel JM, Gonzales C, and Nunes JF. 1982. Research and development in the control of reproduction. Proc Int Conf Goat Prod Diseases, pp 584-601.

Devendra C, and Burns M. 1970. Goat production in the tropics. Tech Commun No. 19, Comm Bue Anim Breed Genet, Commonwealth Agricultural Bureaux, Farnham Royal, England, xii + 184 pp.

Eiamvitayakorn J, Rigor EM, Apelo CL, and Garcia BR. 1987. Aberrant estrus cycles in goats *(Capra hircus)*. J Thai Vet Med Asso 38 (4) : 57-69.

Gonzales - Stagnaro C, and Madrid - Bury N. 1982. Sexual season and estrous cycle of native goats in a tropical zone of Venezuela. Proc Int Conf Goat Prod Diseases (Abstr), p 311.

Guss SB. 1977. Management and diseases of dairy goats. Dairy Goat Journal Publishing Cooperation, Arizona, pp 167-177.

Hafez ESE. 1980. Functional histology of reproduction. In : Reproduction in Farm Animals. 4th ed, ESE Hafez (ed). Lea and Febiger, Philadelphia, pp 63-66.

Hulet CV, and Shelton M. 1980. Sheep and goats. In : Reproduction in Farm Animals. 4th ed, ESE Hafez (ed). Lea and Febiger, Philadelphia, pp 346-357.

Lyngset O. 1968. Studies on reproduction in the goat. III. The functional activity of the ovaries of the goat. Acta Vet Scand 9 : 268-276.

Mangalindan JF. 1984. Goat production. LDC-MAF Publication, Ministry of Agriculture and Food, Philippines. 36 p.

Moore NW. 1984. Manipulation of reproduction. In : Goat Production and Research in the Tropics. JW Copland (ed). Proceeding of a workshop held at the Univ of Queensland, Brisbane, Australia. 6-8 Feb 1984.

Nalbandov AV. 1976. Reproductive Physiology of Mammals and Birds. 3rd ed, NH Freeman and Co, San Francisco, 334 p.

Prasad SP. 1979. A note on the occurrence of short oestrous cycles and possible association of ovarian activity in Barbari nannies. Indian J Anim Sci 49 (10) : 854-856.

Rao VH, and Bhattacharyya NK. 1980. Ovulation in Black Bengal nanny goats. J Reprod Fert 58 : 67-69.

Rowlands IW, and Barbara JW. 1984. Mammals : non-primate eutherians. In : Marshall's Physiology of Reproduction. 4th ed, GE Lamming (ed). Churchill Livingstone, New York, pp 619-627.

Sah SK, and Rigor EM. 1985. Estrous cycle, estrous duration and ovulation time in goats. Phil Agr UP Los Banōs 68(4) : 461-470.

Sahni KL, and Roy A. 1967. A study on the sexual activity of the Barbari goat *(Capra hircus)* and conception rate through artificial insemination. Indian J Vet Sci 37(4) : 269-276.

Shelton M. 1978. Reproduction and breeding of goats. J Dairy Sci 61 : 994-1010.

Villegas V. 1959. Reproductive phenomena in sheep and goats under Philippine conditions. Phil J Anim Ind 29 : 105-108.

Wani GM. 1982. Investigations on ovarian activity by laparoscopic technique in normal cyclic and anoestrus Jamunapari does. Proc Int Conf Goat Prod Diseases (Abstr), p 496.

Warbritton V. 1934. The cytology of the corpora lutea of the ewe. J of Morphology 56(1) : 181-202.