

CYCLIC ACTIVITY OF OESTRUS IN ZOMRI GOATS NATIVE TO SAUDI ARABIA

Basiouni, G. F. and A. A. Al - Hozab

Department of Animal Sciences, College of Agricultural and Food Sciences, King Faisal University, P.O.Box 420, Al-Hofouf 31982, Saudi Arabia.

ABSTRACT

The main objective of this study was to investigate whether the local Zomri female goats are seasonal or continuous breeders. Reproductive cyclicity was determined endocrinologically in five postpubertal female goats. Blood samples were collected twice a week over a twelve months period for the measurement of plasma progesterone concentrations which were used to determine reproductive cyclicity. Results of this study suggest that Zomri female goats native to Saudi Arabia tend to have a long reproductive season which extend throughout most of the year with a temporary cessation during the hot months of May-August.

Key words: Oestros, cyclicity, Zomri goats, progesterone

INTRODUCTION

It is generally accepted that a number of factors affect the breeding season of both sheep and goat including day length, breed, nutrition and temperature. However, photoperiod appears to be the most important factor in this respect. The breeding season has been reported to vary according to their geographical location; it starts when light to dark ratio starts to fall (Thimonier, 1981) i.e. after June 21st in northern latitudes (Robertson, 1977), and ceases at a time when light to dark ratio is increasing. In the tropics, however, where there is less seasonal variation in daylength, both goat and sheep tend to breed almost throughout the year (Devendra and Burns, 1983; Amoah and Gelaye, 1990).

There seems to be an interaction of endogenous rhythm with the seasonal changes in day length. For example, when temperate sheep breeds are moved to tropical environments, they lose their tightly defined breeding season, although individual ewes still exhibit a seasonal period of reproductive activity of similar length. This suggests that the seasonality of reproduction is attributed to an endogenous circannual pattern, which in turn is synchronized by seasonal changes in daylength to occur at a particular time of the year. On the contrary, in equatorial regions, goats display year-around sexual activity (Mackenzie, 1980).

Changes in daylength, even though of small magnitude (3.7 h) was found to influence the seasonality of oestrous and ovarian activities in Rahmani ewes (Aboul-Naga *et al.*, 1987). In the near east, many native sheep and goat breeds can be categorized as breeds of long breeding season showing cyclic activity throughout most of the year, with a period of low sexual activities (anoestrus) limited to spring months (Aboul-Ela and Chaemineau, 1988). Egyptian Nubian goats was also found to have a

marked drop in the percentage of does coming into oestrus during the months of March-May (Aboul-Ela *et al.*, 1988).

There are about 4,373,137 goats (about 56% of sheep population) in Saudi Arabia and can therefore, play an important role in the livestock industry of the Kingdom. However, unlike sheep which are raised using both conventional and modern intensive farming systems, all the goats are raised using conventional methods. Basic information on reproductive patterns of goats in the Kingdom is scarce, whereas importance of such information can not be over-emphasized if this resource is to be exploited for the production of animal protein. This study is one of the series aimed to build a databank of basic information about goat breeding.

The main objective of this particular study was to determine the pattern of reproductive seasonality in the native Zomri breed of Saudi Arabia.

MATERIALS AND METHODS

Five adult Zomri goats with an average body weight of 23 ± 0.7 kg were used soon after they attained puberty (374 ± 2.0 days). They were housed away from male goats under natural conditions in the goat unit at King Faisal University Experimental Station ($25^{\circ} 30'N$). Through the experimental period they were fed alfalfa hay supplemented with concentrates. Water and salt licks were provided *ad libitum*.

The daylength varied from a maximum of 13 hrs 47 min in June to a minimum of 10 hrs 43 min in January. The maximum and minimum temperatures during the month of July were $46^{\circ}C$ and $26.6^{\circ}C$ respectively, while during January these were $20.3^{\circ}C$ and $9.1^{\circ}C$, respectively. The maximum relative humidity during the months of January and May were 100% and 7%, respectively.

Blood samples were collected twice a week for one calendar year by Jugular venepuncture using evacuated tubes containing EDTA. Soon after collection, all blood samples were centrifuged, plasma decanted, and stored at $-20^{\circ}C$ until assayed for progesterone. Plasma progesterone concentrations were measured using a radioimmunoassay described by Corrie *et al.* (1981) as modified by Law *et al.*, (1992). The intra- and inter-assay coefficients of variation were 10.5% and 11.7% respectively, while the limit of sensitivity was 0.12 mg/ml.

Plasma progesterone samples concentrations for each individual animal were plotted against time to determine cyclicity throughout the twelve months experimental period.

RESULTS AND DISCUSSION

A cyclic pattern was observed in plasma progesterone concentration throughout the twelve month experimental period in all the does (Figure 1, a-e). During the months of May and June, in 4/5 does plasma progesterone concentrations were disrupted and returned to the basal levels (Figure 1, a-d) indicating a temporary absence of cyclicity. 1/5 does also had low (basic)

levels of progesterone concentrations during the months of Aug-Oct. (Figure 1,e).

Goats are seasonally polyoestrous with females coming into heat at regular intervals during the breeding season which varies with geographical location. Most breeds of goats which are kept at medium latitudes display a pronounced seasonality of breeding. However, breeding activities for goats kept in tropical and subtropical regions never stops completely when kept in suitable environments showing a peak in breeding activity during autumn and low activity in late spring to mid-summer (Greyling and Van Niekerk, 1987). Results of the present experiment show that the native Zomry goats exhibited an extended period of cyclicity throughout the year with a little effect of daylength when kept under the closed farming system used in this study under which both water and feed were always available. It is more likely that the extended cyclicity observed in the present experiment was due to less variation in day length (13 hrs. 47 min length in June versus 10 hrs. 43 min in January). A temporary cessation of the cyclicity was, however, observed around the months of May-August in most of the experimental animals. Post-experiment examination of ovaries revealed that basal progesterone concentrations in 1/5 does during the period from August to October, were due to development of follicular cyst.

The present study was not designed to examine cycle length and/or frequency mainly due to the limited resources. Nevertheless, progesterone profiles indicate that these animals had an average cycle length of 21 days. Had blood samples been taken more frequently, it would have been possible to determine the cycle length more precisely. However, the observed cycle length in the present experiment is consistent to that reported in some goat breeds such as the French Alpine (about 20 days) (Chemineau *et al.*, 1991).

In addition to photoperiod, the temporary absence of cyclicity observed around the month of June in 4/5 does may be due to other environmental factors (e.g high environmental temperature). Such an adverse effect of high temperatures on cyclicity has already been reported in Nubian does raised under different geographical locations in Georgia (U.S.A. latitude 30-35 N). They were found to have an extended breeding season throughout the year with a temporary absence of cyclicity during the month of May (Amoah *et al.* 1996). The onset of summer has already been reported to have an adverse effect on the goat reproductive system in general (Singh, *et al.* 1978). Heat stress in particular is known to reduce the gonadotrophin LH secretion in cows (Madan and Johnson, 1973; Vaught *et al.*, 1977). Such reduction in LH secretion is critical for the morphological and biochemical changes in granulosa and theca cells of the preovulatory follicles (McClellan, *et al.*, 1975; Henderson and Moon, 1979). With reduced LH concentrations follicle development will be affected, secreting oestradiol concentrations not enough to exert positive feedback and therefore, no preovulatory LH peak and hence, absence of cyclicity. Although it was not part of the present study, it will be quite interesting to study the effect of high environmental temperatures on follicle development in goats.

The present study was conducted at premises away from males as the onset of cyclical activity can be stimulated by the smell of male.

Moreover, it was conducted in such a system that the nutrition would not have affected the cyclicity. Therefore, the only factors which have resulted in the observed pattern of plasma progesterone concentrations in these animals, are related to the environment i.e photoperiod and temperature. Photoperiod does not seem to play a major role in this respect as it was not very different during the month of April (when animals were cyclic) than during the month of May-August (when animals were acyclic). So probably, it were the higher temperatures (heat stress) which might have resulted in the temporary absence of cyclicity. While further studies are required to clearly separate the effect of daylength from that of heat stress on the seasonality of reproduction in goats, the results of the present study do indicate that Zomri goats native to Saudi Arabia have an extended breeding season throughout most of the year with a temporary cessation of cyclical activities during the months of May-August.

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النشاط الدورى للشبق فى اناث ماعز الزمرى المستوطنة فى المملكة العربية السعودية

غازى بن فيصل بسيونى و عادل بن عبدالله الحزاب

قسم علوم الانتاج الحيوانى-كلية العلوم الزراعية والأغذية - جامعة الملك فيصل ص.ب. 420-الهفوف 31982 المملكة العربية السعودية

إن الهدف الأساسى لهذه التجربة هو التعرف على دورية التناسل فى اناث الماعز من سلالة الزمرى، حيث تم تحديد دورية التناسل فى خمسة من اناث الماعز بعد وصولها سن البلوغ عن طريق اخذ عينات للدم مرتين أسبوعيا لمدة اثنا عشر شهرا للتعرف على تركيز هرمون البروجسترون فى الدم لتحديد دورية التناسل. تشير نتائج هذه التجربة إلى أن اناث الماعز من سلالة الزمرى المستوطنة فى المملكة العربية السعودية تميل إلى التناسل خلال معظم أشهر السنة مع وجود توقف مؤقت لدورة الشبق خلال الأشهر التي تتميز بارتفاع درجات الحرارة الجوية (مايو - يونيو - يوليو - أغسطس).