The effect of seasons on sexual cycle of female desert goats on the basis of progesterone profiles

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Abstract

This study was conducted to determine whether south Darfur desert goats are seasonal breeders or not. Fifteen female desert goats were used in this experiment. Ovarian cyclicity was monitored by measuring plasma progesterone concentration twice per week for one year. The ovulation was preceded by a transient increase in serum concentrations of progesterone more than 1 ng/ml. The results indicated that does were cycling during all the seasons of the year with a slight decrease in summer and winter.

Key words: Goats, seasonality, ovarian cyclicity, progesterone.

Introduction

The annual change in day length is the environmental factor that dominantly affecting seasonal breeding in small ruminants. The doses of seasonal breed, in mid and high latitude (higher than 350 N), stop ovulating and displaying oestrous behaviour for several months in the year (Hafez and Hafez, 2000). With a decrease in latitude, the seasonality of local breeds becomes less marked and the individual anoestrous periods are shorter (Chemineau, et al., 1991). In the tropical climate, the seasonal variation in day length is not marked, and accordingly, the goats, if they are fed at maintenance levels, tend to

breed through the year and ovulate all the year round (Chemineau, 1986). Seasonal anoestrous occurs when the day length increases and this period is associated with an absence of estrus and ovulation and decreased secretion of the reproductive hormones (Hafez and Hafez, 2000).

The pattern of sexual activity in goats is reported to be dependent on photoperiodicity (Chemineau, et al., 1999). Goats in temperate zone are seasonally polyestrous (Chemineau, et al., 1991, Jainudeen, et al., 2000), whereas, in the tropical zone, where variation in the day is less, goats tend to breed throughout the year (Chemineau, 1986) however, tropical Indian goats show more cyclic activity during summer and thus seasonal oestrus activity (Wani, et al., 1980). The maximal and minimal periods of sexual activity were associated with winter and summer respectively in Creole goats of Argentina (Riveraa, et al., 2003). In Damascus goats the progesterone level during the luteal phase ranged from 2.6 to 5.4 ng ml−1 (Khadiga, et al., 2005). In other study, (Ravindra and Rawlings, 1997) the first observed ovulation was preceded by a transient increase in serum concentrations of progesterone (6 days duration), with a peak concentration of 1.30 +/- 0.22 nmol l-1.

MATERIALS and METHODS

Site of study:

This study was conducted in Nyala, South Darfur state, which is located in the semi arid zone, between latitudes 12.03^{o} N. and longitudes 24.53^{o}E.

Meteorological data

The prevailing climatic conditions during the experimental period 2007 and 2008 are shown in appendices, table (1).

Experimental design:

Fifteen desert does at start of puberty (6-8 month age), in good body condition, and free from any clinical detectable abnormalities were penned together in an open ended barn. They were fed concentrates and hay, with free access to water and mineral licks. To monitor ovarian cyclicity, blood samples were collected twice a week for a year for progesterone assay.

Blood sampling:

Blood samples were collected from the jugular vein. For plasma preparation blood samples were centrifuged at approximately 2000 rpm for 15 minutes. Plasma samples were then stored at -20oC in epindorf vials till analysis

Hormonal assay:

Progesterone radioimmunoassay:

The progesterone determination in the serum samples of experimental goats were analyzed using progesterone radioimmuno assay kit –IMK-458. Supplied by Department of Isotope, China Institute of Atomic Energy, Beijing.

RESULTS

Previous studies have reported that the first observed ovulation was preceded by a transient increase in serum concentrations of progesterone with a peak concentration of 1.30 +/- 0.22 nmol l-1. therefore in this study the plasma progesterone profile was used to monitor ovarian cyclicity and considered the progesterone concentration of ≥ 1 nmol l-1 indicative of ovulation.

The level of progesterone which measured twice weekly for 12 months (Fig.1 and 2) showed that experimented does showing estrous activities throughout the year (≥ 1.0

nmol l-1.). In April and May sexual activity was decreased. The monthly variations in the percentage of desert does exhibiting oestrus was 50% in January, 75% in February, 87.5% in March, 50% in April, 37.5% in May, 87.5% in June, 87.5% in July, 87.5% in August, 100% in September, 87.5% in October, 75% in November and 37.5% in December.

Fig. 1: Monthly variation in the percentage of desert does showing ovarian activity as measured by progesterone level.

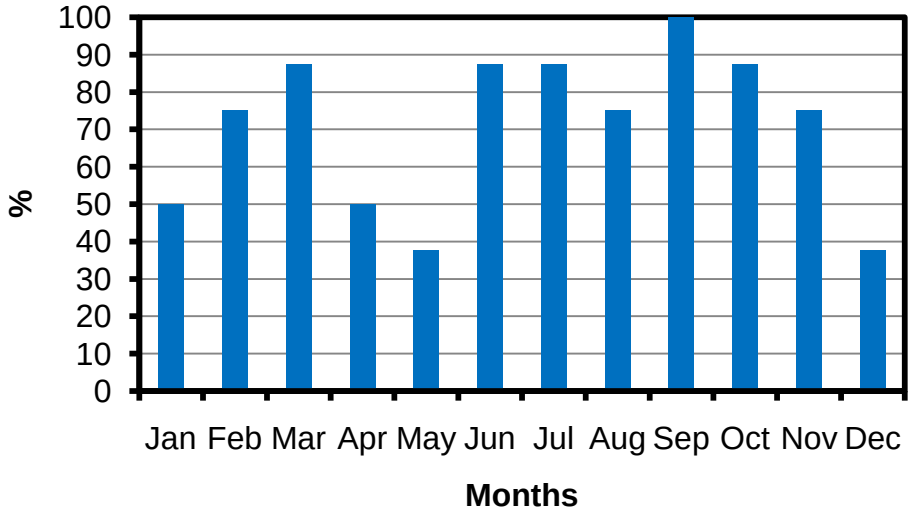
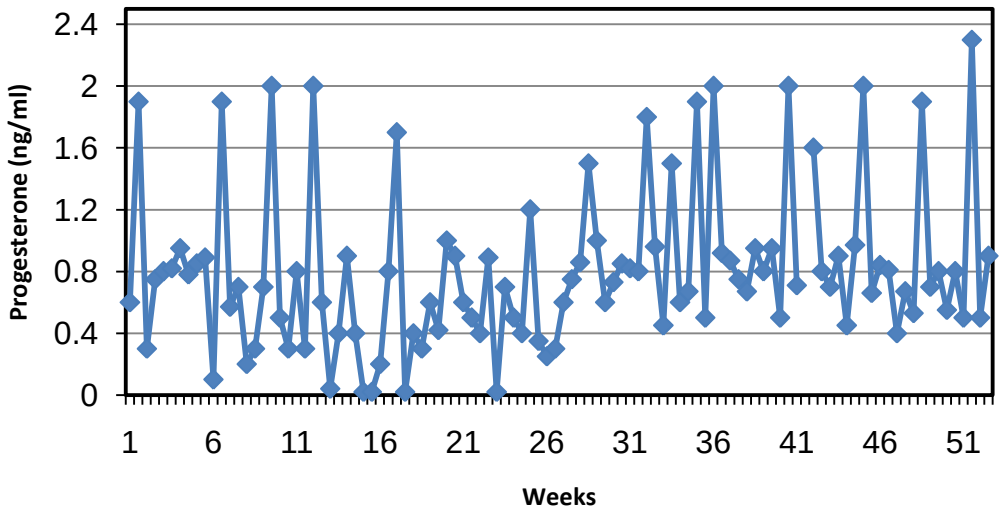


Fig. 2: Variation in plasma progesterone concentration in experimental doe number 52:



DISCUSSION:

This study was design to determine whether or not there is a true seasonal pattern of sexual activity in the female Desert goat independent of variations in temperature during the different months. Many research works studied the variation in oestrous seasonality in temperate areas (Woodfill, et al., 1994, Delgadillo, et al., 2000, Malpaux, et al., 2001, Riveraa, et al., 2003). However there is lack of information with regard to tropical areas. This study showed that does were cycling all the year round with a slight decrease in April May, and Dec. Jan this decrease could be due to the temperature effect, (high, April May and low Dec. Jan). This result is in agreement with previous study in tropical climate (Chemineau, 1986) and disagree with Hafez and Hafez (2000) who reported that the ewe and does are seasonally polyoestrous animals with normal ovulatory cycles occurring in the autumn and winter. Since the variation in the day length is less in the tropical zone, the goats tend to breed throughout the year and this could explained our data.

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Appendix

Table (1)

Month	2007				2008			
	Tem (^{o}C)		R.H (%)	Rain fall (mm)	Tem (^{o}C)		R.H (%)	Rain fall (mm)
	Max.	MIN.			Max.	Min.		
January	27.8	13.5	24	Nill	30.6	15.5	22	Nill
February	33.4	16.9	17	Nill	31.3	16	20	Nill
March	36.8	20.8	13	Nill	37.7	22.3	12	Nill
April	39.5	23.5	16	Nill	37.6	24.6	30	6.8
May	39.8	25.6	41	30.6	37.5	24.6	45	13
June	36.9	23.8	39	157.6	37.1	24.5	59	75
July	32.1	21.3	79	97.1	33.5	22.4	74	137
August	31.4	21.5	85	127.1	31.3	21.7	81	249
September	34	21.4	69	43.1	34.3	22.6	74	47.8
October	37	22.2	31	3.8	35.5	21.9	39	11.6
November	34.7	18	17	Nill	33	18	20	Nill
December	31.4	15	22	Nill	32.6	17	22	Nill
Yearly Mean	34.6	20.3	38	38.3	34.3	20.9	41	45.1

The seasons can be estimated as follows:

1- Autumn: from 18 May up to 28 October
2- Summer from 16 February up to 17 May
3- Winter from 29 October up to 15 February