

## Preliminary studies on reproductive activities of local Abadeh does, Fars province, southern Iran

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### Summary

No published information are available on the reproductive indices of local Abadeh does reared in northern Fars province, southern Iran. This study was conducted to determine the duration of the breeding season, and the length and duration of the oestrous cycle. Twenty single parity 2-year-old does from Abadeh (weighing 19–26 kg) were purchased and transferred to the School of Veterinary Medicine of University of Shiraz. They had access to alfalfa hay, water ad libitum and natural light. Vasectomised teaser buck was turned with the flock and observation was made every 12 hrs during the day for standing heat detection, from late-August (2003) to late-August (2004). To determine the onset of reproductive activity as well as occurrence of silent oestrus, blood samples were collected from jugular vein every 10 days. Following the onset of breeding season and observation of standing heat, 10 does were randomly selected in their 2nd oestrous cycle for twice weekly blood sampling. Serum progesterone concentration was determined using a commercial radioimmunoassay kit. It was found that silent oestrus occurs mostly in early breeding season. The first standing heat was observed in mid-September which was considered as the onset of breeding season. Occurrence of standing oestrus increased through October, November and December. The peak of standing oestrus was recorded during late-October to early, mid-November. The mean  $\pm$  SD duration of the oestrous cycle was  $19.7 \pm 1.1$  days and the mean  $\pm$  SD length of oestrus was  $23.8 \pm 12.3$  hrs. The mean ( $\pm$ SD) concentrations of serum progesterone in days 0 (day of standing heat) to 4, varied between 0.1 and 0.8 ng/ml. Concentrations of progesterone during the luteal phase varied between 2.7 and 3.9 ng/ml. The results of progesterone assay during oestrous cycle indicate that the follicular and luteal phases last about 4–5 days and 14 days, respectively. In conclusion, oestrus activity in local Abadeh does is highly seasonal with a peak of activity being observed during the late-October to the end of November.

**Key words:** Abadeh does, Breeding season, Oestrous cycle, Standing heat, Progesterone

### Introduction

Although, various aspects of reproduction in different breeds of goat kept under a variety of environments in many parts of the world have been studied (Thorburn and Schneider, 1972; Bondurant *et al.*, 1981; Thibier *et al.*, 1981; Thompson *et al.*, 1983; Akusu and Ajala, 2000; Khanum *et al.*, 2000), there is still a need to increase our knowledge on this issue, particularly when it is compared with cattle and other food animals (Mori and Kano, 1984; Akusu *et al.*, 2003). Some aspects of reproduction in Iranian breeds of female sheep and goats have been studied either by examination of abattoir materials (Emady, 1976) or by laparoscopic approach (Sefidbakht *et al.*, 1978) or daily observation of oestrus activity

(Bathaei, 1996). So far, no study has been carried out to characterize the reproductive indices of local Abadeh does reared in northern Fars province, southern Iran (Tavakkolian, 1999). The following study was therefore conducted to determine the duration of the breeding season, the length of the oestrous cycle, duration of oestrus and the associated blood progesterone changes. Such information is essential to improve the reproductive performance and productivity of this native goat, which plays an important role in food animal production under tribal systems of agriculture.

### Materials and Methods

#### Animals and the site of study

Twenty single parity 2-year-old local

Abadeh does (weighing 19–26 kg) with no history of reproductive abnormalities were randomly selected and purchased from a flock. The flock was under the supervision of Jihad Agriculture Organization of Abadeh city (285 km north of Shiraz; 2030 m above the sea level and a latitude of 3130 m), and was kept under a traditional system. The animals were transferred to the School of Veterinary Medicine of Shiraz situated at Badjgah (14 km north of Shiraz; 1810 m above the sea level and a latitude of 2959 m). The mean  $\pm$  SD day length in spring, summer, autumn and winter was  $13.2 \pm 1.2$ ,  $14.6 \pm 0.7$ ,  $11.3 \pm 0.6$  and  $10.9 \pm 0.6$  hrs, respectively. Does were kept in a partially-roofed building under natural light with access to water ad libitum. They were fed dry alfalfa hay, twice a day, on the base of NRC recommendations. In addition, they were allowed to graze one hr at a pasture close to their accommodation during April and May, when fresh grass was available.

Each doe was ear tagged. In addition, to be easily identified, each one had also a large numbered collar. Details of the does are summarized in Table 1. All animals received appropriate antiparasitic therapy. A vasectomised buck with good libido was run with the flock soon after they have settled into their new environment.

**Table 1: Characteristics of mature Abadeh does\***

Traits	Range	Mean
Weight (kg)	19–27	23
Crown rump (cm)	86–99	91
Wither's height (cm)	54–66	58

\*Colours: majority black, some grey, brown and cream

### Oestrous cycle investigation

The does were observed twice daily from August (2003) to September (2004), at approximately 12 hrs intervals for one hr, during early morning and late afternoon to monitor their behavioural responses to the teaser buck. A doe was assumed to be in oestrus if she stood to be mounted by the teaser. The duration of oestrus was calculated by adding six hrs to the time of first and last time that the doe stood to the teaser (Bathaei, 1996). The inter-oestrus

interval was calculated by measuring the time interval between two consecutive oestruses.

### Blood sampling and progesterone assay

A sample of 10 ml blood was collected from the jugular vein of each doe, every ten days starting from the second day after they were housed in the site of experiment until they started showing signs of their first oestrus. Then, a more intensive blood sampling schedule (twice weekly) was used for ten randomly-selected does commencing from the time of their second standing oestrus. Blood samples were transported to the laboratory and centrifuged for 15 min at 2500 rpm. Sera were separated and kept frozen at  $-20^{\circ}\text{C}$  until assayed for progesterone determination.

Serum progesterone concentrations were determined by radioimmunoassay (Orion Spectra kits; Orion diagnostica, Finland). Intra- and inter-assay coefficients of variation were 5.8 and 5.1, respectively. The sensitivity of the assay was 0.1 ng/ml. Results are presented as mean ( $\pm$ SD).

### Statistical analyses

Data relating to the length of the inter-oestrus interval and the duration of oestrus were analysed by general linear model, using SAS software. Analysis of variance was used to analyse the data. Means were compared by Duncan's test to find the significant difference. The level of significance was set at  $p \leq 0.05$ .

## Results

### Breeding season

The first standing oestrus was observed in mid-September. Gradually the number of does showing standing oestrus increased during October, November and December, when oestrus activity was at its maximum. During January, February and March, a noticeable decline in the number of observed oestruses was recorded. From April onward, no standing oestrus was recorded. By the end of October, all the does had shown standing oestrus. The duration of breeding season of local Abadeh does was seven

months starting from September and ending in March. Recorded standing oestruses during February and March was very low (approx. 3%). The monthly number and percentage of does in oestrus and observed oestruses during the breeding season are presented in Figs. 1 and 2, respectively.

**Fig. 1: Number and percentage of Abadeh does in oestrus during different months of the year**

**Fig. 2: Number and percentage of observed oestruses in Abadeh does during different months of the year**

#### Occurrence of silent oestrus

A serum progesterone concentration > 0.5 ng/ml was considered as the presence of luteal activity (most likely a corpus luteum). In those animals which had no standing oestrus but had a serum progesterone concentration >0.5 ng/ml, we assumed that

silent oestrus had occurred. These silent oestruses occurred during September; transition from an oestrus to breeding season.

#### Oestrous cycle

Forty-eight standing oestruses were observed and recorded. The mean  $\pm$  SD duration of oestrus was  $23.8 \pm 12.3$  (range: 12–77) hrs. Durations of the first five oestruses are presented in Table 2. Table 3 summarizes the distribution of inter-oestrus intervals categorized as “short” (<17 days), “normal” (17–23 days) and “long” cycles (>23 days), in a total of 69 recorded cycles. There was no significant difference between the lengths of the first five cycles (Table 4). The mean  $\pm$  SD inter-oestrus interval between normal cycles of local Abadeh does was  $19.7 \pm 1.1$  days.

**Table 2: Mean ( $\pm$ SD) duration of oestrus in consecutive oestrous cycles**

Cycle	No. of cycles recorded	Mean $\pm$ SD (hrs)
1 <sup>st</sup>	8	23.5 $\pm$ 8.12
2 <sup>nd</sup>	16	22.09 $\pm$ 11.8
3 <sup>rd</sup>	12	24.38 $\pm$ 19.5
4 <sup>th</sup>	10	26.85 $\pm$ 19.5
5 <sup>th</sup>	2	20.5 $\pm$ 0.7

**Table 3: The percentage and number of short, normal and long oestrous cycles in Abadeh does**

Cycle	% of cycles (n)	Mean $\pm$ SD (days)
Short	2.9 (2)	8.75 $\pm$ 3.46
Normal	84.05 (58)	19.77 $\pm$ 1.1
Long	13.05 (9)	36 $\pm$ 9.9

**Table 4: Mean ( $\pm$ SD) length of the first five normal oestrous cycles in Abadeh does**

Cycle	Cycles (n)	Mean $\pm$ SD (days)
1 <sup>st</sup>	16	19.91 $\pm$ 1.2
2 <sup>nd</sup>	17	19.95 $\pm$ 1.2
3 <sup>rd</sup>	11	19.59 $\pm$ 1.1
4 <sup>th</sup>	7	19.67 $\pm$ 0.85
5 <sup>th</sup>	4	19.18 $\pm$ 0.9

#### Progesterone changes during oestrous cycle

The results of progesterone assays of ten does after their second standing oestrus are

presented in Fig. 3. Serum progesterone concentrations during the first four days of the cycle (follicular phase) varied between 0.1 and 0.8 ng/ml. There was a significant increase from day 6 to 14 (luteal phase) when the level of serum progesterone ranged between 2.7 and 3.9 ng/ml. The level of serum progesterone, was then declined during the last few days of the cycle and reached to 0.4 ng/ml on the 19th day. The progesterone level of four does remained high (3.7–4 ng/ml) at their standing oestrus. The results were the same when the assay was repeated. These data were therefore excluded from the herd calculations.

**Fig. 3: Progesterone changes during oestrous cycle of Abadeh does**

## Discussion

The present study showed that there is a definite breeding season for local Abadeh does of about seven months with its peak of the reproductive activities in October, November and December, when the day length is short. This finding is clearly in contrast to beliefs of local farmers who think that the Abadeh does are not a seasonal breeder. It agrees with the observations of Smith and Sherman (1994) that the normal breeding season of the does in the northern hemisphere is mostly from October to March, although in temperate regions some animals may cycle year around.

Serum progesterone concentration before late-August, was <1 ng/ml. This indicates that Abadeh does are in anoestrus from April to August when no standing oestrus was observed in this group of the studied animals. The relatively high concentrations of serum progesterone found in late-August and early-September in the present study, can reflect the luteal activity

showing that silent heat mostly occurs during the transition from anoestrus to the onset of the breeding season. This result is in keeping with previous observations (Ott *et al.*, 1980; Thompson *et al.*, 1983) on dairy goats. The occurrence of silent heat could be attributed to the hormonal imbalances such as progesterone and oestradiol deficiencies (Pineda, 1989; Gordon, 1997). Undoubtedly, various factors such as presence of buck, light manipulation as well as genetic and nutritional management prior to the onset of the breeding season can affect the occurrence of silent heat in does (Bretzlaff, 1997).

Our results showed that the mean  $\pm$  SD length of oestrous cycle in Abadeh does is  $19.7 \pm 1.1$  days which is within the range of 18–21 days reported for other breeds of goats (Shelton, 1978; Akusu and Ajala, 2000; Greyling, 2000; Khanum *et al.*, 2000). Greyling (2000) stated that variations in the oestrous cycle of goats are attributed to season of the year, post-partum period, environmental temperature and humidity. In addition, genetic and individual differences, nutrition, stress as well as immediate or gradual contact with the buck can also influence the length of the oestrous cycle (Shelton, 1978; Hafez and Hafez, 2000). In our experiment, some of the above factors such as change in the daylight and mating by the teaser did not seem to have changed the length of the oestrous cycle.

The higher incidence of long cycles observed in our study could be attributed to the breed (Shelton, 1978), or failing to observe a standing oestrus. Nevertheless, the length of oestrous cycle found in our study is comparable with the results in Alpine dairy (Chemineau *et al.*, 1982) and other breeds of goats (Pineda, 1989; Pathiraja *et al.*, 1991; Smith and Sherman, 1994; Greyling, 2000). It should be pointed out that it is not possible to easily differentiate the effects of different factors such as breed, age, geographic conditions, and teasing method on the length of the oestrous cycle (Shelton, 1978).

The variations in the progesterone level observed during the oestrous cycle of does in our study are comparable with other reports (Thorburn and Schneider, 1972; Ott *et al.*, 1980; Thompson *et al.*, 1983). The

high level of serum progesterone concentrations during oestrus of four Abadeh does in the present study is similar to what have previously been reported by Ott *et al.*, (1980). They found >3 ng/ml progesterone in serum of two goats during oestrus. Whether this is due to the progesterone secretion from other sources rather than corpus luteum (Heap and Linzell, 1966) or is the result of stress and other factors are not still clear (Ott *et al.*, 1980).

In conclusion, oestrous activity in local Abadeh does is highly seasonal with the maximum oestrus activities being observed during late-October to the end of November. We found a mean  $\pm$  SD inter-oestrus interval of  $19.7 \pm 1.1$  days. As the population of does in Iran is estimated to be more than 20 millions, further studies are required to understand various aspects of reproductive life of this economically-important species.

### Acknowledgements

The authors are indebted to Professor M. J. Zamiri for his useful suggestions and help throughout experiment as well as his cooperation with statistical analyses. They also wish to give their appreciation and thanks to Professor D. E. Noakes for his sincere cooperation, comments as well as correcting manuscript. Technical assistance given by Mr. Z. Taghipoor, typing of manuscript by Mrs. M. Sharifpour, and sincere cooperation by Jahad Agriculture of Shiraz and Abadeh cities are also acknowledged. Financial support, provided by Shiraz University Research Council (Grant No. 82-VE-1616-C244) is greatly appreciated.

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