POSTPARTUM LEVELS OF SERUM PROGESTERONE, OESTRADIOL, PROLACTIN AND THYROXINE IN NATIVE ZOMRI GOAT OF SAUDI ARAIBA

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ABSTRACT

Serum concentrations of oestradiol, progesterone, prolactin and thyroxine were followed for the first four weeks postpartum in 12 native Zomri breed of Saudi Arabian goats. Oestradiol concentrations were decreased significantly at 2 to 21 days after kidding, then increased to nearly same level as day one after 28 days. On the other hand, serum levels of progesterone remained unchanged throughout the period of this study, while the concentrations of prolactin increased at 28 day postpartum. Concentrations of thyroxine steadily declined to reach the minimum level at day 28 postpartum. These results indicate that the follicular development in Zomri goats starts during the third week postpartum.

INTRODUCTION

Uterine involution and resumption of ovarian activity are the major changes occurring in the reproductive system during postpartum period. These changes are well-documented in many domestic species except goats (Jainudeen and Hafez, 1993). The endocrine basis of various reproductive stages of ruminants are well-studied (Bedford *et al.*, 1972; Smith *et al.*, 1973; Bazer and First, 1983). In goats, physiological studies concerning hormonal interrelationships during postpartum period are needed to characterize this period which is vital to control breeding intervals.

Azour *et al.* (1989) studied the concentration of different hormones during postpartum period in goats. They found that concentration of oestradiol decreased sharply after parturition and started to increase at day 21 to reach same level as day one after 28 days postpartum. On the other hand, progesterone concentration decreased 2 - 14 days after parturition to return to its day one level by day 21 postpartum. Saleh (1994) reported that serum levels of oestradiol and progesterone in Ardi goats, native to Saudi Arabia, declined to minimum levels two days after kidding, and concentration of oestradiol started to increase during the third week of lactation.

The present study was designed to investigate the temporal relationship between oestradiol, progesterone, thyroxine and prolactin during early postpartum period in Zomri goats of Saudi Arabia.

MATERIALS AND METHODS

Twelve female native Zomri goats of Saudi Arabia aged 2-3 years were used in this study. All animals were kept under intensive management system at the Experimental Station, King Faisal University, Saudi Arabia. Regular individual blood samples were collected from the jugular vein into 10 ml vacutainer tubes with no additives. The blood samples were taken daily for the first 3 days postpartum and then every week for one month. The serum was separated by centrifugation at 3000 rpm for 10 minutes and stored under 20°C until hormonal assays were carried out.

Serum oestradiol and progesterone concentrations were determined using radioimmunoassay (RIA) technique adopted by Xing *et al.* (1983) and Kubasik (1984), respectively. The RIA kits were purchased from DCP Diagnostic Corporation, Los Angles. The coat-A count oestradiol or progesterone procedure based on antibody-coated tubes. I^{125}-labeled oestradiol or progesterone competes with oestradiol or progesterone in the samples for antibody sites. Following the incubation period, separation of bound from free hormones was achieved by decanting; the tubes were then counted using gamma counter and the concentration was calculated. The intra-and inter-assay coefficients of variation (CV) were 7.3 and 9.5% for oestradiol and 11.6 and 16.4% for progesterone, respectively. Prolactin concentration was measured according to the method used by Cowden (1979). The intra-and inter-assay coefficients of variation (CV) were 7.2 and 10%, respectively. Determination of thyroxine was carried out using solid phase enzyme-immunoassay according to the method

of Wood (1980). The intra-and inter-assay coefficients of variations (CV) were 10.2 and 17.3%, respectively.

Means of hormonal concentrations at various experimental intervals were compared with day one level using student-t-test according to the method described by Snedecor and Cochran (1987).

RESULTS

Mean serum concentrations of oestradiol started to decrease gradually reaching the minimum level of 25 pg/ml at day 7 postpartum. Oestradiol concentrations started to increase steadily after day 14 to reach 121 pg/ml at day 28, which is close to day 1 level. On the other hand, concentrations of progesterone throughout the experimental period remained low and unchanged. Concentration of prolactin continued same as day one, but a significant ($P<0.01$) increase was observed at day 28. A gradual decline was noticed in thyroxine levels to reach 5.1 ug/dL at day 28 postpartum (Table 1). The temporal relationship between hormones studied indicated that higher oestradiol level was observed at day 28 postpartum and it was accompanied with increasing levels of prolactin and decreasing levels of thyroxine.

DISCUSSION

The data reported in this study showed a steady increase in the level of oestradiol, commencing by 14th day after kidding. This finding is in a good agreement with studies reported by Azouz *et al.* (1989) and Saleh (1994). The increase in the level of oestradiol may have been resulted from postpartum ovarian follicular development promoted by elevated levels of follicle stimulating hormone.

Progesterone concentrations remained low and unchanged during the period of this study. Similar results were reported by Llewelyn *et al.* (1992) and Saleh (1994) who found very low levels of progesterone during first week of lactation. On the other hand, Azouz *et al.* (1989) reported an increase in the level of progesterone at the third week postpartum. The low level of progesterone in this study may be due to lack of a functional corpus luteum.

Prolactin may have two divergent mode of action on the ovary, stimulatory and inhibitory (McNeilly *et al.*, 1982). Direct inhibitory role of prolactin may vary considerably between mammalian species. Hyperprolactinemia prevents resumption of ovarian activity in breast- feeding women (McNeilly, 1979). On the other hand, normal ovarian activity occurs postpartum in dairy cows (Carruthers and Hafs, 1980) and dairy goats (Hart, 1975). The close relationship between concentrations of prolactin and oestradiol observed in this study indicates that prolactin may not play an inhibitory role on the resumption of ovarian activity in goats.

Reproduction in farm animals is closely related with dynamic activity of the thyroid functions (Afiefy, 1966). The steady decrease in concentrations of thyroxine noted in this study was closely related to the increased level of oestradiol. Azouz *et al.* (1989) observed similar results with TSH and triiodothyronine in postpartum goats. This may indicate the independence of follicular growth from increasing levels of thyroid hormones during postpartum period. The results of this study demonstrate that the first follicular growth starts during the third week of lactation as indicated by increasing level of oestradiol. However, further studies are needed to determine the duration of the first oestrous cycle after kidding.

Table 1: Serum concentratins of oestradiol, progesterone, prolactin and thyroxine during postpartum period in goats (means ± SE).

Days after Parturition	Oestradiol (pg/ml)	Progesterone (ng/ml)	Prolactin (ng/ml)	Thyroxine (μg/dL)
1	130.00±0.39	0.27±0.09	4.60±0.49	8.67±0.47
2	120.00^{a}±3.49	0.28±0.07	4.90±1.42	6.88±0.75
3	26.70^{b}±0.47	0.33±0.05	5.33±2.05	7.43±0.49
7	25.00^{b}±0.50	0.13±0.03	4.43±0.76	7.00±2.02
14	58.00^{b}±0.82	0.24±0.09	5.03±1.10	6.30^{a}±0.34
21	93.00^{b}±1.20	0.16±0.08	5.95±2.36	6.30^{a}±0.46
28	121.00±5.11	0.15±0.05	9.25^{b}±0.43	5.10^{b}±0.09

a: means significantly different from day one level at $P < 0.05$.
b: means significantly different from day one level at $P < 0.01$.

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