HORMONE PROFILE IN SURTI GOATS DURING POSTPARTUM PERIOD

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Received 02-04-2016 ***Accepted 30-04-2016***

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ABSTRACT

The present study was undertaken to investigate changes in serum hormonal profile of post partum Surti goats. 20 recently parturated (treatment) goats and 20 non pregnant (control group) goats. Blood samples were collected from treatment group on 0, 7, 14, 21, 30 and 45 day post kidding and once from control group. Serum samples were analyzed for Tri-Iodothyronine (T_3) and Tetra-Iodothyronine /Thyroxine (T_4), cortisol, progesterone (P_4) and estradiol, T_4 and P_4 were significantly low whereas cortisol and estradiol levels were significantly high on 0 day post partum. Onset of kidding was marked by increased cortisol and estrogen and decreased progesterone.

KEY WORDS: Postpartum period, Hormone profile, Surti goat

INTRODUCTION

Surti goat breed found mainly in some regions of Gujarat and Maharashtra, are widely acknowledged for quality of meat and milk apart from their good reproductive potential and acclimatization to hot and humid environment. Based on these characteristics, its rearing becomes distinctively advantageous as compared to other livestock species not only from physiological but also from economical aspects. In spite of good production potential of Surti goats, this breed has been declared as endangered. Even though it faces a threat of extinction as adequate efforts and studies have not been done to support its survival.

Hormones indirectly play an important role in reproduction and ultimately contribute to milk and meat production. Due to activation of hypothalamic-pituitary-thyroid axis and hypothalamic–pituitary–adrenal axis during stress, hormones such as thyroxine (T_4), triiodothyroxine (T_3) (Todini, 2007) and cortisol are affected significantly. They also have role during postpartum phase (Ninan and Vadodaria, 2000). Hormones like estrogen and progesterone have importance during reproductive phase. Estrogens among all steroid hormones have widest physiological roles including during parturition. As far as progesterone is concerned goat is completely dependent on its only source that is corpus luteum. Reduced feed intake, endocrine and metabolic changes during postpartum transition period, makes it most stressful period. Therefore it is necessary to study these hormones related to parturition and lactation. Hence to augment our knowledge for attaining optimum transition the present study was planned to get detailed information on levels of some hormones during the post parturient period in Surti goats.

MATERIALS AND METHODS

Present study was conducted in the Department of Veterinary Physiology and Biochemistry, Veterinary College, NAU, Navsari. The animals under experiment were selected and maintained at LRS, NAU, Navsari. Total 40 Surti goats aged 36 to 51 month were selected for the study and divided into two groups (treatment group: postpartum and control group: non-pregnant goats) of 20 animals each. Approximately 5 ml of blood was collected from each animal on day of kidding, 7^{th}, 14^{th}, 21^{st}, 30^{th} and 45^{th} days postpartum in treatment group and once from control group and

serum was harvested and used for further analysis of hormonal parameters

ELISA based kits were used for assay of T_3 and T_4 (Diagnostic Pvt India Ltd., Thane, India), Cortisol (Diatek, Kolkata, India), Progesterone (Vishat Diagnostic Pvt Ltd, Thane, India) and estradiol (Diagnostics Biochem Canada Inc, Canada). The data obtained after laboratory analysis were analyzed using Randomized Block Design.

RESULTS AND DISCUSSION

Levels of various hormones analyzed during post-partum period in Surti goats is presented in table-1. A significant (P<0.01) difference was observed for T_4, cortisol, progesterone and estradiol during post partum.

T_3 and T_4

Serum T_3 concentration increased steadly from 0 day to 21st day of kidding followed by a slight decrease on 30th and 45th day of parturation. However, the increase in concentration of T_3 was found to be non-significant between control and treatment group.

Serum T_4 concentration was lowest (2.83±0.07 µg/dl) on 0 day of kidding and highest (5.56±0.15 µg/dl) on 14th day post partum. The values of T_4 on 7th, 30th and 45th day post partum were more or less similar. A significant (P<0.01) difference between control and treatment group was also observed.

Table 1: Hormonal profile (Mean ± SE) during 0 to 45th day post kidding in Surti Goats

Parameters	0 day	7 day	14 day	21 day	30 day	45 day	Control
T_3 (ng/ml)	0.54 ±0.09	0.73±0.18	0.80±0.17	0.95±0.12	0.92±0.14	0.85±0.16	0.91±0.17
T_4 (µg/dl)	2.83±0.07^{a}	4.76 ±0.07^{c}	5.56 ±0.15^{e}	5.28 ±0.07^{d}	4.84 ±0.08^{c}	4.73 ±0.08^{c}	4.31±0.05^{b}
Cortisol (µg/dl)	2.89 ±0.06^{d}	1.63 ±0.07^{c}	1.34±0.03^{b}	1.18 ±0.03^{a}	1.11±0.08^{a}	1.05 ±0.05^{a}	1.03±0.05^{a}
Estradiol (pg/ml)	65.13±3.83^{e}	57.17±2.83^{d}	53.52±2.63^{d}	51.50±3.01^{c}	49.55±1.84^{c}	44.44±1.91^{b}	20.76±1.37^{a}
P_4 (ng/ml)	0.55±0.04^{a}	0.56±0.03^{a}	0.74±0.08^{ab}	0.82±0.07^{b}	0.84±0.05^{b}	0.90±0.06^{bc}	1.04±0.12^{c}

Mean bearing different superscript differ significantly at P<0.01

Similar to present findings where Serum T_3 and T_4 concentration were lowest on the day of kidding followed by significant (P<0.01) increase for T_4 up to 14th day post partum have been reported in Tellicherry goats (Suganya and Gomathy (2009) and in black Bengal goats (Mondal, *et al*., 2014) and in Osmanabadi goats (Debbarma *et al*., 2013). The lowest values of T_3 and T_4 were observed on the day of kidding by Sandabe *et al*., (2004).

The significant decrease in T_4 on the day of kidding may be attributed to the inhibitory effect of glucocorticoids on TSH (Mondal *et al*., 2014). The increase in the concentrations of thyroid hormones during the postpartum period could be due to the influence of estrogen on the development of mammary gland. The decrease in T_4 on the day of kidding and thereafter increase may be due to initiation of lactation and continuous milk production. Decrease in concentration of T_4 may reduce the rate of oxidation and the rate of continuous breakdown and formation of protein and fat in mammary tissue. This will also tend to reduce the adverse effects of nutrient deficiency at the onset of lactation . The decrease in the concentration of plasma T_3 on the day of kidding and its subsequent elevation indicates enhanced utilization as a result of increased metabolism due to stress of

parturition during which the concentration of cortisol increases rather than being utilized by mammary tissue.

Cortisol

During post partum period the highest serum cortisol level was 2.89±0.06 µg/dl on 0 day. Thereafter the values decreased up to day 45th of post partum. The value of cortisol showed a significant difference with declining trend up to 21st day post partum. The values on 21st, 30th and 45th day post partum were similar to each other. The level of cortisol in control group was 1.03±0.05 µg/dl. There was significant ($P<0.01$) difference between treatment and control group. The elevation of serum cortisol on day of kidding is in agreement to the findings of Suganya and Gomathy (2009). During the postpartum period the decline in the values of cortisol are similar to the findings of Mondal *et al*., (2014) in goats. On the day of kidding, the elevated cortisol level could be due to stress induced by the foetus in initiating parturition (Ninan and Vadodaria, 2000). The secretion of ACTH from foetus during the last stage of partition may cause increase in concentration of cortisol.

Progesterone

Progesterone levels showed significant ($P<0.01$) difference with specific increasing trend during post partum period. The values ranged between 0.55±0.04 ng/ml on 0 day to 0.90±0.06 ng/ml on 45th day post partum. There was significant difference between treatment and control group. Similar pattern was reported by Debbarma *et al*., (2013) and Mondal *et al*., (2014).

Khan and Ludri, (2002) has reported that goats carrying twins have somewhat higher progesterone concentration than carrying single fetus. This may be due to presence of corpus luteum on ovary as the source of progesterone in goats. Progesterone also play important role in the mammary development during pregnancy.

Estradiol

During post-partum period, the values of estradiol level ranged from 44.44±1.91 to 65.13±3.83 pg/ml. The value of estradiol was significantly higher on the day of kidding and thereafter decreased significantly and lowest concentration was observed on 45th day post partum. There was significant difference between treatment and control group. Inter relationship exist between estradiol and cortisol as well as between estradiol and T_4 from 0 to 45th day post partum. Both estradiol and cortisol decreased throughout the days of post partum.

The sudden decrease in progesterone level might be contributing to initiation of parturition by causing a significant change in estrogen-progesterone ratio.

It was concluded from the present study that postpartum stress on the day of kidding was highest and thereafter it showed declining trend as evident by decreasing cortisol levels throughout postpartum upto 45th day but only upto 21st day postpartum in case of thyroid hormones owing to high metabolic demands of initial phase of lactation. Estradiol declined while progesterone increased thoughout postpartum up to 45th day.

ACKNOWLEDGMENT

Authors are thankful to- Dean, Veterinary College, NAU, Navsari for financial assistance and research facilities and to Research Scientist and Project Incharge of AICRP on goat improvement Surti field unit at LRS, NAU Navsari for availability of experimental animals.

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