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Serum enzyme profile during gestation and early post partum period in Osmanabadi goats

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The aim of this work was to study the blood enzyme profile during gestation in goats, in parturition under climatic conditions of Konkan region, Maharashtra State, India. The results indicated that the enzymes SGOT, AKP and LDH activity had significant differences during pregnancy and post partum; however SGPT did not show significant difference having a major role in maintenance of pregnancy and growth of foetus.

Reproduction is a major factor, contributing to the efficiency of milk and meat production by farm animals (Khanum *et al*. 2008). Pregnancy, parturition and lactation in goats being physiological stress conditions; the adaptive mechanisms are put into work, so as to bring the physiological balance during the various reproductive stages (Jacob and Vadodaria 2000). Pregnancy is a period during which the physiological status of the dam changes progressively as gestation advances because the foetus depend entirely on the dam for the supply of the nutrients and even after parturition for the formation of the colostrum. This necessitates a heavy load on the blood constituents (Hafez 1993). To meet these needs, the dam attempts to reset its metabolism and biochemical profile from normal reference range (Lind 1980). There is limited work done in India regarding the enzyme profile in goats during gestation and lactation under various agro-climatic conditions. The purpose of this study was to investigate changes in activities of serum enzymes, for Osmanabadi goats during gestation and early postpartum period.

The study was conducted on apparently healthy 3.2±0.91 year-old Osmanabadi goats (6) maintained at Bombay Veterinary College Instructional Livestock Farm Complex. The goats were synchronised by 14-day insertion of vaginal sponges impregnated with 60 mg progestagen and followed by intramuscular injections of 200 IU serum gonadotropin (folligon: intervet) after sponge removal. The goats were maintained under uniform standard conditions of feeding and management. The animals were kept in collective pens with asbestos roof, under natural daylight and temperature conditions. The goats were let loose for grazing from 7:00 AM to 11:30 AM At 12:00 PM, they were provided with concentrates, 200g each consisting of cottonseed cake, *tur chunni*, maize, wheat bran, salt and mineral mixture. At 2:30 PM silage (maize bran and maize fodder, 50% each)/ vegetable wastes were offered. Animals were allowed to drink clean water freely and vaccination was done regularly as per farm schedule.

Estrus was detected on the basis of visible signs and symptoms, and by using breeding bucks. Breeding buck for natural service was available in the farm. The goats, exhibiting estrus were served naturally/by artificial insemination (AI). Pregnancy diagnosis was done after one month of service/AI using ultra-sonic scanning. During morning hours, blood samples (5-6 ml) were collected aseptically from the jugular vein in separate sterile glass tubes, on the day of mating/AI (day 0 = day of estrus and natural service/AI) and thereafter every fortnightly during gestation, on the day of parturition and twice weekly up to 15 days post partum. Serum was separated by centrifugation and estimation of serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), alkaline phosphatase (AKP) and lactate dehydrogenase (LDH) were done by autoanalyser, using commercially available kits. Analysis of variance of the data was done using complete randomized design (CRD). Differences in means were tested using critical difference (CD) test.

The average length of gestation recorded in the goats was 148.83±1.93 days, with a range of 149 to 154 days. The average litter size was 1.33±0.90. The results of SGOT, SGPT, AKP and LDH are illustrated in Table 1.

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Table 1. Serum enzyme profile during gestation and early post partum period in Osmanabadi goats

Days after AI	SGOT (IU/L)	SGPT (IU/L)	AKP (IU/L)	LDH (IU/L)
0	62.52±3.37^{g}	21.40±1.86	106.42±13.07^{f}	370.83±7.14^{defg}
14	67.37±3.93^{fg}	18.33±1.94	126.97±13.83^{ef}	342.75±7.94^{fgh}
28	68.88±4.50^{fg}	19.00±1.29	35.33±15.89^{ef}	298.86±9.54^{h}
42	71.20±3.29^{fg}	18.53±1.65	142.53±6.77^{def}	358.21±8.20^{efg}
56	63.35±3.53^{fg}	18.90±1.90	152.85±4.98^{def}	327.81±4.78^{gh}
70	83.30±6.00^{ef}	19.52±2.11	159.57±5.75^{cdef}	396.63±4.46^{bcde}
84	81.43±3.57^{efg}	18.87±2.46	165.58±18.43^{bcdef}	371.45±4.43^{defg}
98	69.03±3.11^{fg}	15.62±1.52	171.70±13.47^{abcdef}	383.61±4.43^{cdef}
112	71.10±3.02^{fg}	17.45±1.93	160.95±13.18^{cdef}	372.62±4.19^{cdefg}
126	96.11±2.18^{de}	21.97±2.94	214.37±13.32^{abcdef}	386.17±4.37^{cdef}
140	94.97±3.47^{de}	17.30±1.07	236.88±3.24^{abcdef}	454.17±7.46^{a}
Day of kidding	99.45±3.17^{cde}	18.77±1.90	254.65±13.10^{abcde}	408.08±5.90^{abcde}
Post partum				
3	104.15±4.08^{bcd}	20.75±2.31	269.58±12.74^{abcd}	401.28±6.13^{abcde}
7	116.78±4.4^{abc}	19.05±1.43	288.45±12.48^{abc}	412.62±6.09^{abcd}
10	121.93±4.81^{ab}	15.37±1.61	299.87±12.20^{a}	425.62±6.84^{abc}
14	132.63±5.23^{a}	15.38±1.68	292.33±12.63^{ab}	439.63±7.46^{ab}

Day 0, day of AI; means, with at least one common superscript do not differ significantly (P<0.05).

Serum glutamic oxaloacetic transaminase (SGOT): The results suggest a significant (P<0.05) increase in SGOT activity during late pregnancy and early post partum period in agreement with observations of Vihan and Rai (1987) in goats. This increase could be attributed to occurrence of gluconeogenesis induced by pregnancy stress (Kaushik and Bugalia (1999) and due to onset of lactation, accompanied by a hypertrophy of hepatic cellular organelles (Marai *et al*. 2009). The increase might be contributed by impairment in some muscle and liver cells due to rapid gluconeogenesis associated with pregnancy. Further, Allen (1977) stated that the effect of acetylcholines in mobilizing amino acids from body proteins during pregnancy is associated with increased rate of hepatic deamination. The higher level of SGOT post partum suggested that the liver is still in a state of hyper-function, but to a lesser extent during pregnancy.

In contrast, Jana *et al.* (1991), Waziri *et al*. (2010) in goats throughout pregnancy and Khan *et al*. (2002) before and after lambing found no significant changes in SGOT activity.

Serum glutamic pyruvic transaminase (SGPT): In the present study nonsignificant changes in the activity of SGPT was observed throughout pregnancy and during post partum period is in accordance with Sandabe *et al.* (2004) in Sahel goats. However, Jana *et al.* (1991) reported higher SGPT activity during first term of pregnancy in goats.

Alkaline phosphatase (AKP): The significant (P < 0.05) increased levels of AKP during post partum in the present study is in accordance with Sarma and Ray (1985) in goats. The increase in enzyme activity appears to be due to the liberation of enzymes for placenta during pregnancy and the uterine events related to pregnancy. Mehta *et al.* (1989) expressed that higher phosphates are required for implantation. The AKP activity is influenced by changes in levels of estrogen in the blood and is higher during advanced stage of pregnancy. AKP is closely associated with bone metabolism and growth (Biogin *et al.* 1981). Numerically higher AKP levels at the pre partum stage could be attributed to presence of the placenta and in utero presence of bony structures in lambs having oestoblastic activity. A possible explanation for the increase in enzyme level could be due to increase in permeability of cell membrane/mitochondria. The change in permeability may be caused by catecholamines released from the adrenal cortex into circulation prior to parturition. Moreover the cellular damage during parturition could be responsible for the rise in the serum enzyme level. AKP is more important for the conceptus after embryonic membranes establish contact with maternal tissues. Uterine environment for all stages of development and survival to term is important and the levels are associated with implantation, embryo growth, survival, uterine carbohydrate metabolism and glycogen deposition. The higher value of AKP at post partum is in agreement with Gurgoze *et al.* (2009). This increase during lactation is due to an increase in the production of isoenzyme. However, Jana *et al.* (1991) and Waziri *et al.* (2010) did not find any significant changes throughout pregnancy and post partum.

Lactate dehydrogenase (LDH): Significant alterations in LDH levels were observed around kidding and during post partum period compared to early gestation and is similar to that reported by Visha *et al.* (2002), Sarma and Ray (1985) in goats. The higher level of LDH may be attributed to the reduction in progesterone level during the last stages of pregnancy and during parturition, since the progesterone is the largest inhibitor to LDH activity Marai *et al.* (2009).

Gurgoze *et al*. (2009) reported high serum LDH activity on day 14 post partum, similar to that reported in the present study. This increased LDH may be due to the decreased protein uptake which causes muscular destruction and then increases muscular enzyme activities. In this respect high level of serum LDH activity is evidence of the protein deficiency during lactation stage.

SUMMARY

The aim of this work was to investigate the serum enzyme profile during gestation and early post partum period in Osmanabai goats. It is evident that none of the serum enzymes viz. SGOT, AKP and LDH and SGPT activity has conspicuous variation during pregnancy though increase was observed around kidding and during early post partum period in the activity of SGOT, AKP and LDH compared mainly to values of first trimester of pregnancy. It indicates that under proper management, goats are fairly capable of tolerating gestational stress.

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