

## SERUM BIOCHEMICAL AND ENZYMATIC STUDIES DURING DIFFERENT STAGES OF PREGNANCY IN COWS

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### ABSTRACT

Serum biochemical and enzymatic profile of 20 cows in three different stages of pregnancy and non-pregnancy (control) was studied. The serum glucose values (mg/dl) obtained for the first, second and third trimester of pregnancy and in non-pregnant animals evinced a significant difference ( $p < 0.05$ ). The total protein concentration did not reveal any significant variation between groups. The serum cholesterol values differed significantly ( $p < 0.05$ ). The serum ALT value (U/L) at 3<sup>rd</sup> trimester was significantly higher than the values at 1<sup>st</sup> and 2<sup>nd</sup> trimester and in non-pregnant group of animals. AST activity (U/L) also differed significantly.

**KEY WORDS:** Cow. Serum Biochemical Constituents, Enzymatic Profile, Gestation Period.

### INTRODUCTION

The biochemical constituents of blood are known to alter according to physiological status of the organisms and are reflected in the blood metabolic profile (Antunoviæ *et al.*, 2002). Cows with high production potential will continue to lactate by using their own body reserve and maintain high level of production thereby reducing the concentration of various vital metabolites drastically (Tainurier *et al.*, 1984). The changes in blood concentration of glucose, protein or enzymes may all reflect alteration in liver function associated with fat accumulation during pregnancy. The conceptus not only shares the womb but also shares the blood through placental circulation. Hence, the estimation of haematological and biochemical indices of blood and other body fluids could have a predictive clinical importance for future prophylaxis. The present study was therefore undertaken to investigate the role of serum glucose, total protein, total cholesterol and enzymes like ALT and AST, during different stages of gestation period in cows.

### MATERIALS AND METHODS

The study was carried out on crossbred cows during the period from August 2012 to April 2013 maintained at Instructional Livestock Farm, OUAT, Bhubaneswar. Healthy crossbred cows were selected based on previous breeding records, date of AI and gynaeco-clinical examination. Pregnancy diagnosis was made by per rectal palpation 60 days post-AI. A total of 20 animals were investigated out of which 10 cyclic non-pregnant cows were taken as control and 10 pregnant cows each were investigated thrice at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> trimesters of gestation. Ten ml of blood was collected adopting routine aseptic procedure and 4 ml of serum harvested was kept at  $-40^{\circ}\text{C}$ . ALT and AST enzymes were estimated within 5 days of collection. All the parameters were estimated as per the standard procedure with the kit supplied by Crest Biosystems on biochemistry analyzers. The data generated were analyzed statistically. (Snedecore and Cochran, 1994)

### RESULTS AND DISCUSSION

From the results given in table 1 it is evident that during all stages of pregnancy in cows there was significant variations in the level of biochemical parameters i.e. glucose, protein and cholesterol

level decreased significantly . The decrease was observed from 1st trimester to 3rd trimester . Although decrease in protein level was non significant . The activities of the two aminotransferases ALT and AST increased significantly (P 0.05 ) although activity of AST was found to decrease in 2nd trimester , the reason is obscure. Comparison of the level of serum glucose between gestation stages revealed a significant difference (p<0.05). The decrease in blood glucose with the advancement of pregnancy has been attributed to foetal development and mobilization of maternal glucose to foetal blood circulation. Fowden *et al.* (2006) reported that there was significant uptake of glucose by the gravid uterus, foetus through active transport process and uteroplacental tissues at both mid and late gestation leading to comparatively lower level of blood glucose during this period. The finding of the present study is in close conformity with Bell *et al.* (1995) who attributed the decrease in glucose level to a higher energy requirement for foetal metabolism and/or progressive appearance of foetal insulin which was reported to pass into maternal blood.

There is a non-significant decrease in protein concentration with advancement of pregnancy. This might be due to anabolic effect of placental oestrogen and increased vascularity.

The significant variation with higher values in control non-pregnant animals and during mid to late stages of pregnancy as observed during present investigation is in close conformity with the findings of Alameen and Abdelatif (2012). The decreased serum cholesterol level from early stage of gestation towards the late gestation may be due to rise in nutritional demand by the developing foetus in uterus. Further the bioconversion of cholesterol to different steroid in placental tissue might have depleted cholesterol pool (Hagwane *et al.*, 2009).

**Table 1: Serum glucose, total protein, total cholesterol concentrations and transaminase activities in non-pregnant and pregnant cows**

Gestation period	Serum constituents				
	Glucose (mg/dl)	Total protein (g/dl)	Total cholesterol (mg/dl)	ALT activity (U/L)	AST activity (U/L)
Control (non-pregnant)	52.89±0.87 <sup>a</sup>	8.28±0.26	202.98±10.19 <sup>a</sup>	17.87±3.28 <sup>a</sup>	40.63±2.97 <sup>ab</sup>
1 <sup>st</sup> trimester (0- 3 month)	52.08±1.04 <sup>ac</sup>	8.22±0.27	201.46±10.32 <sup>a</sup>	17.86±3.66 <sup>a</sup>	42.27±3.45 <sup>ab</sup>
2 <sup>nd</sup> trimester ( 4-6 month)	49.47±1.06 <sup>bc</sup>	7.77±0.26	162.08±8.97 <sup>b</sup>	21.44±3.32 <sup>a</sup>	32.31±4.02 <sup>a</sup>
3 <sup>rd</sup> trimester ( 7 – 9 month)	47.58±1.05 <sup>b</sup>	7.44±0.30	130.91±12.98 <sup>b</sup>	36.67±5.12 <sup>b</sup>	50.98±5.42 <sup>b</sup>

Figures with the common same superscript within a column do not differ significantly.

In the present study the ALT activity (U/L) in non pregnant cows was almost similar to 1<sup>st</sup> trimester of gestation and it increased to during 2<sup>nd</sup> trimester of pregnancy with a significant increase in 3<sup>rd</sup> trimester. Comparison of AST activity at different stages of gestation with non-pregnant cows revealed a significant difference (p<0.05). The present findings of AST activity (U/L) in non-pregnant cows was 40.63 ± 2.97 which is in close proximity with Singh *et al.* (1972). The activity during 1<sup>st</sup> trimester showed a slight increasing trend but decreased during 2<sup>nd</sup> trimester while a significant increase was observed during 3<sup>rd</sup> trimester. The increased ALT and AST activity with the advancement of pregnancy might be due to physiological variation; inherent hepato-cellular deviation coupled with stress inflicted by the growing foetus and negative energy status encountered which finds the support of Cebra *et al.* (1997). This rise could also be attributed to occurrence of

gluconeogenesis induced by pregnancy state. During the 3<sup>rd</sup> trimester of gestation there is more growth of foetus as compared to the preceding trimester, it might have led to higher release of ALT and AST activity in compensating normal physiological and mechanical activity of the dam.

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