

HORMONAL AND IMMUNOLOGICAL STUDIES IN DIFFERENT TRIMESTER OF PREGNANCY IN COWS

P.P. HARICHANDAN¹, D.N. MOHANTY², S. DAS³ AND B.K. PATRA⁴

Department of Animal Reproduction, Gynaecology & Obstetrics,
College of Veterinary Science and Animal Husbandry, O.U.A.T, Bhubaneswar-751003

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ABSTRACT

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This investigation was carried out with an objective to study serum progesterone and total immunoglobulin levels of cows in three different trimesters of pregnancy. A total of 10 pregnant cows were selected for the investigation besides 10 normal, healthy and non-pregnant cows at oestrus which were considered as control group. Blood sample collected in each gestational stage and serum sample were estimated through kits supplied by Crest Biosystems. The serum progesterone values (ng/ml) observed in first, second and third trimester of pregnancy were 4.85 ± 1.5 , 5.76 ± 0.46 and 4.75 ± 1.36 respectively. The cows at oestrus recorded a value of 0.88 ± 0.14 (ng/ml) for serum progesterone concentration. The analysis of variance revealed a highly significant difference ($p < 0.01$) among various stages of pregnancy and non-pregnant (control) group. The total immunoglobulin concentrations in blood serum (g/dl) were estimated to be 2.65 ± 0.10 , 3.20 ± 0.10 , and 2.73 ± 0.06 for 1st, 2nd and 3rd trimester of pregnancy respectively whereas in non-pregnant control group the value was 2.71 ± 0.07 g/dl. Analysis of variance revealed a significant difference ($p < 0.01$) among various trimester of pregnancy.

Key word: Cow, Pregnancy trimester, Total Immunoglobulin, Progesterone profile

Progesterone from ovarian source influences the production of endometrial secretion necessary for embryonic development (Giesert *et al.*, 1992). Progesterone is essential for preparation of the reproductive tract to facilitate implantation of embryo and maintenance of pregnancy (Hafez and Hafez, 2000). Wiltbank *et al.* (2006) proposed that the changes in physiological norms noted in high producing cows may be due to high blood flow to the liver resulting from high dry matter intake, which causes low circulating concentration of hormones. Thus, it seems reasonable to assure that one of the causes of early foetal loss in high producing dairy cows could be sub optimal concentrations of progesterone. During pregnancy, various changes in the immunoglobulin profile are also correlated with the immune status of the newly born calves and

play an important role in antibody mediated defence mechanism (Earley *et al.*, 2000). The immune status of body undergoes variations during priming effect of different major steroid hormones. In this context, the total immunoglobulin fraction of the blood has been estimated at different period of pregnancy along with non-pregnant cows for comparison. The present study was therefore undertaken to investigate the serum progesterone profile and total immunoglobulin concentration during 1st, 2nd and 3rd trimester of pregnancy and to correlate aforesaid parameters in precipitating peri parturient problems and their benefits.

The present study was carried out in the Department of Animal Reproduction, Gynaecology and Obstetrics, C.V.Sc & A.H, OUAT, Bhubaneswar during the period from August 2012 to April 2013. Healthy crossbred cows were selected based on previous breeding records, date of AI and gynaecological examination. Pregnancy diagnosis was done as per the procedure laid down by Zemjanis (1970).

¹ Corresponding author: Ph.D.Scholar, ARGO,
E mail ID- harichandanprangya@gmail.com

² Professor and Head

³ Director, TVCC

⁴ Assistant Professor, ARGO.

Ten pregnant cows and ten non-pregnant normal cyclic animals were considered for this experiment. Serum progesterone and total immunoglobulin levels were assayed on the basis of their stages of pregnancy i.e. 1st (0-3 months), 2nd (4-6 months) and 3rd (7-9 months) trimester, from experimental cows and was compared with control group at oestrus. Ten millilitre of blood was collected adopting routine aseptic procedure and serum was harvested from it and stored at -40°C for further study. Progesterone was assayed for quantitative estimation by direct immune-enzymatic technique using kit supplied by crest biosystem. Total immunoglobulin in the serum was determined by using ammonium sulphate-sodium solution precipitated technique as designed for total protein assessment in Biuret method.

The statistical analysis of the data was done as per the methods described by Snedecor and Cochran (1994).

The serum progesterone values (ng/ml) at first, second and third trimester of pregnancy were 4.85 ± 1.50 , 5.76 ± 0.46 and 4.75 ± 1.36 , respectively. The non-pregnant cows at oestrus recorded a value of 0.88 ± 0.14 ng/ml for serum progesterone concentration which is in close agreement with the findings of Singh *et al.* (1998). The significant increase in the level of progesterone from oestrus to mid pregnancy is due to growth of CL after ovulation. The higher values of progesterone during the first trimester of gestation might be associated with the formation of matured luteal tissue following ovulation. Significantly lower level of progesterone in last trimester observed in the present study indicates the progressive dulling effect of luteal function and conversion of placental progesterone to oestrogen that might have further reduced the value of progesterone which is required for activation of myometrium for initiation of parturition.

The total serum immunoglobulin concentration (g/dl) in non-pregnant control group was 2.71 ± 0.07 in present study which corroborates the findings of Sivaraman *et al.* (2002). The values in 1st, 2nd and 3rd trimester of pregnancy were 2.65 ± 0.10 , 3.20 ± 0.10

and 2.73 ± 0.06 (g/dl), respectively. Test of significance revealed a highly significant difference between 1st and 2nd trimester of pregnancy ($p < 0.01$) where as a significant difference ($p < 0.05$) was observed between control group and second trimester of pregnancy. The increase in the globulin concentration during pregnancy might be due to change in their endocrine profile where an animal's transition occurs from non-gravid to gravid state and their transformation might have influenced more production of globulin by B-lymphocytes. The decrease in immunoglobulin concentration in the terminal stage of pregnancy in cows might have occurred because of transition of globulin fraction from the blood to the mammary gland and tubular genital tract which is in partial agreement with Liberg (1977).

Thus, the present study implies that the role of progesterone is vital for sustenance of pregnancy showing significantly higher value in pregnant cows compared to non-pregnant ones. The significant increase of progesterone in mid gestation indicates augmentation of this hormone from other sources (adrenal cortex, placenta) besides corpus luteum. The increase in total immunoglobulin concentration in mid gestation may be due to change in endocrine profile whereas; decrease total immunoglobulin concentration during 1st trimester of gestation is suggestive of immunomodulation. From the above observation it can be inferred that evaluation of progesterone and immunoglobulin at specific stage of gestation can give an insight for a precise understanding of the predisposing factor so as to evolve an approach for ameliorating the postpartum complication in dairy cattle.

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