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SERUM TRACE MINERALS VARIATION DURING PRE AND POST-PARTUM PERIOD IN NILI-RAVI BUFFALOES

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ABSTRACT

The present study was conducted with the objective to the iron, copper and zinc variations in serum of Nili-Ravi buffaloes during pre and post partum periods determine. The study was carried out on 35 pregnant Nili-Ravi buffaloes during June 2008 to October 2008 at Buffalo Research Institute, Pattoki, District Kasur. Blood samples were taken from these buffaloes during three, two and one week before parturition, at the time of parturition and then one, two and three weeks after parturition. Serum iron, copper and zinc were determined on Atomic Absorption Spectrophotometer. The mean serum iron and copper concentration differed significantly ($P<0.05$) among different groups. There was decreasing tendency of iron concentration towards parturition. The copper concentration was found significantly higher ($P<0.05$) at the day of parturition and it increased thereafter significantly ($P<0.05$) following three weeks. The serum zinc concentrations increased significantly ($P<0.05$) among last three weeks before parturition. There was non-significant ($P>0.05$) decrease in zinc concentration between 1st and 2nd week after parturition where as a significant increased ($P<0.05$) in zinc concentration took place during 3rd week after parturition. Serum zinc concentrations also dropped at the day of parturition.

Key words: Nili-Ravi buffalo, parturition, serum, iron, copper, zinc.

INTRODUCTION

Apart from energy and protein, minerals are the main limiting factor for livestock production (Judson and McFarlane, 1998). Minerals are the essential nutrients bearing a significant role in the animal reproduction, because their excess or deficiency produces detrimental effect on the performance of livestock. Trace elements Cu, Co, Zn, Fe, Se, I, Mo, Mn and certain macro-elements like K, Ca, Na, Cl, P are found to be very essential for normal livestock growth (Underwood, 1981). Both macro and micro minerals play a vital role in augmenting production and reproduction in farm animals and their deficiency causes impairment in body functions (Corah, 1996). Deficiency of different minerals as single or combined results in reproductive failure. In ruminants, number of factors like season and physiological variations such as those in pregnancy and lactation can affect serum chemistry and minerals levels (Yildiz *et al*., 2005). Blood metabolic profile changes are important as they help in monitoring the severity of metabolic diseases and their treatment.

There is scanty information about the micro mineral status before and after parturition in Nili-Ravi buffaloes. The present study was therefore undertaken with the objective to determine the iron, copper and zinc variations in serum of Nili-Ravi buffaloes during pre and post partum periods.

MATERIALS AND METHODS

The study was carried out on 35 pregnant Nili-Ravi buffaloes during June 2008 to October 2008 at Buffalo Research Institute, Pattoki, District Kasur. All the experimental buffaloes were free from brucellosis, tuberculosis and mastitis. These buffaloes were housed in the same shed with free access to open air. Each buffalo was identified by ear tag. The animals received their diet according to gestation stage and had free access to drinking water and common salt.

Blood samples were taken from these buffaloes during three, two and one week before parturition, at the time of parturition and then one, two and three weeks after parturition. Twenty ml of blood from each buffalo was collected in a clean glass test tube through venipuncture of jugular vein using a sterile 16 gauge needle. Test tubes containing blood were placed in a slanting position for one hour to let the serum separate. The serum was then aspirated carefully with a pipette, placed in glass vials, labelled and stored at -20˚ C till analyzed.

Wet digestion of the samples was done by following the method of Richard (1968). Serum iron, copper and zinc were determined on Atomic Absorption Spectrophotometer (Model AA-5). Standard solutions for iron, copper and zinc were prepared using the available reagent grade salts. Each standard solution was run one by one for these minerals and their absorbance was recorded. Standard curves for each mineral were

constructed by plotting the absorbance of standards against their concentrations. Then concentrations of respective minerals in the samples were calculated from their respective standard curves.

The mean (±SE) values for serum iron, copper and zinc of experimental buffaloes were calculated. The data were analyzed by using statistical package SPSS 13, to determine the significant variations among different groups, repeated measure ANOVA was applied at 5% level of significance.

RESULTS AND DISCUSSION

The mean (±SD) values for iron, copper and zinc during pre and post partum period are presented in table 1 and the graphical representation of these values are shown in figure 1.

Table 1: Mean (±SD) values (ppm) for iron, copper and zinc during different weeks during pre and post partum period

Weeks pre and post partum	**Iron** (n=35)	**Copper** (n=35)	**Zinc** (n=35)
Three week pre partum	2.22^{e}±0.10	0.34^{a}±0.10	1.92^{a}±0.08
Two week pre partum	2.17^{d}±0.6	0.50^{b}±0.08	2.22^{b}±0.11
One week pre partum	2.09^{b}±0.11	0.88^{c}±0.06	2.43^{e}±0.06
Day of parturition	2.02^{c}±0.08	1.48^{d}±0.11	2.28^{c}±0.09
One week post partum	1.98^{a}±0.11	1.92^{f}±0.09	2.15^{d}±0.09
Two week post partum	1.96^{a}±0.09	2.01^{e}±0.12	2.16^{d}±0.05
Three week post partum	2.07^{b}±0.08	1.88^{g}±0.06	2.25^{bc}±0.10

Values sharing similar superscripts in a column differed non-significantly

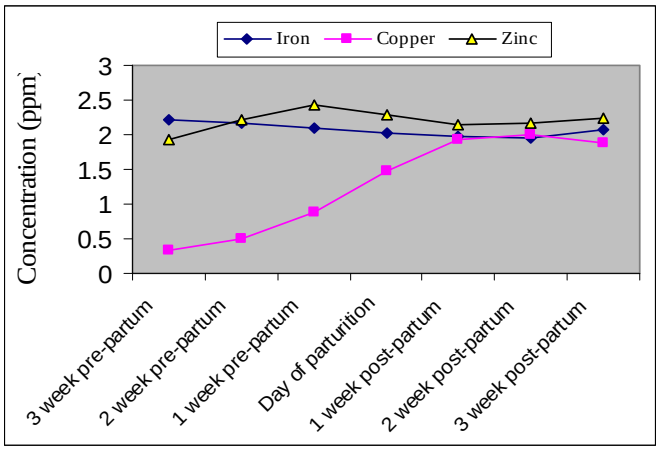

Fig. 1: Trace minerals concentration during different weeks pre and post partum periods

The mean serum iron concentration differed significantly among different groups. There was decreasing tendency of iron towards parturition. This may be because of utilization of iron by mammary gland. Azab and Maksoud (1999) also reported similar findings in Baladi goat. The mean serum copper concentration showed a significant increasing trend (P<0.05) pre and post partum periods. These findings are in consistent with the results of Mehere *et al.* (2002). They observed an increasing trend of copper during last month of pregnancy and towards parturition. Cerruloplasmin in plasma increases with increasing estrogen during late pregnancy. Thus it is normal that copper concentrations increases in pregnant cattle (Yokus and Cakir, 2006). In the present study, the serum copper concentrations were also increased with advancing gestation and this may be due to increased estrogen levels towards the end of gestation. The copper concentration was significantly high (P<0.05) at the day of parturition. This is because of conservation of copper by increasing absorption and preventing losses via excretory pathways in order to accommodate the high demands of fetus. Pathak *et al.* (1986) also reported that an increase in copper concentration from last 10 days of gestation towards parturition is a requirement to trigger on the endocrine glands related to the physiology of initiation of labor pain and process of parturition.

The serum zinc concentrations differed significantly (P<0.05) among last three week before parturition. There was a significant (P<0.05) increase in zinc concentration where as a significant gradual increase (P<0.05) in zinc concentration took placed during three weeks after parturition. These results corroborate with Mehere *et al*. (2002). There exist a correlation between plasma zinc status and events occurring during gestation and parturition (Yokus and Cakir, 2006). In the present study, serum zinc concentrations dropped non-significantly at the day of parturition. In cows, the zinc levels had a tendency to decrease during parturition when copper levels are high. Drop in zinc concentration in the present study might be the result of copper inhibition of zinc intestinal absorption (Alonso, 2000).

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