

**SERUM CONCENTRATIONS OF COPPER, IRON, ZINC AND SELENIUM IN CYCLIC AND ANOESTRUS NILI-RAVI BUFFALOES KEPT UNDER FARM CONDITIONS**

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**ABSTRACT**

The present study was planned to determine serum micro-mineral status (copper, iron, zinc, selenium) in cyclic and anoestrus buffaloes during March to June, 2008. Serum micro-mineral contents were determined by atomic absorption spectrophotometer. Mean serum concentrations of copper, iron, zinc and selenium in cyclic buffaloes were 70.59 µg/dl, 370 µg/dl, 181.4 µg/dl and 0.10 µg/ml, respectively. The corresponding values for anoestrus animals were 62.23 µg/dl, 358.13 µg/dl, 164.07 µg/dl and 0.07 µg/ml. Compared with cyclic buffaloes, there were significantly lower serum copper, iron, zinc and selenium levels in anoestrus buffaloes ( $P < 0.05$ ). It was concluded that deficiencies of copper, iron, zinc and selenium either singly or in combination, could be responsible for anoestrus condition in Nili-Ravi buffaloes. Thus, by improving the nutritional status, fertility can be improved in buffaloes.

**Key words:** Buffaloes, cyclic, anoestrus, serum, micro-minerals.

**INTRODUCTION**

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 including Cu, Co, Zn, Fe, Se, I, Mo, Mn and certain macro-elements like K, Ca, Na, Cl, P have been found to be very essential for normal livestock growth (Underwood, 1981). Trace elements may function as cofactors, as activators of enzymes, or as stabilizers of secondary molecular structure (Valee and Wacker, 1976). Deficiency or excess of minerals like P, Cu and Zn have been associated with subnormal fertility and anoestrus conditions (Moddie, 1965). It was hypothesized that the deficiency or excess of some micro minerals in the blood may cause anoestrus in buffaloes. The present study was, therefore, designed to determine levels of micro minerals (Cu, Fe, Zn, Se) in the serum of cyclic and anoestrus Nili-Ravi buffaloes.

**MATERIALS AND METHODS**

The present study was conducted on 30 adult Nili-Ravi buffaloes kept at the Buffalo Research Institute, Pattoki, District Kasur, Pakistan during March to June, 2008. Animals were divided into two groups on the basis of their reproductive status. Group A included 15 buffaloes with normal cyclic estrus cycle and group B included another 15 buffaloes with the history of anoestrus. To confirm anoestrus, rectal palpation in anoestrus buffaloes (group B) was done on two occasions at an interval of 11 days.

About 20 ml of blood from each animal was collected in a clean sterilized glass test tube through

jugular venipuncture, serum was harvested and stored at  $-20^{\circ}\text{C}$ . Wet digestion of samples was done, as described by Richard (1968). The serum copper, iron, zinc and selenium were determined by using atomic absorption spectrophotometer (AA-5). The mean values ( $\pm$  SE) for copper, iron, zinc and selenium of two experimental groups of buffaloes were calculated. To determine the significance between cyclic and anoestrus group, two sample independent t-test was applied, using statistical package SPSS 13.

**RESULTS AND DISCUSSION**

The mean serum copper level in cyclic buffaloes was  $70.59 \pm 2.59$  µg/dl vs  $62.23 \pm 2.20$  µg/dl in anoestrus buffaloes, the difference being significant ( $P < 0.05$ ). Lower copper concentration in anoestrus cattle has been reported in various studies (Deshpande *et al.*, 1981; Dabas *et al.*, 1987; Dutta *et al.*, 2001). Estrogen hormone has been reported to increase copper level (Sato and Henkin, 1973) and the lower level of copper in anoestrus buffaloes in the present study may be due to lower estrogen level in anoestrus animals (Rajkumar *et al.*, 2006).

Mean serum iron contents in cyclic and anoestrus buffaloes were  $370 \pm 2.88$  and  $358.13 \pm 3.46$  µg/dl, respectively, the difference was significant ( $P < 0.05$ ). These findings are in agreement with those of Dutta *et al.* (2001). Lower level of iron causes normochromic anemia in animals, which in turn affects the response of ovarian receptors to estrogen, resulting in anoestrus condition in animals (Kumar and Sharma, 1993).

Mean serum zinc level in cyclic buffaloes was significantly higher ( $181.4 \pm 2.35$  µg/dl) than in anoestrus buffaloes ( $164.07 \pm 2.01$  µg/dl). Dutta *et al.*

(2001) also reported low zinc level in anoestrus heifers. Fall in zinc level was associated with fall in steroid hormone concentrations which indicated that there was some co-relation between plasma zinc levels and progesterone-estrogen levels for proper reproductive processes.

Selenium level in the cyclic buffaloes was  $0.10 \pm 0.008$   $\mu\text{g/ml}$  and in anoestrus buffaloes it dropped significantly to  $0.07 \pm 0.010$   $\mu\text{g/ml}$ . In cattle and sheep, selenium deficiency is associated with reduced fertility (Hidiroglou, 1979) and high selenium concentration reduces the incidence of anoestrus (Harrison *et al.*, 1984).

It was concluded that the deficiencies of copper, iron, zinc and selenium either singly or in combination could be responsible for anoestrus condition in Nili-Ravi buffaloes and by improving the nutritional status the fertility can be improved in females of this species.

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