

Serum zinc, copper and cobalt level in normal cyclic, anoestrus and repeat breeder buffaloes

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ABSTRACT

In the present study, serum concentration of trace minerals was estimated in normal cyclic, anoestrus and repeat breeder buffaloes. The serum level of Zn was lower in anoestrus ($0.72 \pm 0.05 \mu\text{g/ml}$) and repeat breeder buffaloes ($0.88 \pm 0.15 \mu\text{g/ml}$) as compared to normal cyclic buffaloes ($1.00 \pm 0.04 \mu\text{g/ml}$). However, the difference was not significant. The serum level of Cu was significantly ($P < 0.05$) lower in anoestrus ($0.59 \pm 0.03 \mu\text{g/ml}$) and repeat breeder buffaloes ($0.62 \pm 0.03 \mu\text{g/ml}$) as compared to normal cyclic buffaloes ($0.88 \pm 0.03 \mu\text{g/ml}$). The serum level of Co was non-significantly lower in anoestrus ($0.018 \pm 0.001 \mu\text{g/ml}$) and repeat breeder buffaloes ($0.016 \pm 0.001 \mu\text{g/ml}$) as compared to normal cyclic buffaloes ($0.022 \pm 0.002 \mu\text{g/ml}$).

Key words: Anoestrus, repeat breeder, serum trace minerals, buffalo, cyclic

Reproductive failure accounts for more than half of all losses resulting from disease of buffaloes. This picture is reflected in the increasing number of cases of infertility reported in veterinary clinics and animal health camps (Kaikini, 1989). In spite of optimum nutrition, there are still cases of anoestrus and repeat breeders without any malformation or genital disorders detected on repeated gynaeco-clinical examinations. It is possible that anoestrus and repeat breeding in healthy buffaloes may be due to mineral and/ or trace elements imbalance or deficiency. In view of these aspects, a study was conducted to examine the zinc, copper and cobalt levels of buffaloes having reproductive problems.

Ninety infertile buffaloes aged 3-9 years, fed with paddy straw, wheat straw, sugarcane tops and berseem were selected from certain areas of Rohilkhand region of Uttar Pradesh state. Among 90 infertile buffaloes, 28

were anoestrus and 62 were repeat breeder. Thirty five non cyclic buffaloes of the same region served as control. Approximately, 10 ml of blood was collected in a clean sterile test tube from jugular vein puncture using 16 gauze sterilized needle from both infertile and control buffaloes. Serum was separated and stored at -20°C till analysis. Serum Zn, Cu and Co were estimated by using atomic absorption spectrophotometer (ASS-4129 ECL) after digesting the serum samples as per the procedure described by Kolmer *et al.* (1951). The data were analyzed by student 't' test (Snedecor and Cochran, 1989).

The serum level of Zn was lower in anoestrus buffaloes ($0.72 \pm 0.05 \mu\text{g/ml}$) as compared to those in normal cyclic buffaloes ($1.00 \pm 0.04 \mu\text{g/ml}$). However, the difference was not significant. Our findings are in conformity with Sharma *et al.* (1999) who also recorded no significant difference in Zn Concentration among cyclic, anoestrus & suboestrus buffaloes. Kirchgernsner *et al.* (1976) also did not observe any significant difference in Zn concentration of normal and anoestrus cows. However, Kalita *et al.* (1999) reported significantly low level of plasma Zn in anoestrus heifers than those in normal cyclic heifers.

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The serum level of Zn was lower in repeat breeding buffaloes ($0.88 \pm 0.15 \mu\text{g/ml}$) as compared to normal cyclic buffaloes ($1.00 \pm 0.04 \mu\text{g/ml}$), however the difference was not significant. Our findings are in agreement with the findings of Kalita *et al.* (1999). However, Manickam *et al.* (1977) reported significantly lower level of Zn in repeat breeder cows as compared to normal cyclic cows. Hidiroglou (1979) suggested that Zn acts as a co-factor in certain enzyme system and can influence reproductive performance of ruminants. The beneficial effect of Zn on the reproductive function may be either direct (Zn complexed with a specific ligand in gonad) or indirect by way of chain hypothesis, gonadotrophin and sexual glands through affecting the biosynthesis of proteins and transmission of genetic information (Prasad *et al.* 1989). Zn may play a significant role either singly or in combination with other elements for maintaining the reproductive rhythm of the animal.

The serum level of Cu in anoestrus buffaloes ($0.59 \pm 0.03 \mu\text{g/ml}$) was significantly lower as compared to those in normal cyclic buffaloes ($0.88 \pm 0.03 \mu\text{g/ml}$). Our findings are in agreement with the findings of Sharma *et al.* (1999). In contrary to this, Kalita *et al.* (1999) observed no significant difference in Cu level between anoestrus and normal cyclic cows.

The concentration of Cu was also significantly lower in repeat breeder buffaloes ($0.62 \pm 0.03 \mu\text{g/ml}$) as compared to those in normal cyclic buffaloes ($0.88 \pm 0.03 \mu\text{g/ml}$). Our findings are in agreement with the Nandi *et al.* (1999). However, Kalita *et al.* (1999) did not find any significant difference in Cu level between repeat breeder and normal cyclic cows.

The Cu has been suggested to play a vital role in enzymatic functions of the body. Its decreased level in

Table 1: Serum Zn, Cu and Co profile in normal cyclic, repeat breeder and anoestrus buffaloes

S. No.	Parameters	Normal cyclic (n=35)	Repeat breeder (n= 62)	Anoestrus (n=28)
1	Zn ($\mu\text{g/ml}$)	1.00 ± 0.04^a	0.88 ± 0.15^a	0.72 ± 0.05^a
2	Cu ($\mu\text{g/ml}$)	0.88 ± 0.03^a	0.62 ± 0.03^b	0.59 ± 0.03^b
3	Co ($\mu\text{g/ml}$)	0.022 ± 0.002^a	0.016 ± 0.001^b	0.018 ± 0.001^{ab}

Values bearing different superscripts in a row differ significantly ($P < 0.05$)

anoestrus and repeat breeder animals might suggest an impairment of this enzymatic function resulting in infertility condition. Georgievskii (1981) observed that copper is involved in maintaining activity of labile hypophyseal hormones in blood. It facilitates prostaglandin E_2 ($\text{PG } E_2$) action, probably by enhancing $\text{PG } E_2$ -receptor binding. Cu deficiency have effect on physiological functions in general and reproduction in particular (Hidiroglou, 1989). It has also been observed that administration of Cu improves the reproductive performance of the animals. Kulkarni *et al.* (1994) found that feeding of Cu deficient diet results in anoestrus condition and feeding of CuSO_4 or administration of copper glycinate intramuscularly reversed gonadal activity to normal functional status by increasing copper concentration.

The concentration of Co was nonsignificantly lower in repeat breeder ($0.016 \pm 0.001 \mu\text{g/ml}$) and anoestrus buffaloes ($0.018 \pm 0.001 \mu\text{g/ml}$) as compared to normal cyclic buffaloes ($0.022 \pm 0.002 \mu\text{g/ml}$). Co has been found to be required in the synthesis of vit. B12 and its deficiency has been associated with anoestrus, delayed onset of puberty (Hidiroglou, 1979; Pugh *et al.*, 1985), abortions, nonfunctional ovaries (Wagner, 1962), birth of weak calves and general infertility (Alderman, 1963). It has been observed by several workers that cobalt deficiency impaires breeding performance and the most common manifestation of cobalt deficiency is marked reduction in conception rate with reduction in oestrus during normal breeding season.

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