BLOOD PLASMA TRACE ELEMENTS IN REPEAT BREEDING MEHSANI BUFFALOES

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ABSTRACT

Blood plasma trace mineral analysis indicated that the levels of blood plasma copper, iron, zinc and manganese were significantly higher ($P < 0.05$) in normal fertile as compared to repeat breeding Mehsani buffaloes at 0, 10th and 20th days post-estrus.

Key words: Trace minerals, Repeat breeder, Buffalo

The trace mineral deficiency plays an important role in repeat breeding in buffaloes. Hidiroglou (1979) in his review stated that various minerals can influence reproductive performance of ruminants. Reproductive failure may be induced by deficiencies of single or combined trace elements and by their imbalances. Concomitant infertility in buffaloes is believed to be associated with enzymatic dysfunction resulting from these deficiencies. Based on the findings pertaining to various trace elements, it is evident that the relationship between biochemical attributes and fertility in dairy animals is vague, complex and dynamic. Nutrition remains a variable -that needs to be further evaluated. Despite the lack of well controlled and planned studies, many researchers, veterinarians and dairymen still feel that nutrition plays a critical role in the reproductive efficiency of dairy cattle and buffaloes. Minerals and trace elements play an important role in the promotion of action of hormones and enzymes at sub-cellular level in an integrated fashion (Dhoble and Gupta, 1986). Das *et al.* (2002) explained that cows with repeat breeding problem without any apparent gynaecological abnormality or infection could be suspected for mineral deficiency. Hence the present study was conducted to evaluate role of trace elements deficiency in repeat breeding Mehsani buffaloes.

MATERIALS AND METHODS

Blood plasma trace elements *viz.*, copper, Iron, manganese and zinc were determined as per the method of Oser (1979) using tri-acid digested samples (Sulphuric acid : Perchloric acid : Nitric acid - 1: 2:1) with atomic absorption Spectrophotometer (Model AA646, Shimadzu make) Blood plasma trace elements were estimated in all the repeat breeder and normal fertile Mehsani buffaloes. Data were analyzed using randomized block design (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The average blood plasma level of trace elements during different phases of estrous cycle in repeat breeding and normal cycling Mehsani buffaloes has been presented in the Table.

Mean copper levels ranged between 0.766 ± 0.032 to 0.779 ± 0.031 ppm and 0.53 ± 0.05 to 0.54 ± 0.054 ppm during different phases of estrous cycles in normal fertile and repeat breeding Mehsani buffaloes, respectively. The mean plasma copper levels were significantly higher ($P < 0.05$) in the normal fertile buffaloes than repeat breeding buffaloes during all the phases. These results are in agreement with the results

obtained by Manickam et *al.* (1977), Parmar *et al.* (1986), El-Azab *et al.* (1993), Rupde et *al.* (1993), Saxena (1993), George and Nair (1995), Prasad and Rao . (1997), Chandrakar *et al.* (2002) and Das *et al.* (2002) in cows. Hypocuprosis in cattle is shown to be associated with reproductive disorders including fertility failure (Hidiroglou, 1979; Saxena, 1993). Whenever such disorders are attributed to copper deficiency, the most common symptoms are prenatal mortality, particularly early embryonic loss (Hidiroglou, 1979). Significantly higher pooled overall mean plasma copper levels observed in the present study in normal fertile as compared to repeat breeding buffaloes very well supports the above contentions. It is however, not clear whether copper status alone is influencing the reproductive status of the ruminants or it is the definite ratio between trace minerals which may be the deciding factor in regulating fertility.

Mean plasma iron level among repeat breeder and normal fertile Mehsani buffaloes varied from 2.11 ±0.06 to 2.13 ± 0.05 ppm and 2.78 ± 0.06 to 2.81 ± 0.09 ppm, respectively; between different phases of estrous cycle. Mean plasma iron levels in normal fertile group of buffaloes were significantly ($P < 0.05$) higher than, those of repeat breeding Mehsani buffaloes during all the phases studied. The present findings are in agreement with Manickam *et al.* (1977), Parmar *et al.* (1986) and Dutta et *al.* (2002) in cows. Iron is abundant in all feeds and fodders; hence a deficiency in adult ruminant seems improbable. But in some instances very low availability of iron in some roughages and its physiological absorption at intestinal level could adversely affect the ruminant reproduction which is evident in this study.

Mean zinc levels varied from 1.35 ± 0.04 ppm to 1.39 ± 0.04 ppm and 1.89 ± 0.02 to 1.91 ± 0.02 ppm in various groups of repeat- breeder and normal fertile Mehsani buffaloes during different days of estrous cycle. Among the group of normal fertile buffaloes, the mean plasma zinc level was significantly ($P<0.05$) higher than repeat breeding Mehsani buffaloes during all the stages of estrous cycle. The pattern of significantly lower plasma zinc levels observed in repeat breeding Mehsani buffaloes in the present study is in full agreement with the observations made by Manickam *et al.* (1977), Parmar *et al.* (1986), El-Azab *et al.* (1993), Rupde *et al.* (1993), Prasad and Rao (1997), Das *et al.* (2002) and Dutta *et al.*(2002) in cows. Zinc is closely related with Vitamin-A functioning in the body tissues including gonads of livestock (Chhabra *et al.* 1980). In the target organs (ovaries and testes) zinc deficiency results in low subperoxidase dismutase activity (Chhabra and Arora, 1985). The micro sections of ovaries show degenerative changes with deformed Graafian follicles which become reversible when nutrient supply is made normal. The mean plasma manganese level in the Mehsani buffaloes under the study varied from 2.71 ± 0.06 to 2.74 ± 0.07 ppm and 3.09 ± 0.09 to 3.13 ± 0.09 ppm in repeat breeder and normal fertile buffaloes during different phases of estrous cycles. Significantly higher ($P < 0.05$) level of manganese is found in blood plasma of normal fertile Mehsani buffaloes than in repeat breeding Mehsani buffaloes during all the stages of estrous cycle. The trend of significantly higher blood plasma manganese level found in the present study is in full agreement with the results obtained by Parmar et *al.*(1986), El-Azab (1993), Rupde *et al.* (1993), Prasad and Rao (1997) and Dutta *et al.* (2002) in cows. Manganese is an activator of a number of enzymes both of somatic cells and gonads and due to its deficiency, there may be signs of disturbed or depressed reproduction (Underwood, 1977). Impairment of reproduction such as delayed estrus and conception in female animals has been reported due to deficiency of manganese in diet (Dyer and Rojas, 1965; Rojas *et al.* 1965). Delayed/depressed estrus and poor conception rates have also been reported in cattle (Hidiroglou, 1979) and buffaloes (Malik, 1987) suffering from manganese deficiency. Jain (1994) opined that the lower plasma manganese levels in repeat breeding animals were suggestive of its role in fertilization failure and increasing number of open days in dairy animals. The findings of the present study also support these reports.

Table : Average blood plasma concentrations of trace elements (ppm) during different phases of estrus cycle in repeat breeding and normal cycling Mehsani buffaloes.

Elements (ppm)	0 day of estrous		10th day of estrous		20th day of estrous	
	Normal	Repeat Breeder	Normal	Repeat Breeder	Normal	Repeat Breeder
Copper	0.78 ± 0.031[a]	0.54 ± 0.054[b]	0.77 ± 0.032[a]	0.53 ± 0050[b]	0.77 ± 0.025[a]	0.54 ± 0.054[b]
Iron	2.82 ± 0.09[a]	2.13 ± 0.058[b]	2.78 ± 0.066[a]	2.11 ± 0.062[b]	2;81 ± 0.095[a]	2.12 ± 0.063[b]
Zinc	1.92 ± 0.020[a]	1.39 ± 0.044[b]	1.89 ± 0.021[a]	1.35 ± 0.0.46[b]	1.92 ± 0.020[a]	1.38 ± 0.043[b]
Manganese	3.13 ± .094[a]	2.74 ± 0.071[b]	3.0.9 ± 0.09[a]	2.71 ± 0.068[b]	3.13 ± 0.091[a]	2.73 ± 0.066[b]

Means carrying different superscripts differ significantly ($P < 0.05$) within each column

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