BLOOD PLASMA TRACE ELEMENTS IN REPEAT BREEDING MEHSANA BUFFALOES

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ABSTRACT

Blood plasma trace minerals analysis indicated that the levels of iron, copper, cobalt, zinc and manganese were comparatively higher in antibiotics (Cephalexin or Ciprofloxacin+Tinidazole) treated Groups-I and II as compared to untreated control Group of repeat breeding buffaloes (n=6 each) whereas cobalt and manganese were significantly higher in treated Groups-I.

Key words: Trace minerals, Repeat breeder, Buffalo

Deficiencies or excess of certain trace minerals in blood adversely affect the normal reproductive rhythm and induce reproductive failure. The trace mineral deficiency and concomitant infertility in buffaloes is believed to be associated with enzymatic dysfunction resulting from these deficiencies. 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). It is possible that repeat breeding, in otherwise healthy buffaloes may be due to mineral and / or trace elements imbalance or deficiency. Therefore, assessment of mineral status in buffaloes is considered to be an important criterion to increase animal productivity especially in the tropics and subtropics where imbalances or deficiencies of various major minerals and trace elements in animal feed and fodder are common. These experiments was carried out for the study of trace minerals like iron, copper, cobalt, zinc and manganese in blood plasma of repeat breeding Mehsana buffaloes.

MATERIALS AND METHODS

Eighteen otherwise healthy repeat breeder Mehsana buffaloes were selected from the villages on the basis of breeding history and detailed gynecological examination. They were divided in to 3 groups each of six animals. Animals of group-I and II were treated intra-uterine route once with 4 gm Cephalexin powder and Ciprofloxacin 125 mg + Tinidazole 150 mg each dissolved in 60 ml of distilled water respectively, whereas Group-III no treatment was advocated. Blood samples were obtained in heparinised vials on days 0, 3, 12, 17 and 24 of estrous cycle. Blood plasma trace elements *viz.*, copper, zinc, manganese, cobalt and iron were determined as per the method of Oser (1979) using tri-acid digested samples (concentrated nitric acid + sulphuric acid + perchloric acid) with atomic absorption spectrophotometer (Model AAS4141, Electronics Corporation of India Ltd.). Data was analyzed statistically using factorial completely randomized design (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The mean circulatory concentrations of plasma iron of three groups varied non-significantly during all phases of estrous cycle (Table). These findings were in alliance with the results obtained by Singh and Pant (1998) and Rupde *et al.* (1998) in cows and Jain (1994) and Yessein *et al.* (1994) in buffaloes. The findings revealed that there were no significant differences between two treatment groups but slightly higher levels were observed in group-II than group-I.

Mean plasma copper concentrations also neither varied significantly between the 3 groups nor between

the phases of estrous cycle. These findings were in agreement with the results obtained by Yessein *et al.* (1994) and Singh *et al.* (2006) in buffaloes and Datta *et al.* (2002) in cows. Slightly higher concentration of copper on the day of estrous in group-II was in agreement with report of Singh *et al.* (1991). However, Kulkarni (1993) reported that the serum copper levels in follicular phase (112.20 ± 0.04 µg/ml) were significantly higher than luteal phase (95.77 ± 0.47 µg/ml) in buffaloes.

Mean plasma cobalt concentrations (ppm) varied between 3 groups at all phases of estrous cycle. Significantly higher ($P<0.05$) level of cobalt was found in blood plasma of Group-I and II as compared to Group-III except on 17th day of estrous cycle (Table). These findings were in agreement with Singh *et al.* (2006) and Yadav *et al.* (2006) in buffaloes. Prasad *et al.* (2007) found significantly higher plasma concentrations of cobalt in normal as compared to repeat breeder cows. They indicated that cobalt is essential for optimum fertility; however, deficiency of copper and zinc plays a significant role in reducing the conception rate.

Mean plasma zinc concentrations (ppm) varied significantly between groups at all the phases of cycle. This pattern of non-significant difference observed in Group-I, II and III was in accordance with the results obtained by Singh *et al.* (2006) in buffaloes. Optimum level of zinc was essential to maintain the activity of FSH and LH and thereby to facilitate normal reproductive performance. Moreover, prostaglandin binds zinc and facilitates its transport. A reduction in zinc level interferes with prostaglandin receptor-mediated phase and consequently the luteolytic process in turn causes some of the reproductive pathologies (Carlson *et al.*, 1982). Zinc deficiency might lead to reduction in GnRH secretion by hypothalamus and eventually decreased levels of FSH and LH and arrest of ovulation (Kaswan and Bedwal, 1995).

Mean plasma manganese concentrations (ppm) varied significantly between 3 groups during different days of estrous cycle. Significantly higher ($P<0.05$) levels of manganese were found in blood plasma of Group-I and II as compared to Group-III animals, except on 17th day. On the day of estrus, 3rd and 24th days of estrous cycle significant differences were observed among 3 groups. The mean concentration of manganese in blood plasma of group-II was significantly higher ($P<0.05$) as compared to Group-III and group-I during all phases of estrous cycle (Table). This trend was in agreement with the results obtained by Rupde *et al.* (1993) and Dutta *et al.* (2002) in cows. Manganese has been an activator of enzymes both of somatic cells and gonads and due to its deficiency, there might be signs of disturbed or depressed reproduction (Underwood, 1977). Delayed/depressed estrus and poor conception rates were also reported in cattle and buffaloes suffering from manganese deficiency (Malik, 1987).

Supplementation of Cobalt, Manganese, Zinc, Iron and Copper with the mineral mixture supplied to repeat breeding Mehsana buffaloes might prove to be a corrective measure to overcome repeat breeding condition.

TABLE. BLOOD PLASMA CONCENTRATIONS OF TRACE MINERALS AT DIFFERENT PHASES OF ESTROUS CYCLE IN REPEAT BREEDING MEHSANA BUFFALOES

Days of oestrus cycle	Groups	Iron (ppm)	Copper (ppm)	Cobalt (ppm)	Zinc (ppm)	Manganese (ppm)
0th day	Group -I	2.136 ±0.028	0.545 ±0.005	0.439 ±0.016^{a}	1.387 ±0.008	2.763 ±0.012^{a}
	Group -II	2.158 ±0.037	0.554 ±0.010	0.433 ±0.018^{a}	1.392 ±0.007	2.778 ±0.010^{b}
	Group -II	2.124 ±0.024	0.540 ±0.007	0.405 ±0.023^{b}	1.382 ±0.019	2.741 ±0.009^{c}

3rd day	Group -I	2.131 ±0.022	0.549 ±0.006	0.440 ±0.025[a]	1.378 ±0.006	2.752 ±0.012[a]
	Group -II	2.154 ±0.028	0.548 ±0.009	0.444 ±0.018[a]	1.383 ±0.009	2.779 ±0.008[b]
	Group -II	2.119 ±0.022	0.535 ±0.007	0.378 ±0.018[b]	1.373 ±0.010	2.737 ±0.005[c]
12th day	Group -I	2.095 ±0.026	0.532 ±0.005	0.435 ±0.018[a]	1.365 ±0.005	2.735 ±0.011[a]
	Group -II	2.133 ±0.026	0.533 ±0.003	0.439 ±0.023[a]	1.363 ±0.009	2.735 ±0.008[a]
	Group -II	2.122 ±0.028	0.533 ±0.010	0.385 ±0.017[b]	1.353 ±0.010	2.719 ±0.006[b]
17th day	Group -I	2.113 ±0.028	0.534 ±0.006	0.423 ±0.014[a]	1.389 ±0.007	2.738 ±0.011[a]
	Group -II	2.113 ±0.028	0.549 ±0.007	0.418 ±0.022[a]	1.401 ±0.005	2.749 ±0.011[b]
	Group -II	2.135 ±0.018	0.544 ±0.007	0.410 ±0.014[a]	1.384 ±0.009	2.733 ±0.010[a]
24th day	Group -I	2.090 ±0.025	0.547 ±0.009	0.440 ±0.009[a]	1.377 ±0.014	2.749 ±0.006[a]
	Group -II	2.131 ±0.020	0.550 ±0.008	0.430 ±0.013[a]	1.382 ±0.012	2.762 ±0.015[b]
	Group -II	2.117 ±0.031	0.548 ±0.011	0.386 ±0.023[b]	1.372 ±0.010	2.735 ±0.009[c]

Note: Means bearing different superscripts between the rows differ significantly at 5 % level

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