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Research Article

Study on Relationship of Soil, Plant and Serum Minerals Concentration in Cyclic and Anestrus Buffaloes

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ABSTRACT

The present study was carried out to study the relationship of concentration of minerals in soil, plant and in cyclic and anestrus buffaloes. A total of 22 anestrus and 5 cyclic buffaloes were utilized for the study. The concentration of minerals i.e. Cu, Fe, Zn, Mn, Ca and P was studied in soil, plants and serum of buffaloes. The ration of Ca:P was disturbed in anestrus buffaloes. The concentration of Cu, Fe, Zn, Mn and P were significantly lower compared to plants. The concentration of Cu, Zn, Mn, Ca and P in the true anestrus and normal cyclic buffaloes were within the normal range. However, the concentration of Fe in true anestrus and normal cyclic buffaloes were higher compared to normal range.

Keywords: Soil, plant, anestrus, Cyclic and buffaloes

Various minerals influence reproductive performance of ruminant either singly or in combination with other elements (Valee and Walker 1976). 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 and Suttle, 1997). 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). Ruminant are frequently subjected to sever dietary deficiencies of trace minerals such as Copper, Cobalt, Manganese, Zinc, Iron and Selenium. The impairments of reproductive function resulting from these mineral deviancies are believed to be associated with dysfunction (Maleeki, 1973 and Chandolia and Verma, 1987). The net flow of utilizable of minerals to the grazing animals, in particular is likely to vary widely from season to season and from year to year. The trace minerals content of our natural feeds is determined primarily by the mineral availability from the soil and secondly by the actual minerals composition of soil. The availability of minerals in soil depends upon their effective concentration in soil solution (Hoekstra, 1973). This concentration is influenced by pH moisture, organic matter, leaching, and the presence of the other elements and the microbial activity of the soil (Burk, 1978). Crop management and climatic conditions also influences the eventual trace mineral levels in feeds, use of fertilizers and

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or heavy rainfall can result in lush pasture growth and the dilution of some trace minerals (Burk, 1978). The stage of plant maturity and method of the forage handling influence the availability of trace elements to the animals. As the pasture matures there is also a gradual decline in the trace mineral contents, particularly copper and zinc (Glandstone andLoneragan, 1967). 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 soil, fodder, serum of cyclic and anoestrus Murrah buffalo.

MATERIALS AND METHODS

Twenty four parous and lactating buffaloes aged 4 to 10 years were employed to the study. All the animals were in the anestrus as confirmed on the basis of their history as well as their rectal examination of genital organs twice at an interval of 10 days. Animals having smooth and inactive ovaries with apparently normal genitalia and with no palpable abnormalities were used for study. Besides, 5 cyclic animals were also selected.

Blood samples were drawn from jugular vein aseptically with the help of a sterilized disposable syringe and needle. About 10 ml of blood was transferred the test tubes and slant was formed. The test tubes were kept undisturbed for two hours for serum separation. The serum showing any blood cells was centrifuged at 300 rpm for 10 minutes. The serum sample were then stored in well labelled glass/plastic vials in a deep freezers at – 20°C temperature pending assay.

The sample of available fodder (Berseem) and grasses (doob grass), which were consumed by the animals undertaken for study, were collected from five different fields. Each sample was made by collecting equal amount of Berseem (dry) or grasses from four different corners and one central place of the field. They were finally chopped into small pieces, homogeneously mixed and finally approximately 25 gm was taken as sample. The samples were dried overnight in a hot air oven at 100^0 C. They were finally ground and stored in air tight polythene packs.

The soil samples were collected from the same five fields from where fodder samples were collected. Each sample was made by collecting equal amount of soil from four corners and one central place of the field from a depth of 12 cm and by making a V shaped area. The samples were dried overnight in a hot air oven at 100^0 C. the samples were ground with the help of a roller and were then stored in polythene packs.

The estimation of Cu, Co, Zn, Mn and Fe was done on Atomic Absorption Spectrophotometers (AAS).

RESULTS AND DISCUSSION

Perusal of table 1 revealed that the mean concentration of Cu in the soil sample was 3.40±0.17 (range, 2.82-3.74) ppm. In plants the concentration of Cu was significantly high with the mean value as 23.89±2.30 (range, 19.74-31.56) ppm. In the blood of true anestrus buffaloes the concentration (1.28±0.04 ppm) was significantly lower compared to the concentration in soil and plants. Similarly, the concentration of Cu in the blood of normal cyclic buffaloes (1.47±0.16, range, 1.10-2.02 ppm) was significantly lower compared to the concentration in plants and soil. Our results for the concentration of Cu in the soil are in agreement with the finding of (Bedi and Khan 1984) and Lall *et al*. (1994) and suggest that the soil of the area is not deficit of Cu. The concentration of Cu in the plant was within the range as reported by (Verma, 1995). The result of concentration of Cu in the true anestrus and normal cyclic buffaloes were within the normal range (Radostitis *et al.* 1994).

The mean concentration of Fe in the soil was found as 213.02±6.51 (range, 202.50-238.19) ppm. This concentration was significantly lower compared to the mean concentration of plant (590.48±1.84, range, 585.96-595.19 ppm). In true anestrus (71.63±18.24 range, 68.35-18.38) and normal cyclic buffaloes (63.59±5.84 range 53.53-85.88 ppm) the concentration of Fe was which was significantly lower compared with concentration of Fe in soil and plants. In our study, the concentration of Fe was higher than normal range (Bedi and Khan, 1989 and Lall *et al.* 1994). The concentration of Fe in plants were within normal range (Verma, 1995). In our study, the true anestrus and normal cyclic buffaloes have higher concentration of Fe as compared to reports by various workers (Prasad *et al.* 1989; Vohra *et al.* 1995 and Prasad and Rao, 1997).

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Table 1: Concentration of mineral in soil and plant and their relationship with true anestrus and cyclic buffaloes

Minerals	Attributes	Soil	Plant	True anestrus buffaloes	Cyclic Buffaloes
Cu	Mean ±s.e.m.	3.40±0.17	23.89±2.30	1.28±0.04	1.47±0.16
(ppm)	Range	(2.82-3.74)	(19.74-31.56)	(1.01-1.85)	(1.10-2.02)
	n	5	5	22	5
Fe	Mean ±s.e.m.	213.02±6.51	590.48±1.84	71.63±18.24	63.59±5.84
(ppm)	Range	(202.50-238.19)	(585.96-595.19)	(68.35-18.48)	(53.53-85.88)
	n	5	5	22	5
Zn	Mean ±s.e.m.	16.70±1.32	34.34±0.65	13.46±1.44	19.20±4.72
(ppm)	Range	(11.68-19.40)	(32.06-35.73)	(2.03-26.79)	(8.19-31.01)
	n	5	5	22	5
Mn	Mean ±s.e.m.	14.75±3.65	171.45±1.33	5.53±0.53	15.11±2.00
(ppm)	Range	(9.35-29.08)	(167.62-174.20)	(2.85-11.52)	(10.64-18.09)
	n	5	5	22	5
Ca	Mean ±s.e.m.	210.21±19.06	109.94±26.56	82.91±4.41	83.94±13.61
(ppm)	Range	(141.34-244.67)	(38.32-167.17)	(59.67-121.90)	(53.4-134.60)
	n	5	5	22	5
P	Mean ±s.e.m.	300.19±13.05	1352.00±57.74	25.73±1.48	39.59±2.47
(ppm)	Range	(269.40-36.37)	(117.0-1520.00)	(17.15-44.53)	(30.61-44.90)
	n	5	5	22	5

The mean concentration of Zn in the soil was found as 16.70±1.32 (range, 11.68-19.40) ppm. This concentration was significantly lower compared to the mean concentration of plant (34.34±0.65, range, 32.06-35.73) ppm. Similarly, the concentration of Zn in true anestrus buffaloes was 13.46±1.44 (range, 4.82-26.79) ppm, which was significantly lower compared to the concentration in plant but did not differ with the concentration in soil. In normal cyclic estrus buffaloes the concentration of Zn was 19.20±4.72 (range, 8.19-31.01) ppm which was significantly lower compared to concentration in the plants. Our Finding for the concentration of Zn in soil was comparable with findings of Khan *et al.* (1979) and Bedi and Khan(1984). The concentration of Zn in plant in this study falls in the range reported by (Bedi and Khan, 1989 and Verma, 1995). The concentration of Zn in true anestrus and cyclic buffaloes were lower than normal range (Radostitis *et al.* 1994).

The mean concentration of Mn in the soil was found as 14.75±3.65 (range, 9.35-29.08) ppm. This concentration was significantly lower compared to the mean concentration of plant (171.45±1.3, range, 167.62-174.45) ppm. Similarly, the concentration of Mn in true anestrus buffaloes was 5.53±0.53 (range, 2.85-11.52) ppm, which was significantly lower compared to the concentration in soil and plant. In normal cyclic estrus buffaloes the concentration of Mn was 15.11±2.00 (range, 10.64-18.09) ppm which was significantly lower compared to concentration in the plants and significantly higher compared to the concentration in true anestrus buffaloes. In our study, the concentration of Mn in the soil was lower than normal range (Bedi *et al.* 1984 and Lal *et al.* 1994), while concentration of Mn in the plants falls in the range as reported by (Bedi and Khan, 1989 and Verma, 1995).

The mean concentration of Ca in the soil was found as 210.21±19.06 (range, 141.34-244.67) ppm. This concentration was significantly higher compared to the mean concentration of plant (109.94±26.56, range, 38.32-167.17) ppm. Similarly, the concentration of Ca in true anestrus buffaloes was 82.91±4.41 (range, 59.67-121.90) ppm, which was significantly lower compared to the concentration in soil and plant. In normal cyclic estrus buffaloes the concentration of Ca was 83.94±13.61 (range, 53.40-134.60) ppm which was significantly lower compared to concentration in the plants and soil. The concentration of Ca in our study was much lower compare to report by other workers (Lal *et al.* 1994 and Verma, 1995). Our results in cyclic and anestrus buffaloes were higher than normal range (Radostitis *et al.* 1994).

The mean concentration of phosphorus (P) in the soil was found as 300.19±13.05 (range, 269.40-346.37) ppm. This concentration was significantly lower compared to the mean concentration of plant (1352.0±57.74, range, 1170.0-1520.0) ppm. Similarly, the concentration of P in true anestrus buffaloes was 25.73±1.48 (range, 17.15-44.53) ppm, which was significantly lower compared to the concentration in soil and plant. In normal cyclic estrus buffaloes the concentration of P was 39.59±2.47 (range, 30.61-44.90) ppm which was significantly lower compared to concentration in the plants and soil. The concentration of P in soil was much higher (Lal *et al.* 1994). Our concentration of P in the plants falls in range reported by Verma, 1995. The concentration of P in serum of cyclic and anoestrus buffaloes were far below than reported value of Radostitis *et al.* (1994).

CONCLUSION

It can be concluded from the experiments that minerals plays important role in animal reproduction. The relationship between soil, plant and animals is very important to maintain the mineral balance in animals.

REFERENCES

Bedi, S.P.S. and Khan, S.A. 1984. Trace element status of soil, fodder and animals in Bijnor District of U.P. *Indian. J. Anim. Sci*., **54**: 570-574.

Burk, R.F. 1978. Selenium in nutrition. *Wld. Rec. Nutri. Diet.*, **30**: 88-106.

Chandolia, A.K. and Verma, S.K. 1987. Studies on biochemical profile in anestrus buffalo heifers. *Indian Vet. J*., **64**: 482-484.

Glandstone, J.S. and Loneragan, J.F. 1967. Minerals elements in termperature crops and pasture plants. I. Zinc. *Aust. J. Agric. Res*., **18**: 427-446.

Hoekstra, W.G. 1973. Biochemical role of selenium. In Trace element metabolism in animals-2, pp 61-77. Baltimore University, Park Press.

Khan, S.A., Bedi, S.P.S., Sawhey, P.C. and Ranjhan, S.K. 1979. Zinc status of soil, plants and animals in Tarai area (U. P). *Ind. J. Anim. Sci*., **49**: 612-616.

Lall, D., Gupta, R. and Gupta, V.K. 1994. Blood serum levels of certain mineral elements in lactating buffaloes in relation to forage and soil content. *Ind. J. Anim. Nutr*., **11**: 233-236.

Maleeki, J. 1973. Investigation on the influence of heavy cobalt granuales on the appearance of estrus, on the estrus cycle and on the reproductive cycle and some production and physiological factors incows. *Zes. Nauk. Acad. Roln*., **41**: 73.

Moddie, E.W. 1965. Hypoglycaemia and hypomagnesaemia. *Br. Vet. J*., **121**: 338-349.

Prasad, C.S., Sharma, V.P., Reddy, O.A. and Chinnaiya, G.P. 1989. *Ind. J. Dairy Science,* **42**: 489-92.

Prasad, K.S.N. and Rao, S.V.N. 1997. Blood mineral profile of anoestrus and repeat breeder crossbred cows- a field study. *Ind. J. Anim. Nutr*., **14**(2): 135-137.

Radostitis, O.M., Blood, D.C. and Gay, C.C. 1994. *A text book of the diseases of cattle, sheep, pigs, goats and horses*. 8th ed. Bailliere Tindall Oval Road, London.

Underwood, H.J. and Suttle, N.F. 1981. *The minerals Nutrition of Livestock*, 3rd edition. ABI Publishing.

Valee, B.L. and Walker, W.E.C. 1976. *In:* Proteins, 4.0 Neurath, ed. Vol. 5. A. P. New York.

Verma, D.N. 1995. *A textbook of animal nutrition*. 1st ed. Kalyani Publishers, Ludhiana.

Vohra, S.C., Dindorkar, C.V. and Kaikini, A.S. 1995. Studies on blood serum levels of certain biochemical constituents in normal cycling and anoestrus crossbred cows. *Ind. J. Anim. Repro*., **16**: 85-87.

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