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RESEARCH ARTICLE

STUDIES ON THE LEVELS OF CERTAIN MINERALS IN SOIL, FODDER AND SERUM OF DAIRY ANIMALS

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ABSTRACT

A study was undertaken to find out certain macro and micro mineral levels (Ca, P, Mg, Zn, Fe, Mn and Cu) in soil, fodder and serum of dairy cattle owned by College of Veterinary Science, AAU, Khanapara, Guwahati-22. The soil and fodder samples were collected and processed following the procedure of Mitchell and Rhue (1979) and Fick, *et al*. (1979), respectively. The serum samples was analysed as per method of Fick *et al*. (1979) with the help of Atomic Absorption Spectrophotometer. The phosphorus content in soil, fodder and serum was found below the critical level whereas the levels of Ca, Mg, Zn, Fe, Mn and Cu were observed above the critical level. Hence, phosphorylation of soil including supplementation of phosphorus to the livestock may be practised.

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INTRODUCTION

Mineral composition of forage plant is affected by soil plant factors including pH, drainage, fertilization, forage species, forage maturity, yield and climate or seasonal condition (Sarkar *et al*., 1990). Animal gets minerals from soil through plants (Baruah *et al.,* 2000). The minerals are very very essential elements for normal metabolic and physiological process of the animal body. Hence, it is imperative to know the mineral's level in soil, plant and animal to understand various mineral deficiency disorders in animals. Keeping this fact in view the present study was undertaken to find out certain micro and macro minerals level in soil, fodder and blood of dairy cattle maintained at Instructional Livestock Farm (ILF) of College of Veterinary Science, AAU, Khanapara, Guwahati, Assam.

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MATERIALS AND METHODS

The study was conducted to assess the macro and micro minerals such as Calcium (Ca), Phosphorous(P), Magnesium(Mg), Zinc(Zn), Iron(Fe), Manganese(Mn) and Copper(Cu) in the soil of fodder field, fodder and serum of dairy cattle belongs to College of Veterinary Science, AAU. Sixty six samples of soil and fodder respectively were collected. Soil samples (2kg) were collected from 5 spots from a depth of 15-18th cm below the soil surface following the procedure of Jackson (1973).

The samples were air dried, crushed and finally stored in properly labelled polythene bag. The soil minerals Ca, P, Mg, Zn, Fe, Mn and Cu were extracted from the soil samples with double extractant method described by Mitchell and Rhue (1979). Fodder samples were collected from the fodder field, dried at 65° C in a drying oven, grinded and stored in polythene bags and analyzed for mineral contents following the method of Fick *et al*. (1979).

The serum samples were collected from 62 heifers and cows of either age and analyzed for mineral contents according to the methods described by Fick *et al.* (1979). The soil, fodder and serum content of Mg, Zn, Fe, Cu and Mn were estimated with the help of Atomic Absorption spectrophotometer (GBC 932 AA model). Moreover, the Ca and P were analysed with the help of Perkin Elmer Analyst 200 Atomic Absorption spectrophotometer.

RESULTS AND DISCUSSION

The average soil content of Ca, Mg, Zn, Fe, Mn and Cu were 82. 24± 0.14, 23.72 ± 0.1 3, 2.64± 0.10, 43.19± 0.14, 24.42± 0.14 and 1.49±0.07 ppm, respectively and observed above the critical levels according to McDowell *et al*. (1984). Similar results were also reported by Baruah *et al*. (2000), Sarkar *et al*. (2004) and Sharma *et al*. (2006). The soil phosphorous value (5.62±0.11ppm) was found below the critical level of 10ppm (McDowell *et al*., 1984) which was in consonance with the reports of Dutta (1998), Baruah *et al*. (2000) and Sharma *et al*. (2009). Dutta (1998) stated that the higher acidity of soil favours the formation of insoluble salt of phosphorous like Aluminium phosphate leading to soil phosphorous deficiency.
The average value of fodder Ca (0.60 ± 0.02%), Mg (0.29 ±0.01%), Zn (39.00 ±1.17ppm), Fe (154.13 ±9.63), Mn (139.27 ±7.09ppm) and Cu (11.54 ±0.42ppm) was found above the critical level.

However, the phosphorous level (0.24 ±0.01%) was observed below the critical value of 0.25% as per McDowell *et al.* (1984). The present finding was in accordance with the reports of Sharma *et al*. (2002). However, Baruah *et al*. (2000) and Kumaresan *et al*. (2010) reported much lower content of fodder phosphorous. Dutta (1998) stated that the low pH of soil prevents availability of ionic state of phosphorous in soil and subsequent absorption by the plant.

Out of 62 serum samples analyzed, the average Ca, Mg, Zn, Fe, Mn, and Cu were recorded as 9.74± 0.11%, 3.67± 0.06%, 1.75±0.06ppm, 3.93±0.03ppm and 0.82±0.01ppm, respectively and were found to be above the critical level. But the phosphorous level (4.37± 0.05%) was found below the critical level (McDowell *et al*., 1984). The state of hypophosphataemia in the animals of present study might be due to the continuous feeding with the phosphorous deficient fodder grown on phosphorous deficient soil. Similar results were also reported by Bhattacharyya *et al.* (2004) and Sahoo *et al*. (2007).

From the present study it can be concluded that the average Ca, P, Mg, Zn, Fe, Mn, and Cu levels in serum of ILF (C) cattle were greatly influenced by the mineral contents in the fodder which is mostly governed by the soil concentration of the same. The phosphorous was estimated below the critical level at all three phases of study. Hence, application of phosphorous containing fertilize in soil along with supplementation of phosphorous rich mineral mixture to the animals may be suggested for optimum production and reproduction in dairy cattle.

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