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A STUDY ON TRACE MINERALS IN COW AND BUFFALO MILK IN RED LATERITIC ZONE OF WEST BENGAL.

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ABSTRACT

A detailed survey was carried out in four districts of Red Lateritic Agro-climatic zone of West Bengal.130 no's of cow milk and 120 no's of buffalo milk samples in the third lactation of morning milking were collected randomly from the farmer houses of the surveyed region. Trace minerals viz copper, zinc, manganese and iron were estimated in milk by utilizing Atomic Absorption Spectro Photometer. The data revealed that trace elements in buffalo milk was higher than cow milk. Copper content in cow and buffalo milk was within the normal range whereas, most of the cow milk samples were deficient in zinc. Higher concentration of manganese and iron were found in both the cow and buffalo milk.

Key words : Mineral elements, red lateritic zone, milk.

INTRODUCTION

Chemical composition of milk is highly variable and influenced by intrinsic factors like breed, species, stage of lactation, number of lactations, age of animal etc. and changes in feeding, time of milking etc. The presence of minerals in milk is very important for the nutrition of human beings, particularly young ones. Minerals also play a dominant role in milk processing and product manufacture. Both iron and copper promote development of oxidized flavor in milk and milk products. They also catalyze oxidation of ascorbic acid and influence lipase activity. The present work describes the results on the concentrations of copper, zinc, manganese and iron in cow and buffalo milk in red lateritic agro-climatic zone of West Bengal

MATERIALS AND METHODS

A detailed survey was carried out in the red lateritic zone of West Bengal covering four districts namely Birbhum, Bankura, Purulia and West Midnapore. Composite morning milk samples both from cow (130 no's) and buffalo (120 no's) in the third lactation were collected randomly in the plastic containers avoiding metallic contamination from farmer houses after completion of milking. Trace minerals viz. copper, zinc, manganese and iron were determined as per the method described by Sandel (1950) and Arenza (1977). 2 ml of milk was taken in a 100 ml conical flask and added 20 ml of tri–acid mixture of concentrated H_2SO_4, HNO_3 and $HClO_4$ (9:2:1 v/v). Digestion carried out on hot plate at 180-200^oC.Cooled digested content was transferred to a 50 ml volumetric flask by washing with triple glass distilled water through Whatman filter paper No 42. The final volume was made to 50 ml. Concentrations of trace minerals was made through the Atomic Absorption Spectro Photometer (Perkin Elmer A Analyst 100) using specific lamp and standard. The values are expressed in terms

of ppm (parts per million). The data was analysed as per the method described by Snedecor and Cochra , 1967 using MS Excel software package.

RESULTS AND DISCUSSION

The values of trace elements (Cu, Zn, Mn and Fe) are presented in the Table 1.

TABLE 1

Trace minerals concentrations in milk

	Cow milk				Buffalo milk			
Sample No.	Cu (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)	Cu (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)
1	0.25	3.95	2.58	4.18	0.33	3.87	2.43	3.83
2	0.53	3.99	1.53	3.62	0.49	3.66	1.46	3.81
3	0.25	3.44	1.46	3.08	0.23	3.72	1.65	3.45
4	0.21	3.77	1.83	3.98	0.49	4.23	2.07	3.93
5	0.18	3.02	1.23	2.81	0.20	3.58	1.54	2.40
6	0.25	3.42	1.33	4.01	0.23	3.56	2.36	3.52
7	0.18	3.28	1.32	2.67	0.16	3.98	1.44	3.70
8	0.18	3.07	1.25	2.88	0.17	3.67	1.54	3.29
9	0.12	3.36	1.37	3.51	0.73	3.79	1.41	4.49
10	0.16	2.76	1.41	2.28	0.27	3.41	1.48	3.38
Average	0.23	3.40	1.53	3.30	0.33	3.74	1.73	3.68

Critical level Cu<0.1-0.2µg/ml, Zn<3.3µg/ml, Mn<0.03µg/ml, Fe<0.6µg/ml

Critical level are suggested by Hansard (1983). Below which possible Elemental Deficiencies are Considered.

The average copper content in cow milk was found 0.23 ppm in the range of 0.12 to 0.53 and 0.33 ppm in the range of 0.16 to 0.73 for buffalo milk. It was evident from the present findings that buffalo milk contained higher level of copper than cow milk. This might be due to the fact that high ash content in buffalo milk in comparison to cow milk (Mathur and Roy, 1977). The estimated range of Cu values in cow milk was lower than the reported range (0.75 to 0.87 ppm) of Haldar et.al (2003) but was very near to 0.37 ppm determined by Rojas et. al., (1993). Copper values in buffalo milk was similar (0.10-1.09 mg/kg) with the findings of Yadava and Khirwar (1999). The estimated value for copper in both cow and buffalo milk were above the reported values for Cu is 0.1-0.2µg/ml of Hansard (1983).

The average Zinc content in cow milk determined was 3.40 ppm in the range of 2.76 to 3.99 and 3.74 ppm in the range of 3.41 to 4.23 for buffalo milk. It was evident that buffalo milk contained more zinc than cow milk. The value of Zn in cow milk was very close (3.20 to 3.83 mg/litre) to the observation of Haldar et. al. (2003) and Sarkar et. al., (2000). The Zn values in buffalo milk was lower (5.073-8.366 mg/L) than the reported value of Mathur and Roy (1977) but was very close to 3.63 mg/kg determined by Mandal et. al., (1996). Zinc content in most of the cow milk samples were below the critical level of 3.3 µg/ml (Hansard, 1993) but all buffalo milk samples have Zn values above the critical level.

The average value of Mn in cow milk was 1.53 ppm in the range of 1.23 to 2.58 and 1.73 ppm in the range of 1.41 to 2.43 for buffalo milk. The study revealed that buffalo milk contained higher Mn values than cow milk. Mn ranges in cow milk was almost similar with the range (1.60 to 1.69 µg/ml^{-1}) of Haldar et. al., (2003) but the lower value (0.12 µg/g) was reported by Yadav et. al. (1998). The estimated Mn values in buffalo milk was higher than the reported range (0.05 to 0.53 µg/ml) of Mandokhot and Yadava (1984). However, all the values of Mn in both the cow and buffalo milk were above the critical level of 0.1 µg/ml. (Hansard, 1983).

Average iron content in cow milk was 3.30 ppm in the range of 2.28 to 4.18 and 3.68 ppm in the range of 2.40 to 4.93 from buffalo milk. Fe content in buffalo milk was higher than cow milk. The estimated values for iron of cow milk were in close agreement with Haldar et.al., (2003) who reported Fe in crossbred cows milk varied from 3.97 to 4.19 µg/ml^{-1}. The estimated range of Fe in buffalo milk was almost similar with the reported

range (1.2-6.7 µg/ml) of Mandokhot and Yadava (1984) and (2.636-3.455 mg/L), Mathur and Roy (1977). However, Fe content in all the milk samples were far above the critical level of 0.6 µg/ml, Hansard (1983).

CONCLUSION

The present investigation reveals that trace elements in buffalo milk was higher than cow milk. Copper content in cow and buffalo milk was within the normal range. Most of the cow milk samples were deficient in zinc and below the critical level. Higher concentration of manganese and iron were indicated in cow and buffalo milk.

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