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RESEARCH ARTICLE

Mapping of minerals in common feed resources and high yielding cattle's diet of Dantiwada taluka in North Gujarat region

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Abstract : Sardarkrushinagar Dantiwada Agricultural University adopted ten villages were selected for the study of mineral profile in high yielding cattle. Samples of different feeds and fodders were collected with detail information of feeding practices in area. Mineral contents of common feeds and fodders and diets of high yielding cattle under existing feeding system were studied. Green fodders and dry roughages found in area are good source of calcium while poor source for phosphorus. All the feed sources contain adequate magnesium. The requirement of Cu, Mn and Zn for potential production was calculated which was compared with actual availability of the minerals. The outcome of the study showed, that there were significant low level of Cu and Zn in diet while Mn was in good amount. To overcome deficiency of Cu and Zn, supplementation level was suggested.

Key words : Feed and fodder, Mineral contents, Mineral deficiency, Cattle, Supplementation

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INTRODUCTION

Mineral deficiencies or imbalances in animals are an area specific problem and caused, to a greater extent, by available feed resources and feeding practices followed by farmers (Shinde and Sankhyan, 2009, Prasad and Gowda, 2007). The under supply of minerals in livestock rations is the most common feature. Especially, marginal deficiencies are expressed as sub-normal growth or low productions that are difficult to diagnose and result in significant economic losses. The deficiency of certain minerals may not affect crops yields but their availability from such forages may be inadequate for requirement of livestock. It is, therefore, necessary to generate information on mineral status area wise so as to identify deficiencies or toxicities (Hinders, 1999). Area wise mapping of elements in feed and fodder is relatively a rapid, reliable and cost effective method of providing baseline data on the levels of macro and microelements.

RESEARCH METHODOLOGY

The survey was conducted in Sardarkrushinagar Dantiwada Agricultural University adopted villages in Dantiwada Taluka. The names of villages are Vaghrol, Nilpur, Lodapa, Fatepura, Dhaneri, Jegol, Dantiwada, Bhadali, Nani Bhakhar, and MotiBhakhar. Random sampling technique was used to select the respondents. In each village, 10 farmers who own cattle producing at least 10 kg or more milk per day were selected. Information regarding the amount and types of feeds and fodders being offered to the animals, approximate rate of daily feed intake by individual animal were collected with the fair degree of precision on a questionnaire from individual farmer using standard sampling procedure, samples of green fodder, dry roughage, individual concentrate ingredients, compound concentrate mixtures and homemade concentrate mixtures were collected from all the respondents. The collected feed and fodder samples were dried and ground to 1 mm sieve and digested in tri-acid then volume is made

to 50 ml. The Ca content was analyzed by the method of Talapatra *et al.* (1940) and the phosphorus content was analyzed colorimetrically by AOAC (1999) method. The contents of Cu, Mn and Zn were analyzed using atomic absorption spectrophotometer (ECIL, AAS 4141). The mineral intake of animals was calculated from quantity of daily feed and fodder consumed. Their requirements for Cu and Mn (NRC, 2001) and Zn (Arora, 1981) were worked out. The data were subjected to statistical analysis using methods of Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Most of the dairy animal owners keep the animals stall-fed either at home or at farm within a limited area. Crop residues, predominantly wheat and bajri straw, were found to be the main source of roughages in the ration of animals in the area. They store dry fodder like straws of bajri, wheat, jowar and groundnut haulms. Most of them grow green fodders like Jowar, 'rajaka-bajari (multicut), chicory leaves, hybrid napier and lucerne. They also feed local mixed grasses. It was found that the dairy animals were fed roughage three times and concentrates offered twice a day at the time of milking. Among the concentrate they feed banasdan (compound cattle concentrate) manufactured by Banaskantha District Cooperative Milk Producers' Union Limited (Banas Dairy), commercial concentrate mixtures, maize grain, bajri grain, jowar grain, wheat grain, guar grain, cottonseed cake, isabgul lali etc.

The minerals composition of feeds and fodder collected during the survey is given in Table 1. The data on and Ca and P content of the feedstuffs are in agreement with the reports of Anonymous (1983) and Desai *et al.* (1985). Grains contained consistently low calcium probably due to poor tranfer of Ca from plants segment to seeds (Garg *et al.*, 2005). Calcium content was consistenly higher in green fodders and straws, and had wider Ca:P ratio. It has been reported that wider Ca:P ratio interfere in the utilization of these minerals in animal system (Singh and Kundu, 2006). The Cu content seemed to be lower in most of the feedstuffs collected. The feeds like wheat straw, jowar straw, bajri straw, groundnut straw, paddy straw, wheat bhoosa, etc. and green roughage like lucerne, rajaka-bajari,

Table 1 : Mineral content in feeds and fodders samples (Figure in parathion denote the number of sample analysed)

Name of the sample	P	Ca	Cu	Mn	Zn
	%		ppm		
Concentrates					
Banasdan + CSC (25)	0.81	0.96	9.01	65.68	67.26
Banasdan + CSC + Bajri (26)	0.78	1.03	6.85	51.30	84.70
CSC + Wheat bhardo+ Guar bhardo (21)	0.73	1.17	8.21	60.43	64.50
Banasdan + Bajri + Isabgul lali (19)	1.01	0.56	11.24	71.58	84.89
Banasdan + CSC+ Tuar chunni (16)	0.53	1.05	12.86	87.43	70.12
Banasdan+ Wheat bhardo + CSC+ Isabgul lali (10)	0.82	1.24	11.36	79.57	68.57
Guar bhardo (12)	0.33 ±0.01	0.19±0.02	5.89 ±1.18	16.37 ±1.26	39.87 ±2.87
Wheat bhardo (18)	0.34 ±0.01	0.15 ±0.01	5.66 ±1.02	31.48 ±1.44	36.75 ±3.39
Bajri (14)	0.44 ±0.01	0.19 ±0.01	3.56 ±0.24	15.24 ±1.27	19.27 ±2.34
Jowar (22)	0.37 ±0.01	0.15 ±0.02	3.14 ±0.31	14.85 ±1.02	22.76 ± 2.41
Banasdan (30)	1.12 ±0.11	1.27 ±0.13	24.10 ±0.63	86.65 ±3.32	100.26±3.58
Isabgul Gola (15)	0.37 ±0.01	0.56 ±0.07	14.00 ±0.47	50.68 ±2.26	48.87 ±.2.13
Cotton Seed Cake (15)	0.43 ±0.04	0.39 ±0.03	8.06 ±0.45	34.68 ±1.75	34.00 ±1.53
Green roughages					
Jowar green (32)	0.32 ±0.10	0.56 ±0.05	7.56 ±0.20	72.01 ±2.35	29.33 ±5.22
Rajka Bajri (35)	0.36 ±0.04	0.94 ±0.06	9.25 ±1.43	64.56 ±3.42	39.67 ±2.29
Chickory leaves (28)	0.70 ±0.05	0.78 ±0.03	8.69 ±1.04	60.24 ±4.26	28.14 ±2.03
Lucerne (28)	0..78 ±0.08	1.37 ±0.05	7.21 ±0.34	36.24 ±1.86	27.46 ±1.46
Local mixed grass (25)	0.35 ±0.01	0.78 ±0.02	9.57 ±0.54	59.74 ±2.52	26.64 ±1.63
Dry roughages					
Bajra straw (35)	0.16 ±0.05	0.61 ±0.04	3.76 ±0.41	40.36 ±1.87	19.79 ±1.34
Wheat straw (32)	0.14 ±0.03	0.32 ±0.04	4.38 ±1.30	46.65 ±2.14	14.29 ±1.15
Jowar straw (35)	0.32 ±0.04	0.48 ±0.04	6.46 ±0.34	56.83 ±1.13	17.40 ±2.16
Ground nut straw (30)	0.23 ±0.02	0.42 ±0.03	8.56 ±0.28	22.76 ±1.56	18.25 ±0.56
Wheat bhoosa (25)	0.16 ±0.02	0.37 ±0.04	5.65 ±0.30	50.15 ±2.88	16.93±1.67

Table 2 : Average estimated levels of Cu, Mn and Zn supplied to cattle in comparison to their calculated requirements

Village	Mineral intake (mg/day)			Mineral requirement (mg/day)			Mineral intake (% of requirement)		
	Cu	Mn	Zn	Cu	Mn	Zn	Cu	Mn	Zn
Vaghrol	136.79	846.05	739.24	153.27	613.08	1260.22	89.26	138.00	58.66
Nilpur	124.99	848.26	679.68	146.88	587.52	1207.68	85.10	144.38	56.28
Lodapa	140.31	853.58	758.82	153.08	612.02	1258.00	91.66	139.47	60.32
Fatepura	131.22	776.20	731.68	142.23	568.86	1169.20	92.26	136.45	62.58
Dhaneri	137.91	846.41	763.18	156.42	625.68	1286.12	88.17	135.28	59.34
Jegol	126.58	728.28	589.31	135.54	542.16	1114.44	93.39	134.33	52.88
Dantiwada	120.98	704.89	682.63	137.16	548.64	1227.76	88.21	128.48	55.60
Bhadali	136.02	778.59	786.19	145.26	581.04	1194.36	93.64	134.00	60.74
NaniBhakhar	126.88	744.66	754.93	147.33	589.32	1211.38	86.12	126.36	62.32
MotiBhakhar	122.62	720.43	654.75	138.78	555.12	1141.08	88.36	129.78	57.38
Average	130.43	783.82	714.41	145.53	582.34	1207.02	89.61	134.65	58.61

chickory leaves,jowar green, Gajaraj, local mixed grass etc., the quantities were under 16.95 ppm. These findings are in agreement with Garg *et al.* (1999). However, Desai *et al.* (1985) reported slightly higher values of Cu content in these feedstuffs. Most of the homemade concentrate mixtures contained more than 12 ppm and banasdan contained 24.10±0.63 ppm Cu, which might have been achieved by using mineral mixture as per BIS specifications during manufacture of compound concentrate.

Most of the green fodders offered to the animals contained reasonable amount of Mn (36.24±1.86 to 72.01±2.35 ppm), it was apparent that most of the dry roughage was low in Zn content. Jowar straw, groundnut straw, paddy straw, wheat bhoosa etc. showed less than 26.38 ppm Zn. This is in agreement with the findings of Desai *et al.* (1985) and Kumar (2009).

The perusal of data on Cu, Mn and Zn content of feedstuffs collected during the survey showed variation when compared with the values obtained in the surveys of feeds and fodders in North Gujarat and other part of Gujarat. The possible reason for such variations may be that with the introduction of high yielding crop varieties, intensive crop systems and extensive fertilizer application; the mineral profile in soil, plants or animal feedstuffs are rapidly changing, which in turn affect the mineral status of animals (Miller, 1979; Singh and Sangwan, 1987; Vasudevan, 1987; Underwood and Suttle, 1999).

The overall availability of Cu in daily diet of cattle was low. It was 140 mg/day against requirement of 162 mg/day. The availability of Mn was higher than needed one. Actual availability was 890 mg/day against requirement of 672 mg/day. The availability of Zn was significantly low in cattle feeding. It was 750 mg/day against requirement of 1333 mg/day. Overall there were deficiency of 12.77 % and 43.98 % in Cu and Zn supply for cattle .To maintain the essential level in daily diet plan supplementation of $CuSO_4$ and $ZnSO_4$ should be given. Suggested level of $CuSO_4$ (24%) was 54 to 129 mg/day while $ZnSO_4$ (33%) 1.40 to 1.93 g/day to overcome deficiency. Table 2 showing average estimated levels of Cu, Mn and Zn supplied to cattle in comparison to their calculated requirements.

Summary:

The study suggested that deficiency of copper and zinc was prevalent in area surveyed. For optimum production and reproduction performance by high yielding cattle required minerals must be supplied in necessary amount. Supplementation of Cu and Zn in suggested level will fill the gap between availability and requirements of deficient minerals in cost effective way. By following specific mineral supplementation feeding practices will help to maintain production level of highly capable dairy animal in most economic path.

LITERATURE CITED

Anonymous (1983). Final Report of the I.C.A.R. scheme (From February 1952 to June 1973), Western Regional Animal Nutrition Station, Gujarat Agricultural University, Anand Campus, Anand-388 110.

AOAC (1999). *Official method of analysis*, 18th ed., Association of Official Analytical Chemist, Washington, D.C.

Arora, S.P. (1981).Zinc and vitamin A relationship in metabolism.In Gawthorne, J.M.*et.al.*(Ed), TemA4 (pp 572).Perth, Australia: Springer-Verlag, Berlin, New York.

Desai, H.B., Desai, M.C., Purohit, L.P., Patel, Z.N. and Shukla, P.C. (1985). Survey of cattle feeds and feeding practices in Banaskantha District. *GAU Res. J.*, **11**(1) 35-43.

Garg, M.R., Bhanderi, B.M., Sherasia, P.L. and Singh, D.K. (2005). Mapping of certain feeds and fodders in the Mehsana district of Gujarat State. *Indian J. Dairy Sci.*, **52** (2): 69-77.

Hinders, R.(1999).Research needed to determine correct trace mineral levels.*Feedstuffs*, **71** : 10

Kumar, Sanjeev (2009). Assessment of feeding practices and status of certain minerals in dairy animals of Banaskhantha distict" M.V.Sc Thesis, Sardarkushinagar Dantiwada Agricultural University, GUJARAT (INDIA).

Miller, W.J. (1979). *Dairy Cattle feeding and nutrition*, Academic Press, New York.

NRC (2001).*Nutrient requirements of dairy cattle*, 7th revised ed. National Academy of Sciences, Washington, DC.

Prasad, C.S. and Gowda (2007). Implication of minerals deficiency in ruminants and methods for its amelioration. Pro. International Tropical Anim. Nutri. Conf., Karnal.

Shinde A.K., and Sankhyan,S.K. (2009). Existing feed resources and feeding practices in animals of semiarid region of Rajasthan. A bulletin published by Central Sheep and Wool Research Institute, Avikanagar.

Singh, K. and Sangwan, B.S. (1987). Zinc status in Haryana soils and factors affecting its availability. In: Proceedings of the Symposium on Recent Advances in Mineral Nutrition (Ed. V.M. Mandokhot), Haryana Agricultural University, Hisar, India, pp. 193-197.

Singh, K.K. and Kundu, S.S. (2006). Micronutrient status of livestock feeds of arid regions. In : *Linestock feeding strategies for dry regions*. International Book Distribution Co, Lukhnow, India.

Snedecor,G.W. and Cochran,W.G. (1980).*Statistical methods*, 7th Ed. Lowa State Univ. Press, Ames, Lowa, U.S.A.

Talpatra, S.K., Ray, S.C. and Sen, K.C. (1940). Estimation of phosphorus, chloride, calcium, sodium and potassium in food stuffs. *Indian J. Vet. Sci. & Anim. Husbandry*, **10**:243-246

Vasudevan, B. (1987). Mineral deficiency syndrome among dairy cattle, sheep and goats in India. In: Proceedings of the Symposium on Recent Advances in Mineral Nutrition (Ed. V.M. Mandokhot), Haryana Agricultural University, Hisar, India, pp. 45-49.

Underwood, E.J. and Suttle, N. F. (1999). *The mineral nutrition of livestock*, 3rd ed. CAB International Publishing.