Paper ID: 1205
Theme 2. Grassland production and utilization
Sub-theme 2.3. Soil-plant-animal-human interrelationships

Mineral status of livestock, soil, feeds and fodders in Ajmer district of Rajasthan

Sheela Choudhary[1]*, Ramkesh[2], Sunil Dutt Choudhary[1], Poonam Yadav[1]
[1]Post Graduate Institute of Veterinary Education and Research, Jaipur, India
[2]Central Institute for Research on Goats, Mathura, India
corresponding author e-mail : dr.sdchoudhary89@gmail.com

Keywords: Fodder, Livestock, Macro mineral, Micro mineral, Soil

Introduction

A large number of Indian livestock suffer from deficiencies or imbalances in minerals because they are mainly maintained on crop residue based rations and grazing without access to mineral supplement (Mc Dowell *et al*., 1993). Deficiency or imbalance of single or multiple minerals results in enzymatic dysfunction and hormonal imbalance associated with fertility of animals (Maurice, 2003). In India where dietary concentration of fodder fed to the animals are unknown or highly variable due to availability, season, location, forage, species and animal potential (Sharma *et al.*, 2003), it is important to determine plasma mineral concentrations in animal region wise, to estimate needs of livestock so as to obtain optimum productivity and to access the effect of mineral deficiencies on serum vitamins, hormone and enzyme profile. Limited information is available on the feeding practices and mineral status of livestock, soil and feed in Kekri block of Ajmer district. Keeping this in view the present study was conducted in Kekri block of Ajmer district to establish relationship for different minerals among livestock, soil and feed in order to suggest dietary supplementation of area specific mineral mixture.

Materials and Methods

The study was conducted in Kekri block of Ajmer District. Five villages i.e. Baghera, Bandanwara, Kekri, Sarana and Sarwar were selected for survey and collection of data. Twelve farmers from each village were indentified for collection of information on feeding practices and locally available feed and fodder commonly fed to livestock. Two types of soil samples were collected from each village *viz.* agriculture soil and pasture soil. Feed and fodder used for feeding animals were collected under three broad categories *viz.* straws / kadbies, concentrate / concentrate mixture and tree leaves / green fodder / other resources. From every village covered, a minimum of four samples were collected in each category for mineral analysis. Blood samples of cattle, buffalo, sheep and goat were collected to assess their mineral and protein status. A total of 160 blood samples were collected randomly and centrifuged for separation of serum. The soil was extracted with 0.1 N hydrochloric acid for estimation of minerals *viz.* calcium, magnesium, copper, manganese, zinc and iron. For phosphorus estimation the soil was extracted with 0.5 N sodium bicarbonate. Feed and fodder samples were dried at 100 ± 5^0C in hot air oven and ground to 1 mm sieve and digested in tri-acid and volume was made to 50 ml. Calcium, magnesium, copper, zinc, manganese and iron in feed and fodder were estimated by atomic absorption spectrophotometer (Shimadzu make). Phosphorus in feed and fodder was estimated by UV spectrophotometer (AOAC, 1975). For estimation of calcium and magnesium digested volume was diluted in 0.1% lanthanum chloride in 1:51 ratio and iron, zinc, manganese and copper were estimated in 1:11 dilution with distilled water. Blood samples collected were centrifuged for separation of serum. Calcium was estimated after dilution (1:21) with 0.1% lanthanum chloride to avoid interference from other minerals. Magnesium was estimated after dilution (1:42) with 0.1% lanthanum chloride to avoid interference from other minerals. Copper and zinc were estimated after diluting by 1:21 with triple glass distilled water while iron was diluted with 1:21 with 20% TCA and the supernatant taken for estimation. Manganese was also estimated after dilution with triple distilled water. All the minerals, except phosphorus, were estimated by atomic absorption spectrophotometer (Shimadzoo AA-6300) using standard procedures in soil, feed, fodder and serum. Total protein, albumin and phosphorus were estimated by UV spectrophotometer using diagnostic kits.

Results and Discussion

In soil, calcium, magnesium and copper levels of agriculture and pasture soils were in agreement with the critical values whereas their manganese and iron contents were higher. The quantity of zinc was lower in both agriculture (0.77 ± 0.15 ppm) and pasture (0.38 ± 0.05 ppm) soils.

In feed and fodder sorghum, maize and pearl millet straws are the main roughage source followed by wheat straw. Calcium content of most of the straws was more than the critical level, except sorghum (0.24±0.01%) and wheat straw (0.23±0.02%), which showed lower values. All the straws showed low levels of phosphorus and zinc. Magnesium and iron content of all the straws were well above the critical level. Most of the straws, except wheat straw (11.06±1.21 ppm) sorghum straw (8.74±1.87 ppm) and moong chara (11.02±3.17 ppm) had low copper contents. Calcium level of all concentrates was found to be low, except in sesame cake (1.85±0.00%), whereas phosphorus and magnesium levels of all concentrates were normal. Pear millet and barley grain are poor sources of copper. The level of calcium, magnesium, manganese and iron in all tree leaves were found to be as per standards, whereas copper, zinc and phosphorus were deficient in tree leaves. Most of the large animals are stall fed and get green fodder only during the rainy season when they are sent for grazing. None of the livestock owners surveyed offered mineral mixture to their animals. Salt is fed occasionally by only a few owners. Limited quantity of concentrate is given to the lactating animals in combinations of guar churi and pashu aahar or linseed cake, guar and pashu aahar or guar churi and pellet feed.

In blood the calcium level in lactating native cows was found to be lower than the critical value. Low level of phosphorus and marginally low magnesium levels were observed in all the cattle groups. Copper zinc, manganese, iron, protein and albumin values were in normal range in all cattle groups. Lactating murrah and murrah buffaloes with reproductive problems exhibited low level of calcium than the critical values. Phosphorus level was found to be lower than the critical level in all the groups of buffaloes, goat and sheep.

Information collected from livestock owners by door to door survey revealed that pica was a common problem in all species, which correlates with the present findings. Few animals were found to be suffering with skin problems. This may be related to fact that livestock owners fed only dry roughages, which are zinc deficient, to their animals. Regarding reproductive problems, animals suffer from anoestrus and retention of placenta, which may be due to protein deficient diets.

Conclusion

Results of the present investigation revealed that feed resources available to livestock are mostly deficient in phosphorus, copper and zinc. Thus needs supplementation of these minerals either through inclusion of green fodder, sesame cake or cluster bean churi in the diet or supplementation of mineral mixture.

References

Maurice, P.Boland.2003. Advances in Dairy Technology, 15:319-329.

Mc Dowell, L.R. J.H. Conard and F. Glen Henry. 1993. Centre for Tropical Agricultural, University of Florida. The U.S. Agency for International development and Caibbean Basin Advisory Group (CBAG).

Sharma, M.C., Joshi, C., Gupta, S. (2003). Prevalence of mineral deficiency in soil, plants and cattle of certain districts of Uttar Pradesh. Indian Journal of Veterinary Medicine, 23:4-8.

Acknowledgement

Author is thankful to ICAR, New Delhi for granting ICAR ad hoc project on "Study of mineral profile in livestock of the semi-arid eastern plan of Rajasthan and its correlation with health status and productivity" under which this study was carried out.