

Survey of the mineral status of pastures and small ruminants in the West Region of Cameroon

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Summary

Four dominant grass species (*Hyparrhenia rufa*, *Melinis minutiflora*, *Pennisetum purpureum* and *Sporobolus africanus*) of natural pastures of the West Region of Cameroon were sampled at 60 sites between September and November of 1985. The grass samples were analysed for calcium, phosphorus, potassium, magnesium, sodium, iron, manganese, copper and zinc. Serum was also collected from goats and sheep at the same locations where forages were sampled and analysed for calcium, phosphorus, magnesium, zinc and copper. Results showed that P, Mg, Na, Zn and Cu in forages were generally below the critical level stipulated to satisfy the requirements of grazing livestock in the tropics. Calcium was inadequate in the sera of goats and sheep where as P, Mg, Zn and Cu were adequate. Use of salt licks to supplement intake of mineral elements from grasses by goats and sheep is necessary in the region.

Résumé

Des échantillons de quatre espèces dominantes de graminées (*Hyparrhenia rufa*, *Melinis minutiflora*, *Pennisetum purpureum* et *Sporobolus africanus*) des pâturages naturels dans la région Ouest de Cameroun ont été prélevés sur 60 sites entre septembre et novembre 1985. Les échantillons furent analysés pour leur teneur en calcium, phosphore, potassium, magnésium, sodium, fer, manganèse, cuivre et zinc. Les sérums des chèvres et moutons ont été aussi prélevés aux mêmes sites que les échantillons de fourrage et furent analysés pour leur teneur en calcium, phosphore, magnésium, zinc et cuivre. Les résultats de ces analyses ont montré que les fourrages étaient déficients en P, Mg, Na, Zn et Cu, ne donnant ainsi aucune satisfaction en besoins minéraux définis pour les bétails en zone tropicale. Le calcium était déficient dans les sérums des chèvres et moutons tandis que la teneur en P, Mg, Zn et Cu était adéquate. L'utilisation des pierres à lécher pour l'augmentation de la consommation des minéraux à espèces fourragères par les chèvres et moutons est nécessaire dans cette région.

Introduction

Nutrition has been found to be one of the major drawbacks of animal production in the tropics. While protein, energy and vitamin deficiencies can less accurately be ascribed to geographical regions, mineral deficiencies are often dependent and influenced to a large extent on geographical location (3). Under certain soil and climatic conditions minerals may occur in excess or deficient quantities. If livestock obtain all their feed from pasture from a defined area the likelihood of developing mineral deficiencies or toxicities is increased. The present study carried out in the West Region of Cameroon is to investigate the possibility of mineral deficiency in forages and small ruminants.

Materials and methods

Four dominant grass species (*Hyparrhenia rufa*, *Melinis minutiflora*, *Pennisetum purpureum* and *Sporobolus africanus*) of natural pastures of the West Region of Cameroon were sampled at 60 different sites between September and October 1985. At each site, the upper leaves of each grass species were cut with a knife simulating the grazing of ani-

mals and placed in a separate polythene bags and labelled. The bags were then transported to the laboratory where grass samples were dried in an oven at 60°C for 48 hours. After drying the samples were pounded in a porcelain mortar, sieved through 1 mm sieve and preserved in air-tight sample bottles for analysis.

Serum was obtained from blood collected from the jugular or metatarsal vein of dwarf goats and sheep from same sites where forage samples were obtained, using sterilised needles. Blood was collected in a clean 100 ml test tube, corked and then allowed for serum to separate from the coagulant. The serum was transferred into a clean sample bottle that was stored in an ice box during transportation to the laboratory. At the laboratory it was stored in a refrigerator until required for analysis.

Forage samples were analysed for Ca, K, Mg, Na, Fe, Zn, Cu and Mn after ashing and appropriate dilution with the Perkin Elmer Atomic absorption spectrophotometer while serum samples were analysed for Ca, Mg, Cu and Zn after wet digestion with the same equipment. Phosphorus in digested samples was analysed by the molybdovanadate method.

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Results and discussion

Plant Tissues

The level of calcium in the four grasses studied was generally adequate. Calcium content ranged from 0.17 to 0.90% for all the grass species while the average concentration in *H. rufa*, *M. minutiflora*, *S. africanus* and *P. purpureum* was 0.45, 0.45, 0.40 and 0.55% reported in Literature for tropical grasses.

Phosphorus content of the forages was between 0.10 and 0.53%. Most values were below the critical level of 0.25%. Average values for the four grasses ranged from 0.15 to 0.24% and all were below the critical level recommended for tropical grass. These results agree with reports by McDowell, Conrad and Ellis (5). That phosphorus is an element often found insufficient in grasses in Tropical countries. Phosphorus in tropical soils tends to form insoluble phosphate complexes with iron, calcium and aluminium under acidic conditions rendering the element unavailable for absorption by plants. Thus feeding grazing animals solely on the grasses studied may result in P deficiency.

Potassium concentration was generally adequate in all grasses. Average content in the four grasses ranged from 0.93 to 1.68%. These values are higher than the critical value of 0.60%. Potassium deficiency is very rare in tropical countries since concentrations in forage species in the region often attains 30 g/kg dry matter (7).

The sodium content of the grass species were below the critical level of 0.06%. Overall average concentration in the four forages ranged from 0.009 to 0.013%. On the basis of the NRC (6) and ARC (2) requirements all grasses are grossly inadequate in the element.

When all the forages were analysed for Magnesium the concentration of the element ranged from 0.05 to 0.58%. Average content of *H. rufa*, *M. minutiflora*, *S. africanus* and *P. purpureum* was 0.18, 0.22, 0.14 and 0.24% respectively. Comparing these results with the critical level of 0.20%, *H. rufa* and *S. africanus* were generally deficient in the element.

Iron and Mn content of the forages were adequate although a few samples had concentrations below the critical level of 30 ppm. Average Fe and Mn content of the four species of grass studied ranged from 520-1094 and 104-275 ppm respectively. A dietary allowance of 100 ppm for Fe and 25 ppm of Mn has been recommended by McDowell and Conrad (4).

All forages were generally deficient in Copper and Zinc. Mean concentration of Cu in forages ranged from 4 to 8 ppm while for Zn it was 19 to 28 ppm. Comparing these values with the critical levels of 10 and 30 ppm for Cu and Zn respectively, deficiency was quite evident.

Animal Tissues

Calcium content of sera varied from 1.2 to 7.0 (sheep) and 0.8 to 8.2 mg/100 ml (goats) while corresponding averages were 3.65 and 3.05 mg/100 ml. Both values were below the 8.0 mg/100 ml critical level stipulated by McDowell and Conrad (4). Calcium deficiency has also been reported with sheep in Eastern Sudan but not goats (1). The incidence of Ca deficiency in grazing livestock appears to be high in tropical Africa.

The concentration of phosphorus in the sera of sheep and goats ranged from 5.5 to 23.0 and 2.2 to 20.8 mg/100 ml respectively while the means were 9.93 and 9.80 mg/100 ml respectively. These values were superior to the critical level of 4.5 mg/100 ml. Similarly, average serum concentration of Magnesium for goats and sheep (2.70 and 2.85 mg/100 ml) and Zinc (0.87 and 0.97 mg/100 ml respectively) were adequate when compared to the critical levels of 2.0 and 0.040 mg/100 ml respectively. Copper content of sera of sheep and goats was also adequate. The average was 0.12 mg/100 ml for both species and was higher than the critical value (0.065 mg/100 ml).

From this preliminary study, it may be concluded that supplementation of rations of small ruminants with salt licks containing Ca, P, Na, Mg, Cu and Zn is necessary in the West Province. While calcium is deficient in sera of sheep and goats, the other elements are deficient in forages.

Literature

1. Abu Damir H.G., Tartour G., Adam, S.E.I., 1983. Mineral contents of livestock in Eastern Sudan. *Tropical Animal Health and Production*, 15: 15-16.
2. ARC - Agricultural Research Council, 1965. Nutrient requirements of farm livestock n° 2. Ruminants, Technical Reviews and Summaries H.M.S. London, U.K.
3. McDowell L.R., 1977. Geographical distribution of nutritional diseases in animals. In: CRC Handbook of Nutrition and Food, IFAS, Centre for Tropical Agriculture, University of Florida.
4. McDowell L.R., Conrad J.H., 1977. Trace mineral nutrition in Latin America. *World Animal Review*, 24:24-33.

5. McDowell L.R., Conrad J.H., Ellis A.L., 1986. Les techniques de recherches sur les minéraux pour les ruminants. Séminaire FSSP/CIPEA, 24-27 juin 1985, Addis Ababa, Ethiopie, pp 18-30.

6. NRC - National Research Council, 1976. Nutrient requirements of sheep. National Academy of Science, Washington D.C. USA.

7. Reviere R., 1978, Manuel d'alimentation des ruminants domestiques en Zone Tropicale. Ministère de la Coopération Française, Paris, France.

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