Research Note

MINERAL CONTENT OF VARIOUS GRASS SPECIES AT DIFFERENT CUTTING INTERVALS[1]

Underfeeding is commonly accepted as an important factor limiting livestock production in the tropics. Low available energy and protein levels in forages is often the reason for lower animal productivity. Mineral imbalance (deficiency or excess) in soil and forage has been considered responsible for many productive and reproductive problems in the grazing ruminants of the tropics.[2] At the Corozal substation some of the cattle have been observed to lick soil while having adequate pasture and free choice mineralized salt supplementation. The extent to which this behavior is related to mineral imbalance is unknown.

Various authors have found large variability in the mineral content of different plant species growing on the same soil. Many studies also show large differences in the mineral concentration of different grasses of the same genus. In certain regions "accumulator" forage species containing over 1,000 p/m of Se are found growing side by side with grasses containing less than 100 p/m.[3] Other studies in Puerto Rico have shown that intensively managed forages can supply the requirements of Fe, Cu, Co, S, K, Mg, I and Mn; however, some essential minerals can be absent in forage grown on calcareous, sandy and eroded soils.[4]

Many forage studies emphasize parameters such as dry matter yield, protein content and detergent fiber fractions as measurements of forage quality. However, little attention has been directed toward mineral forage content as a measure of forage quality. The purpose of this research is to draw some empirical comparisons on the mineral content of different grass genera grown under various harvesting systems at the Corozal Agricultural Substation in 1987-1988.

The mineral composition of five *Hemarthria* and five *Cynodon* accessions was evaluated under the simulated grazing technique. With this technique grass is cut 15 cm from the ground surface at 21- and 28-day intervals during the long- and short-day seasons, respectively. The forages were evaluated under intensive fertilization (1 ton/acre of a 15-5-10 fertilizer), and soil pH was brought to 5.5 with the application of limestone before planting.

There was little difference in the number of accessions above or at the critical nutrition level (NACL) between seasons in the individual *Cynodon* and *Hemarthria* genera. In the hemarthrias, K, Fe, Mn, Mo, Se and Co; in *Cynodon*, Ca, Mg, K, Fe, Mn and Se had the NACL at 60% or more. The

[1]Mauscript submitted to Editorial Board 13 June 1990.

[2]McDowell, L. R., J. H. Conrad, G. L. Ellis and J. K. Loosli, 1984. Minerales para rumiantes en pastoreo en regiones tropicales. Departamento de Ciencia Animal, Centro de Agricultura Tropical, Universidad de Florida, Gainesville. Agencias de los Estados Unidos para el Desarrollo Internacional. Boletín Num. 84-71582 de la Librería del Congreso.

[3]McDowell, L. R., 1985. Contribution of tropical forages and soil in meeting mineral requirements of grazing ruminants. Nutrition of grazing ruminants in warm climates. Copyright Academic Press, Chapter 8, p. 173-74.

[4]Vicente-Chandler, J., R. Caro-Costas, F. Abruña and S. Silva, 1983. Producción y utilización intensiva de los forrajes en Puerto Rico. Esta. Exp. Agric. P. R. Bol. 271.

other six elements in each case were considered inadequate because of their lower NACL.

Cynodon genotypes were better in mineral concentration than *Hemarthria*. For example, *Cynodon plectostachyus* USDAPI 341817 had eight elements out of twelve in both seasons above or at the critical nutrition level. *H. altissima* genotype USDAPI 347238 had nine elements during the long-day season and six elements during the short-day season over or at the critical nutrition level.

The mineral composition of six *Panicum maximun* genotypes was evaluated at a harvest interval of 45 days during the short- and long-day seasons, respectively. The accessions received intensive fertilization (1 1/2 ton/acre of a 15-5-10 fertilizer), and soil pH was increased to 5.5 with the application of limestone before planting. All the *P. maximun* species had adequate levels of K, Fe and Mn in both seasons, according to the estimates of the NACL. Most genotypes were consistently low in Na, Zn, Cu, Co and Se. Mo concentration was low and would not contribute to a Cu deficiency. On the basis of the performance of the *Panicum* genotypes, the mineral content of these accessions was low even at this harvest interval.

The mineral composition of three hemarthrias, three digitarias and three brachiarias was also studied during the short- and long-day seasons at harvest intervals of 60 days. Soil pH was 4.75 and all accessions received intensive fertilization. The NACL were adequate in Ca, K, Fe and Mn for the *Brachiaria* and *Digitaria* genera in both seasons. Most hemarthrias showed low Ca and K levels during short days, but had adequate levels of Fe and Mn in both seasons. Most grasses in the *Brachiaria* genera had adequate levels of Mg and Se but inadequate levels of P, Na, Cu, Zn and Co. Mo concentration was low but would not contribute to a Cu deficiency in all accessions. In the *Digitaria* and *Hemarthria* genera all of the accession were adequate in Na, but were inadequate in P, Mg, Cu, Zn, Co, Mo and Se during at least one of the seasons.

Among the accessions, *Brachiaria ruziziensis* PRPI 11716 and 11718 and *Digitaria setivalva* PRPI 6402 presented adequate levels of Se in both seasons. Among the *Digitaria* species, accession PRPI 6402 presented 10 and 9 out of twelve elements over the critical nutrition level during the short- and long-day seasons, respectively.

The following preliminary observations may help to establish future research needs:

1. Mineral concentration can vary according to the season of the year. The recognition of such variability is important when selecting the best adapted forage in a given ecological area.
2. Some accessions with excellent element retention were observed even at the 60-day harvest interval. These cultivars should be evaluated in forage trials even if they are less valuable in other productive and agronomic characteristics.

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