

Forage quality as related to mineral concentrations in tropical regions

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Introduction Often tropical forages contain deficient or toxic concentrations of minerals for grazing livestock (McDowell, 2003). Tropical forages generally contain less of the more essential minerals than species grown in temperate regions (McDowell & Valle, 2000). Mineral elements in forages are dependent upon the interaction of a number of factors, including soil, plant species, stage of maturity, yield, pasture management and climate. The objective of this study was to determine the adequacy of minerals for ruminants in forages collected from seven tropical countries.

Materials and methods Forage samples were collected from six Latin American countries and one African country. The predominant forage genera, with sample numbers in parenthesis, were *Cynodon* (134), *Trachipogon* (118), *Paspalum* (104), *Andropogon* (94), *Pennisetum* (91), *Hyparrhenia* (63), and *Brachiaria* (46). Forage samples were collected, prepared and analysed for minerals by standardised procedures (Miles *et al.*, 2001).

Results Eleven mineral elements as related to critical concentrations are given in Table 1. Differences ($p < 0.05$) were found among forage species and time of collection (wet vs dry season) within countries. The majority of forages for all countries were deficient in P, Na, Cu and Zn. Most countries also had forages deficient in Ca, Mg and Se, while most forages were adequate in K, Fe and Mn.

Table 1 Percentage forage minerals below ruminant requirements

Mineral level	Critical level ^a	Dominican Republic (69) ^b	Bolivia (84)	Colombia (36)	Guatemala (168)	Malawi (21)	Nicaragua (304)	Venezuela (198)
Ca, %	0.30	24	57	100	71	13	80	97
P, %	0.25	83	100	92	57	75	67	98
K, %	0.60-0.80	0	1	15	13	57	20	84
Na, %	0.06	78	100	100	88	97	80	84
Mg, %	0.20	33	64	56	76	31	96	94
Fe, ppm	30	0	0	0	0	3	13	0
Zn, ppm	30	86	81	74	49	94	89	96
Cu, ppm	10	64	100	100	92	91	100	99
Mn, ppm	30-40	10	0	0	24	3	41	5
Co, ppm	0.10	26	48	31	1	13	96	40
Se, ppm	0.10	48	47	74	49	96	18	96

^aCritical levels (ruminants requirements) and complete reference citations for the seven countries are given in McDowell (2003); ^bSample numbers in parenthesis

Conclusions Tropical forages are often deficient in essential minerals. Minerals most deficient were P, Na, Cu, Zn, Ca, Mg and Se.

References

- McDowell, L.R. (2003). Minerals in Animal and Human Nutrition, 2nd ed., Elsevier, Amsterdam.
- McDowell, L.R. & G. Valle (2000). Major minerals in forages. In D.I Givens & H.M. Omed (eds.). Forage Evaluation in Ruminant Nutrition, CABI Publishing, Wallingford, 373-397.
- Miles, P.H., N.S. Wilkinson & L.R. McDowell (2001). Analysis of Minerals for Animal Nutrition Research; 3rd ed., Gainesville, FL, USA.