Variation of nutritional parameters in the strata of tropical forages

D. S. Lwin[AD], D. Barber[B], M. Benvenutti[B], B. Williams[C], D. Poppi[A] and K. Harper[A]

[A]School of Agriculture and Food Science, The University of Queensland, QLD, Australia
[B]Department of Agriculture and Fisheries, The University of Queensland, Gatton campus.
[C]Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, QLD, Australia
[D]Email: d.soelwin@uqconnect.edu.au

In intensive forage-based systems, there is a trade-off between metabolisable energy (ME) content and managing forage quantity. Tropical pastures are difficult to manage for although large quantities are produced, the ME content is limited due to the increase in fibre concentration and decrease in fibre digestibility with maturity. The ME of forages varies within and between plants and it is important to develop harvest or grazing strategies around this variation (Bailey & Butler 1973; Moore & Mott 1973). The aim of this study is to determine the nutritive parameters of the leaf and stem fractions from different strata of forage sorghum, corn and lablab.

For each plant species, three experimental plots (2x2 m) were cut 15 cm above the ground and combined. The grasses were cut into 4 equal vertical strata (Strata 1 (S1), Strata 2 (S2), Strata 3 (S3) and Strata 4 (S4) from top to bottom) and the lablab was cut into 2 equal vertical strata (Strata 1 (S1) and Strata 2 (S2) from top to bottom). Leaves (L) and stems (S) were separated for each strata. Therefore, there are 23 samples in total (4 strata in leaves, 4 strata in stem, seed head (SH) from forage sorghum, 4 strata in leaves, 4 strata in stem, 2 strata in cob (C) from corn and, 2 strata in leaves, 2 strata in stem from lablab). The ME content was estimated from total digestible nutrients (TDN) as determined by Dairy One NRC (2001) equations: DE = 0.04409xTDN and ME (MJ/kg) = 1.01xDE–0.45.

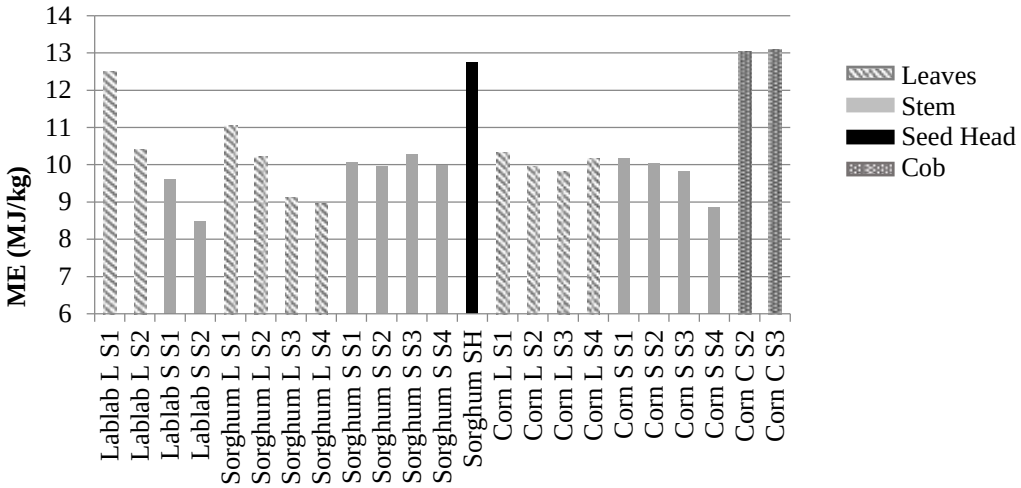

Figure 1. Metabolisable energy as calculated by NRC equation in experimental samples

The leaf fraction ME content in lablab ranged from 12.5 (top strata) to 10.4 MJ/kg DM (bottom strata), and in forage sorghum 11.1 (top strata) to 9.0 MJ/kg DM (bottom strata). In corn there was little variation in ME content of the leaves from the 4 strata (10.3 in the top strata and average 10 MJ/kg DM in the lower strata). The stem ME content of forage sorghum and corn averaged 10 MJ/kg DM and did not change through the strata except at the lowest strata of corn (8.8 MJ/kg DM). The seed-heads of sorghum and corn cobs had high ME contents of 12.8 and 13.1 MJ/kg DM. The variation in ME content throughout a plant could be exploited by manipulating grazing or harvest height to achieve a particular ME content. Harvesting more than one cut height could also achieve forages of varying ME content.

References

Moore JE and Mott GO (1973): Structural inhibitors of quality in tropical grasses, in: Antiquality Components of Forages (ed. Mactches AG), CSSA Spec. Publ. 4, ASA, CSSA, and SSSA, Madison, WI. pp.53-98.