Nutritional characterisation of introduced improved Brachiaria grasses in Rwanda

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Introduction
Livestock is one of the most important agriculture sector in Rwanda. It provides food and improve nutrition, generates income, employment, and is the basis of livelihood of over 68 percent of farmers in Rwanda. It also contributes about 14 percent of national agricultural gross domestic product. Despite its significant contribution in Rwandan economy, livestock productivity is low in the region. One of the major factors contributing to low livestock productivity is the inadequate and poor-quality roughages. Therefore, exploration and wider scale cultivation of high yielding and nutritious forage is the most pragmatic option for sustainable increase in livestock productivity in Rwanda. One of the proven options to increase access to high quality forage and enhance livestock productivity is a use of improved Brachiaria grass in feeding system. The objective of the study was to evaluate improved Brachiaria varieties for adaptation, herbage yield and nutritional values so that it can be integrated into feeding system of livestock farmers in the low rain-fall and acidic soil prone environments of Rwanda.

Materials and Methods
Study site
Brachiaria forage trials were established in two contrasting environments, the acidic soil area (Nyamagabe district) and low rain-fall area (Kirehe district). Nyamagabe district is located in the Southern Province (29°56’ E and 2°5’ S). It occupies an area of 1,090 km² with an elevation ranging from 1,500 to 2,500 m a.s.l. It receives higher average annual rainfall of 1,636 mm than Kirehe district (750 mm). However, average annual temperature (16.5°C) in Nyamagabe is lower than in Kirehe district (21°C).

Four improved Brachiaria grass cultivars namely, B. brizantha cv. Piata, B. brizantha cv. MG4, B. decumbens cv. Basilisk, Brachiaria hybrid cv. Cayman and Panicum coloratum (used as control) were planted in Ndasho sector of Kirehe district and in Cyamika sector of Nyamagabe district. The experiment was established in a randomized complete block design (RCBD) with four replications. Each plot size was 4 m x 5 m and the space between replication was 1 m. These replicated trials were established at one farm in each district.

Laboratory analysis
Grass samples were analysed for chemical composition, in vitro gas production for 72 hours to determine kinetics parameters, metabolisable energy (ME) and organic matter digestibility (OMD).

OMD (g/kg DM) = 148.8±8.89G24 + 4.5CP+0.651XA

ME (MJ/kg DM) =2.2±0.136G24 + 0.057CP +0.0029CP2

Where G24 is the gas volume at 24 h after inoculation, CP is crude protein and XA is the ash content (g/100 g).

Results
There was a significant difference (P<0.05) between sites and harvesting time and interaction between site and harvesting time for the dry matter (DM). The DM significantly increased from harvest at 60 days and 90 days. Grasses planted at Nyamagabe district had higher DM content than grasses at Kirehe district (Figure 1).

Figure 1: Dry matter production of tested grasses in two contrasting selected sites in Rwanda

- Generally, grasses planted in Kirehe district had higher CP content compared to grasses planted in Nyamagabe districts.
- Natural detergent fibre (NDF) differed significantly among species (P<0.001).
- The acid detergent fibre (ADF) of tested grasses showed significant difference (P=0.012) among species and across sites.
- Cellulose content in tested grasses also showed significant difference (P=0.012) among species and the interaction of harvest time and site as well.
- The Organic matter of tested grasses increased from 60 days to 90 days of harvest except for P. coloratum.

Conclusion
Grasses planted in the low rain-fall had high nutritive values compared to those planted in acid soil prone areas of Rwanda. Nevertheless, the results suggested that improved Brachiaria grass could be an alternative forage for dairy farmers in both contrasting environments.