EFEECT OF STORAGE PERIOD ON MACRO MINERALS OF CONGO GRASS (*Brachiaria ruziziensis*) HAY

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ABSTRACT
This study was conducted to evaluate the effect of storage period on *Brachiaria ruzizensis* hay. At 12 weeks after sowing (13 October, 2021), 50kg fresh *Brachiaria ruzizensis* forage was harvested at 15 cm above-ground at six randomly selected points on the pasture to make hay. 5 bags of the hay were stored during the dry season at the 8th (13 December, 2021) and 12th (13 January, 2022) weeks of storage. All data obtained were subjected to one-way ANOVA in SPSS software. The result showed that storage period had no significant effect ($p>0.05$) on phosphorus, calcium and sodium ; however, magnesium and potassium significantly differ ($p<0.05$) between the two storage periods. Phosphorus ranged ($p>0.05$) from 4743.24 mg/kg recorded at 12th week to 4574.99 mg/kg at 8th week of storage. Calcium level ranged ($p>0.05$) from 3880.65 mg/kg recorded at 8th week to 4182.89 mg/kg at 12th week of storage. Magnesium increased ($p<0.05$) from 3,964.45 mg/kg recorded at 8th week to 4,336.60 mg/kg at 12th week of storage. Sodium ranged ($p>0.05$) from 2,008.41 mg/kg recorded at 8th week to 2,118.78 mg/kg at 12th week of storage. Overall, it can be concluded that the storage period did not reduce the macro minerals of *Brachiaria ruziziensis* hay. Based on the results of this study, it could be recommended that *B. ruziziensis* hay could be harvested at 12th week after planting and conserved as hay for up to 16 weeks.

Key words: Storage period, Macro minerals, Storage period, *Brachiaria ruziziensis*, Hay

INTRODUCTION
In Nigeria, ruminant animals majorly derived their feed from natural pastures, which are constituted by unimproved crops. Moreover, pasture crops are succulent, highly nutritious and more abundant in the rainy season, but become fibrous, scarce and lack most essential nutrients that are required for the maintenance, growth, production and reproduction of livestock in the dry season (around November-April), forages become low in quality (Lamidi, 2009). During the dry season, ruminants are mainly fed agro-industrial by-products such as straws, stovers, cereal crop residues and other related feeds. These feeds are usually poor in protein, energy, minerals and vitamins and are generally high in indigestible fractions of lignin and silica. Thus, animal performance is usually poor in the dry season in Nigeria, Forage conservation has long been a dependable technique for addressing feed deficiencies during the dry season (Muraina *et al.* 2016). For example, hay could be produced from the natural pasture during the wet season to preserve the nutritive value of the moderately good unimproved forages for use in the dry season. However, the level of hay quality is dependent on a number of factors, including the stage of maturity at harvest, hay making process and storage system. Yet, there are limited reports on how storage period influence hay quality in Nigeria. Improved grasses can enhance livestock forage production in Nigeria due to their high forage production and nutritive value (Olanite *et al*., 2010). Congo grass (*Brachiaria ruziziensis*) is a species in the Genus *Brachiaria,* known for its vigorous growth in the tropical regions (Singh, 2009). As *Brachiaria* species are known for rapid re-growth, good biomass yield, palatability and nutritive value and persist on a good soil (Hare *et al*., 2005), they could be sown and preserved as hay and thus alleviate the dry season feed and feeding problems facing livestock production in Nigeria. Therefore, this study aims to evaluate the impact of storage period on macro minerals of hay produced from *Brachiaria ruzizensis* sown and harvested in late wet season.

MATERIALS AND METHODS
The establishment of *B. ruziziensis* and hay storage were conducted in Oyo State College of Agriculture and Technology, Igboora,which is located within 7^0 15North and 3^0 30East derived savanna zone of Nigeria .. At 12 weeks after sowing (13 October, 2021), 50kg fresh *Brachiaria ruziziensis* forage was harvested at 15 cm above-ground at six randomly selected points on the pasture. Thereafter, the harvested forage was crushed and sun-dried over two days to reduce the moisture content to about 15%. After the 48 hours drying, the *B. ruziziensis* hay was divided into 10 bags. 5 bags of hay were kept in an open shed with cross-ventilation. The stored hay bags were sampled at the 8th (13 December, 2021) and 12th (13 January, 2022) week of storage.

Minerals analyses

Samples were analysed (in DM %) for minerals using near infra-red spectroscopy (NIRS) equipped with globally calibrated equations developed by International Livestock Research Institute (ILRI) from conventional wet chemistry analysis (AOAC, 2000; Van Soest et al., 1994). The NIRS instrument used is FOSS Forage Analyzer 2500 with software package WinISI II.

Statistical analysis

All data obtained were subjected to one-way analysis of variance in R statistical software. Significant means were separated using Tukey's posthoc test. A significance level of 5% was used to express statistical difference between means.

RESULTS AND DISCUSSION

The result on the effect of storage period on macro minerals of *Brachiaria ruzizensis* hay (Table1) showed that storage period had no significant effect($p>0.05$) on phosphorus, calcium and sodium levels; however, magnesium and potassium significantly differ ($p<0.05$) between the two storage periods. Phosphorus ranged ($p>0.05$) from 4743.24 mg/kg recorded at 12th week to 4574.99 mg/kg at 8th week of storage. The phosphorus contents observed in this study were within the upper level of the recommended range (1-4.8 g/kg) for different ruminant animals (McDowell, 1992; 1997). Calcium level ranged ($p>0.05$) from 3880.65 mg/kg recorded at 8th week to 4182.89 mg/kg at 12th week of storage Calcium is a mineral element required for the maintenance, growth, production, and milk or beef of ruminants (Okukenu *et al.*, 2021). The calcium contents of hay in this study fall within the dietary requirements (1.6-6.0 g/kg) for beef cattle (NRC, 1980) and the required range for different ruminants (1.8 to 8.2 g/kg) (McDowell, 1992; 1997).. The potassium content of the *Brachiaria ruziziensis* hay increased with the storage period and was higher than the 8000 mg/kg recommended for grazing animals (Underwood, 1981) and 10000 mg/kg required by animals under stress (McDowell, 1985). Magnesium level increased ($p<0.05$) from 3964.45 mg/kg recorded at 8th week to 4336.60 mg/kg at 12th week of storage. Sodium ranged ($p>0.05$) from 2008.41 mg/kg recorded at 8th week to 2118.78 mg/kg at 12th week of storage. Magnesium increased ($p<0.05$) from 13289.41 mg/kg recorded at 8th week to 14414.10 mg/kg at 12th week of storage.

Table 1: Effect of storage period on macro minerals in *Brachiaria ruzizensis* hay

Parameter (ppm or mg/kg)	Storage period	Mean	SEM	p-value
Phosphorus	8th week	4743.24[a]	100.18	0.27
	12th week	4574.99[a]		
Calcium	8th week	3880.65[a]	172.48	0.25
	12th week	4182.89[a]		
Magnesium	8th week	3964.45[a]	71.31	0.006
	12th week	4336.60[b]		
Sodium	8th week	2118.78[a]	62.21	0.25
	12th week	2008.41[a]		
Potassium	8th week	13289.41[a]	274.02	0.02
	12th week	14414.10[b]		

[ab]: same superscripts means no significant difference; SEM: standard error of means

CONCLUSION AND RECOMMENDATION

It can be concluded that the storage period did not alter the macro minerals of *Brachiaria ruziziensis* hay and based on the results of this study, it could be recommended that *B. ruziziensis* hay could be harvested at 12th week after planting and conserved as hay for up to 16 weeks.

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