NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

NUTRITIVE VALUE OF *CHLORIS GAYANA* AND *BRACHIARIA RUZIZIENSIS* HAYSAS AFFECTED BY STORAGE PERIOD

Tokbish D. Y., Pyalson E. N. and Akpensuen T. T.
Department of Animal Production, Faculty of Agriculture, University of Jos, Nigeria.
Corresponding email: domzybish@gmail.com 08062731868

ABSTRACT
This study was conducted to evaluate the effect of storage period on nutritive value of *Chloris gayana* and *Brachiaria uziziensis*hays. The experimental design was a two (2 years) x two (2 grasses) factorial replicated three times. Proximate nutrient and detergent fibre composition such as Crude Protein (CP), Ash, hemicelluloses, lignin, acid detergent fibre (ADF), and neutral detergent fibre (NDF) in the hays for the year 2019 and 2020 were determined. Results revealed that, the values for CP (12.6%), ash (9.7%) and hemicellulose (32.5%) were significantly ($p<0.01$) higher in *Brachiariaruziziensis* than *Chloris gayana*. NDF, ADF and Lignin contents were however, higher ($p<0.05$) in *Chloris gayana* with 64.9%, 33.3% and 6.4%, respectively. The content of CP (11.7%) and ash (9.0%) was high in 2020 compared with 2019. The interaction shows that the contents of CP (13.1%), ash (10.0%) and Hemicellulose (32.2%) were higher ($p<0.05$) in *Brachiaria ruziziensis* in the year 2020 compared with *Chloris gayana* in 2019. Calculated Dry matter intake, total digestible nutrients (TDN), relative feed value (RFV) and digestible dry matter (DDM) were higher ($p<0.05$) in *Brachiaria ruziziensis* than *Chloris gayana*. In conclusion, *B. ruziziensis* hay has higher nutritive value than *C. gayana* hay. Farmers should establish the two types of grasses for conservation as hay for dry season feeding.

Keywords: *Brachiaria ruziziensis*, *Chloris gayana*, Hays, Nutrient composition, Storage period

INTRODUCTION
Both under-nutrition and mal-nutrition in livestock are major problems for the greater part of the country (Lulseged, 1985). Feed produced from natural pasture especially during the dry season is decreasing due to several factors that include overgrazing, land degradation and other factors. The production of a fast growing, high yielding and quality forage specie under intensive management gives rise to the availability of a good quality pasture feed. This can be done through the use of forage species that shows their superiority in terms of bulk production, palatability, chemical composition and nutrient availability (Muhammad & Abubakar 2004). It is therefore important to plant and conserve forage to tackle the lack of feed during dry season. Conservation of forage can be done either by hay, silage, haylage etc. Hay is a harvested forage preserved by drying generally to a moisture content of less than 200g/kg (Allen *et al*., 2011). It is the cheapest form of conservation. It is also important to determine nutrient content of conserved hay to meet nutrient requirement of animals. *Chloris gayana* and *Brachiaria ruziziensis* are perennial grasses that are high quality forage which can be used as for grazing, cut and carry green feed or hay (Asebe andAbdena, 2013) that would help supplement the shortage of feed for ruminant.

MATERIALS AND METHOD
The grasses were planted in Federal College of Forestry, Jos North Local Government Area, Plateau State of Nigeria. The experimental design is a 2x2 factorial arranged in a Randomized Completely Block Design (RCBD) replicated four times. The total land area was 7x4m, the plot size was 1.5x1m and the distance between each replicate was 2m. The two grasses (*Chloris gayana and Brachiaria ruziziensis* were harvested in 2019 and 2020.In each year, the plants were harvested just before blooming stage. $0.25m^2$ quadrat was used and placed in the middle of the plot; all plats within the quadrat were cut at a height of 5cm above the ground level. The harvested grasses were shade-dried to prevent bleaching and to maintain nutrient content. The grasses were also carefully handled to prevent leaf shattering. The crop samples were then ground.

Proximate analysis was done using the method of A.O.A.C (1990), Detergent fiber analysis was done using the method of Van Soest *et al*. (1991). Samples were analyzed at Department of Animal Science and the Department of Soil Science Ahmadu Bello University, Zaria Nigeria. Analysis of variance (ANOVA) was used to analyze all generated data. The general linear model of S.A.S (2002), statistical software was used for the analysis and mean were separated using Turkey's Test.

RESULT

The main effect of year and grass hays on nutrient composition is presented in Table1. The result showed that the values for CP, ash and HM were higher ($p<0.01$) in *B. ruziziensis* whereas NDF, ADF and LG contents were higher ($p<0.05$) in *C. gayana*. Also, CP and ash was high in 2020 compared with 2019 while other nutrients parameters such as NDF, ADF, LG and HM were all higher in 2019.

Table 2 shows the interaction of grass hays and year on nutrient composition where the contents of CP, ash and HM were higher ($p<0.05$) in *B. ruziziensis* in the year 2020 compared with others, while NDF ADF and LG were however higher ($p<0.05$) in *C. gayana* in the year 2020.

The main effect of grass hays and year on DMI, TDN, RFV & DDM is shown in Table 3 where all the parameters (DMI, TDN, RFV and DDM) were significantly ($p<0.05$) higher in *B. ruziziensis* comparedwith *C. gayana*. On year, 2020 shows high level of significance ($p<0.01$) over 2019.

Table4 shows the interaction of grass hays and year on DMI, TDN, RFV & DDM where *B. ruziziensis*2020 has higher ($p<0.01$) DMI (4.7%) compared to *B. ruziziensis*2019 (4.3%), while there was no difference between *C. gayana* in 2019 and 2020. *Brachiaria ruziziensis* also had higher ($p<0.01$) values in TDN, RFV and DDM in 2020, while the *C. gayana* had least values in 2019.

Table 1: Main effect of grass hays and year on nutrient composition

Grasses	CP	NDF	ASH	ADF	LG	HM
B. ruziziensis	12.6[a]	59.3[b]	9.7[a]	26.9[b]	5.0[b]	32.5[a]
C. gayana	10.3[b]	64.9[a]	7.8[b]	33.3[a]	6.4[a]	31.7[b]
SEM	0.08	0.27	0.08	0.11	0.15	0.23
P. Value	0.0001	0.0001	0.0001	0.0001	0.0002	0.0422
Year						
2019	11.2 [b]	63.3[a]	8.5 [b]	30.7 [a]	5.8 [a]	32.6 [a]
2020	11.7 [a]	61.0 [b]	9.0 [a]	29.4 [b]	3.6 [b]	31.6 [b]
SEM	0.08	0.27	0.08	0.11	0.15	0.23
P. Value	0.0012	0.0004	0.0026	0.0001	0.0401	0.0139

[abC] Means with different superscripts within a column are significantly different, SEM= Standard error of means, CP = Crude Protein, NDF = Neutral Detergent Fiber, ADF = Acid Detergent Fiber, LG = Lignin, HM = Hemicellulose

Table 2: The interaction of grass hays and year on nutrient composition

Grass X Year	CP	NDF	ASH	ADF	LG	HM
B. ruziziensis 2019	12.2 [b]	60.4 [c]	9.5[b]	27.9[b]	5.2 [b]	32.6 [a]
B. ruziziensis 2020	13.1 [a]	58.2 [d]	9.9 [a]	25.8 [c]	4.8 [c]	32.3 [a]
*C. gayana*2019	10.2 [c]	66.0 [a]	7.5[d]	33.5 [a]	6.4 [a]	32.6 [a]
*C. gayana*2020	10.4 [c]	63.8 [b]	8.0 [c]	33.0 [a]	6.5 [a]	30.8 [b]
SEM	0.12	0.38	0.11	0.15	0.22	0.32
P. Value	0.0282	0.0001	0.0815	0.0008	0.0417	0.0422

[abcd]Means with different superscripts within a column are significantly different, SEM= Standard error of means, CP = Crude Protein, NDF = Neutral Detergent Fiber, ADF = Acid Detergent Fiber, LG = Lignin, HM = Hemicellulose

Table3: Main effect of grass hays and year on DMI, TDN, RFV & DDM

Grasses	DMI	TDN	RFV	DDM
B. ruziziensis	4.5[a]	65.5 [a]	236.0 [a]	68.0[a]
C. gayana	3.6[b]	58.1 [b]	176.3 [b]	63.0[b]
SEM	0.01	0.12	0.90	0.08

P. Value	0.0001	0.0001	0.0001	0.0001
Year				
2019	4.0 [b]	61.1 [b]	199.5 [b]	65.0 [b]
2020	4.1 [a]	62.5 [a]	212.8 [a]	66.0 [a]
SEM	0.01	0.12	0.90	0.08
P. Value	0.0001	0.0001	0.0001	0.0001

[ab] Means with different superscripts within a column are significantly different, SEM= Standard error of means, DMI= Dry matter Intake, TDN = Total Digestible Nutrients, RFV= Relative Feed Value DDM= Digestible Dry matter

Table4: The interaction of grass hays and year on DMI, TDN, RFV & DDM

Grass X Year	DMI(%)	TDN(%)	RFV	DDM(%)
B. ruziziensis 2019	4.3 [b]	64.3 [b]	224.3[b]	67.2 [b]
*B. ruziziensis*2020	4.7 [a]	66.6 [a]	247.7[a]	68.8 [a]
*C. gayana*2019	3.6[c]	57.9 [c]	174.7 [c]	62.8 [c]
*C. gayana*2020	3.6 [c]	58.4[b]	177.9[b]	63.2[b]
SEM	0.02	0.18	1.27	0.12
P. Value	0.0001	0.0008	0.0001	0.0008

[abc] Means with different superscripts within a column are significantly different, SEM= Standard error of means, DMI= Dry matter Intake, TDN = Total Digestible Nutrients, RFV= Relative Feed Value DDM= Digestible Dry matter

DISCUSSION

Nutrient Composition in this study shows that the CP of *C. gayana* hay was higher than 7.6% as reported by Osuga *et al.* (2012) in Kenya for maintenance in ruminants. The CP of *B. ruziziensis* hay (13.0%) was greater than that obtained by Meale *et al.* (2012) in Australia. The NDF and ADF values for *Chloris gayana* reported in this study were less than 71.3% and 38.3% as reported by Osuga *et al.* (2012) in Kenya respectively. The value for NDF and ADF in *B. ruziziensis* was lower than 67.1 and 38.7 reported by Meale *et al.* (2012) in Australia. Lignin content (6.4%) for *C. gayana* was lower than 7.7% reported by El-hag and El-kjanjari (1992) in Egypt. *B. ruziziensis* also had a lower lignin content (5.0%) compared to 6.4% obtained by Meale *et al.* (2012) in Australia. *Chloris gayana* value for hemicellulose (31.7%) was greater than 27.7% as obtained by El-hag and El-kjanjari (1992) in Egypt.

Dry matter intake of hay obtained in this study for *B. ruziziensis* and *C. gayana* is within the range 3.2-4.2% as obtained by Rocha *et al.* (2014) in Brazil and also within the range of 3.8-4.2% reported by Knee, (2005) in Sidney. TDN of *B. ruziziensis* from this study is greater than 62% as obtained by Alan *et al.* (2004). RFV of *B. ruziziensis* and *C. gayana* are far higher than the prime value of 151% as reported by Alan *et al.* (2004) for good quality hay. DDM from this study for *B. ruziziensis* and *C. gayana* proves to be greater than 61.3% as obtained by Alan *et al.* (2004).

The high CP content of hay in this study is an indication that the hay is of good quality and is above the 7% CP required for microbial protein synthesis in the rumen that can support at least the maintenance requirement of ruminants (Minson, 1990), and also within the range of 7.5-15.45% reported in good quality hay (Yihalem, 2004).The difference in proximate and detergent fiber compositionfor the grass hays may be due to species and location difference as they are known to affect nutrient contents of crops.The higher content in CP in *B. ruziziensis* compared to *C. gayana* indicates that greater performance could be obtained from animals fed *B. ruziziensis* hay. The difference between the years arise due to the effect of defoliation where dry matter yield decreases and nutrient content increases as agreed by Cook *et al.* (2005).

CONCLUSION AND RECOMMENDATION

In conclusion, proximate and detergent fiber analysis based on this study shows that *B. ruziziensis* hay has higher nutritive value than *C. gayana* hay. Farmers should establish both grasses for conservation as hay for dry season feeding.

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