EVALUATION OF NUTRIENT CONTENTS OF GMELINA ARBOREA LEAVES AS ANIMAL FEED IN THE TROPICS

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ABSTRACT
An evaluation of chemical and mineral composition different forms of *Gmelina arborea* (GA) leaves was investigated. Experiment 1 involve the determination of the chemical composition of green, yellow and brown leaves of GA. Experiment 2 determined the mineral contents of the different leaves of GA. Results revealed that the chemical composition of the leaves varied significantly ($p.<0.05$). The dry matter ranged from 80.15-91.24 % in green and brown leaves respectively, while the crude protein ranged from 24.4-26.44 % in brown and green leaves respectively. The neutral detergent fibre ranged from 60.92-6.77 % in green and brown leaves respectively. Value of all minerals analyzed did not differ significantly, but was within the tolerable limit for consumption. These result showed that the different forms of *Gmelina arborea* leaves can be used as feed supplement for ruminants in the Tropics.
Keywords: *Gmelina arborea*, leaves, minerals, nutrients.

INTRODUCTION
The attainment of sustainable livestock production largely depends on the availability, quality and quantity of feed. Seasonal fluctuations and scarcity of forage in Nigeria is the major factor limiting the productivity of ruminants as animals rapidly loss weight gained during the lush season which may lead to death, thus resulting in a great economic loss to farmers (Babayemi et al 2003). Various efforts are being made by researchers in resolving these adverse effects. *Gmelina arborea* is a cheap non-conventional feed resource for ruminants in Nigeria. It is a fast growing deciduous Multi-Purpose plant of high nutritive value reaching up to 40 m tall and 140 cm in diameter and grows in climates with mean annual rainfall temperatures of 21-28^{0}C (Jensen 1995). The leaves are very high in protein and it a suitable source of energy (Amata and Lebari, 2011). The leaves are available all year round ensuring availability of feed to animals during the dry season (Amata 2014). The objective of this study is to evaluate the chemical and mineral composition present in three different forms of *Gmelina arborea* leaves as feed supplements for ruminants.

MATERIALS AND METHODS
Collection of samples
Green and yellow leaves are plucked from pear tree while the brown leaves were picked from the floor around the root of the plant. Reasonable numbers of each leaf type were collected and taken to the laboratory for analysis.
Chemical and mineral analysis
Crude protein, crude fibre, either extract and total ash of samples were analyzed in triplicates using standard procedure of A.O.A.C (2012). The crude protein was determined with the micro kjeldahl distillation apparatus, while the NDF, ADF and ADL were determined by Van Soest method (1994).
Analysis of minerals
A total of ten minerals were analysed. Plant parts were digested with HNO_3 / $HCIO_3$ mixtures (nitric acid and perchloric acid) (20:5 v/v). The digest was made up to 100 ml in standard volumetric flask with deionzed water. Ca, Na, K, Fe, Cu, Mn, Zn, Mg and Pb in the digest were determined with the atomic absorption spectrophotometer model 420. (Gallenkemp and Co. Ltd). Phosphorus in the digest was estimated with vanadomolybdate solution. The colour so

developed was read with spectrophotometer at 420 m/u.

Statistical analysis

Data obtained were analyzed and subjected to analysis of variance procedure (ANOVA) of SAS (2012). Significant means were separated by Duncan's (1955) Multiple Range Test.

RESULTS AND DISCUSSION

Table 1 shows the chemical composition of green, yellow and brown leaves of *Gmelina arborea*. All parameters analyzed differed significantly ($p<0.05$). The dry matter content of these leaves ranged from 80.15-91.24 % in green and brown leaves respectively. This result is at variance with the report elsewhere for *Gmelina arborea* leaves (Ibahaze et al 2015), but in agreement with the findings reported for African pear leaf (96.20%) (Arikwe et al. 2012). The CP ranged from 26.44- 24.84 % in green and brown leaves respectively. The value of CP obtained in here is higher than values reported for some conventional forages elsewhere (Ajayi et al 2005). However it is in agreement with the findings of Bamikole et al (2003) who reported CP range of 10-37% for most tropical forage and browse plants. The CP content of this plant is higher than the recommended 8% value for ruminants (Minson 1990). The NDF also varied from 60.92- 63.77% in green and brown leaves. These values are These values are within the recommend limit of 60.00% guaranteed for forage intake by ruminants (Messiner 1991).

Table 2 shows the mineral composition of the different leaves of *Gmelina arborea*. There was no significant variation among the different leaves for all minerals analyzed. However, the values of all the minerals analyzed were within the range recommended for grazing livestock (NRC 2002). This is an indication that the leaves will supply the mineral requirement of animals.

CONCLUSION

The different forms of *Gmelina arborea* leaves investigated showed that the plant has potentials to meet ruminant nutrient requirements in the tropics. The plant would be a cheaper alternative feed supplement to ruminants especially during the dry season.

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Table 1: Chemical composition (%) of different forms of *Gmelina arborea* leaves

	Different forms of *Gmelina arborea* leaves			
Parameters	Green	Yellow	Brown	SEM
Dry matter (DM)	80.15^{c}	88.01^{b}	91.24^{a}	0.42
Crude protein (CP)	26.44^{a}	25.63^{b}	24.84^{c}	0.20
EE	4.00^{c}	4.09^{b}	4.71^{a}	0.02
Ash	14.92^{c}	15.34^{b}	17.26^{a}	0.12
NDF	60.92^{c}	61.87^{b}	63.77^{a}	0.35
ADF	38.79^{c}	40.81^{b}	42.10^{a}	0.20

^{abc}= means on the same row with different superscript differ significantly ($p<0.05$)
SEM= Standard Error of mean

Table 2: Macro and micro mineral content of *Gmelina arborea* leaves

	Macro minerals (%)					Micro minerals (mg/kg)				
Leaves	Ca	P	K	Na	Mg	Fe	Zn	Cu	Mn	Pb
Green	0.85	0.52	1.65	0.52	0.78	423.2	52.5	11.3	85.3	21.2
Yellow	0.87	0.55	1.70	0.53	0.79	428.5	54.3	11.5	87.4	22.5
Brown	0.93	0.62	1.75	0.61	0.86	526.1	61.3	12.8	89.6	25.4
SEM	0.29	0.12	0.13	0.30	0.29	10.9	2.3	0.7	9.3	0.5