

BREWERS DRIED GRAIN AND MAIZE OFFAL MIXED IN EQUAL PROPORTIONS 1:1. THE EFFECT ON NUTRIENT INTAKE AND DIGESTIBILITY OF WEST AFRICAN DWARF WEANER BUCKS FED *GMELINA ARBOREA* LEAVES.

¹N.S. yaikyur, ² A.M Mashi. Dafa kelvin T.

¹Department of Animal production and Health, Federal University Wukari, 200 Katsinal-Ala Road, P.M.B 1020 Wukari, Taraba State, Nigeria.

* Department of Animal Husbandry, Akperan Orshi college of Agriculture, Yandev, P.M.B 181, Gboko, Benue State, Nigeria.

*e-mail of corresponding author solomonyaikyur@gmail.com

ABSTRACT

Twenty (20) West African Dwarf bucks with average weight of 8.04 kg were randomly allocated to four treatments with five animals per treatment in a complete CRD. Treatment one (T₁) was given *Gmelina arborea* leaves *ad Libitum*. Animals on treatment two (T₂), three (T₃) and four (T₄) were fed 100, 200, and 300 g/head/day of a mixture of Brewers dried grain and maize offal and *gmelina arborea* leaves *ad libitum*. The results obtain showed that supplementation significantly increased ($p < 0.05$) feed intake, weight gain, and efficiency of feed utilization. Feed intake increases with increased level of supplement. Based on the results of the study it was concluded that supplementation of *Gmelina arborea* leaves with mixture of brewers dried grain and maize offal at the level of 200 g/head/day (T₂) gave the best nutrient intake and digestibility.

Key words: WAD, *Gmelina arborea* leaves, brewers dried grain, maize offal, nutrient intake and digestibility.

INTRODUCTION

Nutrition has been identified as a major factor limiting ruminant animal production in Nigeria. In the northern part where over 80% of ruminants are found is faced with severe feed scarcity during the dry season and the available forages are of low quality, resulting in weight loss and high mortality in goats. *Gmelina arborea* is a perennial leguminous tree which is notable for its fast growth, large green leaves and high dry matter yield (Admosun, 1988). *Gmelina arborea* leaves are considered good for ruminant because of its crude protein content of 11.9%. The proximate composition showed that *gmelina arborea* have 73.71, 5.39, 13.60, 17.15, 23.00, 65.14, 32.30 and 34.48% of DM, ASH, EE, CF, CP, NDE, ADF and AFE, respectively (Amata and Lebari).

Brewers dried grain (BDG) is the residue of cereal grain which resulted from the manufacture of beer. It is a rich source of essential fatty acid and vitamins especially the B-complex vitamins (Gohl, 1981). Brewers dried grain obtained at the Benue Brewery Limited, makurdi according to Dubaja (1976) is a by-product of beer fermentation which is recovered from the fermentation vats by centrifugation and cooling. Once all sugars have been removed from the grain, the residue is high in protein and fibre that is suitable for animal feeding particularly ruminants.

Maize offal also known as Dusa, a by-product of maize grain obtained after dehulling. The maize is rich in crude protein (cp) and energy (McDonald *et al.* 1999). Maize offal has high energy and crude protein content. The proximate composition of maize offal showed 87.76% dry matter, 11.00% crude protein, 9.45% crude fibre, 4.8% ether extract, 4.23% ash and 78.66% NFE (Vantsawa *et al.*, 2007).

There is little information on the utilization of brewers dried grain and maize offal mixed in equal proportion and fed at different levels as supplement to *Gmalina arborea* in goats.

This paper was therefore designed to evaluate the nutrient intake and digestibility of West African Dwarf weaners goats fed *Gmalina arborea* leaves alone and different levels of mixture of Brewers dried grain and maize offal (1:1) as supplement.

MATERIALS AND METHODS

The experiment was conducted in the small ruminant unit of Akperan Orshi College of Agriculture, Yandev – Gboko, Benue State. Yandev is located in Benue State within the Southern Guinea Savannah

Agro ecological Zone of Nigeria. It lies between longitude 9° 02'E and latitude 7° 21' North of equator (TAC, 2018). The area is characterized by 6-7 months of rainfall which ranges from 1350 – 1400mm. the ambient temperature ranges from 34°C – 36°C with the highest in March, the lowest mean monthly temperature range of 26°C – 28°C occurs in December and January (TAC, 2002). The relative humidity is highest (69%) in August and September and lowest (39%) in January and February.

The maize offal (MO) used in this study was purchased at Gboko Market, while Brewers Dried Grain (BDG) was purchased from Benue Brewery limited (BBL), Makurdi. The maize offal and Brewers Dried Grain were sun dried and mixed at a ratio of 1:1 (i.e 49.75 % of MO and 49.75 % of BDG with 0.5 % of table salt. The experimental diet is shown in Table 1.

Table 1: Composition of Concentrate Supplement

Ingredient	% Composition
Maize offal	49.75
Brewers dried grain	49.75
Common salt	0.50
Total	100

twenty (20) West African dwarf (WAD) bucks with average initial weight of 8.04 kg were sourced from Gboko and its environs, the bucks were vaccinated against Pest de Petits Ruminant (PPR), dewormed and deticked using *ivermectin* preparation before the feeding trial. Routine hygiene and medication to guard against microbial, endo and ecto parasites were taken throughout the study period. The animals were randomly allocated to four treatment diets which was replicated five times with each animal serving as a replicate in each treatment.

Experimental Diet

The experimental diets were

Diet I = 1000 g of *Gmelina arborea* leaves *ad Libitum*

Diet II = 100 g of concentrate mixture of MO/BDG which was offered three hours before serving them with the 1000 g of the *Gmelina arborea* leaves.

Diet III = 200 g of concentrate mixture of MO/BDG which was offered three hours before serving them with 1000 g of the *Gmelina arborea* leaves.

Diet IV = 300 g of concentrate mixture of MO/BDG which was offered three hours before serving them with 1000 g of the *Gmelina arborea* leaves.

Experimental Procedure:

Fresh leaves of *Gmelina arborea* which served as the basal diet were harvested within the Akperan Orshi College of Agriculture Yandev – Gboko every morning, washed, weighed and fed fresh to the goats. Treatment one (T₁) was fed only fresh leaves of *Gmelina arborea ad libitum*. The other treatment diets (i.e T₂, T₃ and T₄); comprised 100 g, 200 g and 300 g of the concentrate mixtures. Animals on these treatments (T₂, T₃ and T₄) were fed the *Gmelina arborea* leaves three hours after the concentrate feed was given to them. The animals were served clean water *ad libitum*. Left over were carefully collected and weighed and feed intake by difference (feed offered less the left-over) was determined. The study lasted for 98 days following on adjustment period of 14 days.

At the end of the feeding trail a seven day digestibility trial was conducted using metabolism cages. During this period, faecal samples from each animal was quantitatively collected, weighed and oven-dried in an oven for a period of 72 hours at 100 °C until a constant weight was attained thereafter the samples were carefully weighed again to determine the dry matter content. The faecal samples were thoroughly mixed, ground and subsamples were stored in sample bags for analysis. The analysis were carried out in the Food Science Laboratory of the University of Agriculture Makurdi.

Apparent digestibilities of; dry matter, crude protein, crude fibre, nitrogen free extract and ether extract were determined using the formula:

$$\text{Apparent Digestibility} = \frac{\text{Nutrient consumed} - \text{Nutrient Voided}}{\text{Nutrient consumed}} \times 100$$

Data obtained for the parameters were subjected to the Analysis of Variance (ANOVA) based Completely Randomized Design (CRD) and where significant difference occurred, the means were separated using Duncan's Multiple Range Test (DMRT) according to the procedures outlined by Steel and Torrie (1991).

RESULT AND DISCUSSION

The proximate composition of feed ingredients and experimental diet are shown in Table 2. The result of nutrient intake are presented in table 3. While dry matter and apparent nutrient digestibility by weaner West African Dwarf bucks fed *Gmelina arborea* leaves supplemented with brewers dried grain and maize offal in the ratio of 1:1 are presented in table 4.

Table 2: Proximate Composition of Dietary Ingredient and Supplement (Dry Matter Basis)

Components (%)	<i>Gmelina arborea</i>	Brewers Grain	Dried	Maize Offal	Supplement (50:50 BDG/MO)
Dry Matter	29.59	86.62		89.62	85.95
Crude protein	10.14	11.57		12.87	12.21
Crude fibre	34.84	3.88		7.88	5.88
Ether extract	8.79	2.42		6.85	4.64
Ash	11.25	3.24		6.08	4.66
NFE	34.98	78.89		66.32	72.61

Table 3: Dry Matter and Nutrient Intake (g/day) by WAD Bucks as affected by the Experimental Treatments. (DM bases)

Nutrients	Experimental Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Dry matter	147.16 ^d	176.05 ^c	188.62 ^b	194.27 ^a	0.88*
Crude protein	18.70 ^c	31.46 ^b	36.15 ^a	36.93 ^a	0.12*
Crude fibre	66.53 ^c	77.66 ^b	82.32 ^a	84.55 ^a	0.25*
Ether extract	17.15 ^b	22.36 ^a	24.79 ^a	24.90 ^a	0.06*
NFE	65.74 ^d	135.71 ^c	158.08 ^b	169.97 ^a	0.76*

SEM = Standard error of mean

* = Significant

a, b, c, d = means on the same rows with different superscript differ significantly (P<0.05)

T₁ = 0 g concentrate/day and *Gmelina arborea* leaves

T₂ = 100 g concentrate/day and *Gmelina arborea* leaves

T₃ = 200 g concentrate/day and *Gmelina arborea* leaves

T₄ = 300 g concentrate/day and *Gmelina arborea* leaves

Table 4: Dry Matter and Nutrients Digestibility Coefficient (%) of WAD Buck as affected by the Experimental treatments.

Nutrients	Experimental Treatment					
	T ₁	T ₂	T ₃	T ₄	SEM	
Dry matter	56.24 ^d		68.66 ^c	72.92 ^b	83.92 ^a	0.29*
Crude protein	52.45 ^d		88.25 ^c	91.16 ^b	94.72 ^a	0.17*
Crude fibre	66.01 ^d		91.51 ^c	94.75 ^b	96.61 ^a	0.75*
Ether extract	50.34 ^d		80.32 ^c	82.89 ^b	91.09 ^b	0.58*
NFE	36.85 ^a		74.11 ^b	77.11 ^b	78.71 ^a	0.19*

a, b, c, d means on the same rows with different superscript differ significantly (P<0.05)

SEM: Standard error of mean

* : significant different

T₁ = 0 g concentrate/day and *Gmelina arborea* leaves

T₂ = 100 g concentrate/day and *Gmelina arborea* leaves

T₃ = 200 g concentrate/day and *Gmelina arborea* leaves

T₄ = 300 g concentrate/day and *Gmelina arborea* leaves

The results show that supplementation of brewers dried grain and maize offal to goats fed *Gmelina arborea* leaves significantly influence intake ($P<0.05$) of dry matter, crude protein, crude fibre, ether extract and NFE among treatments. It was observed in this study that intake of nutrients increased as the level of concentrate supplementation increased.

The superior performance in terms of digestibility of nutrients of the supplemented group (T_2 , T_3 and T_4) to the unsupplemented (T_1) could be due to the fact that the supplemented supplied additional quantity/quality of nutrients that were limiting in the forage. This result tallies with those of Adebawale and Taiwo (1996), Adeleye (2008), Osinowo (1992), Adegbola (2002), Abubakar *et al.*, 2005. The high DM content of the supplemented group also enhanced dry matter digestibility. This agrees with the report of Ogundipe (2002) who reported that, a certain minimum daily dry matter intake is essential to satisfy an animal's appetite and to permit the proper functioning of the digestive tract. The high CP in the supplemental group could also provide adequate protein that would support the rumen microbial activities fermentation which in turn facilitates a better digestibility because the animal on this diet had the best feed conversion ratio.

CONCLUSION

The study showed that supplementation significantly ($p<0.05$) increased feed intake, weight gain and feed utilization. The rate of feed intake and protein quality increases with increased level of supplementation. This could be due to higher dry matter by the supplemented group that met the nutrient requirement of the goats.

RECOMMENDATIONS

Based on the findings of this study, it is recommended that

1. Feeding *Gmelina Arborea* leaves as a sole diet for WAD goats would not support weight gain.
2. A concentrate mixture of BDG and MO (50:50) fed in combination *Gmelina Arborea* leaves as a basal forage at 200g/head/day (T_3) by goat farmers can influence animal performance, save cost and maximise profit

REFERENCES

- Abubakar M., Adegbola, T. A. and Abubakar, M. M. (2005). Effect of varying levels of groundnut haulm and cawpea shell on the performance of red Sokoto goats Nig. J. Anim. Prod. 32(1 and 2) :274-279
- Adebawale, E. A. and Taiwo, A. A. (1996). Utilization of crops residue and agro by-products as complete diet for west African dwarf sheep and goats. Nig. J. Anim. Prod. (23):153-160.
- Adegbola, T. A. (2002). Nutrient intake, digestibility and rumen metabolites in bulls fed rice straw with or without supplements. Nig. J. Anim. Prod., 29(1): 40- 46
- Ademosun, A. A. (1988). Nutritive evaluation of Nigerian forages (ii). The Effect of stage of maturity on nutritive value of *S. Gracilis*. Nig. J. Agric. 7. 164.
- Aduku, A. O. (1993). Tropical feed stuff analysis table. Department of animal science, faculty of agriculture, Ahmadu Bello University, Zaria, Nig. Pp. 1 – 4.
- Amata, A. I. and Lebari, T. (2012). Comparative evaluation of the amino acid profile and anti-nutritional content of the leaves of four selected browse plants in the tropics. International J. of plant, animal and environmental science 2(1):107-111, ISSN 2231-4490.
- BSN (1982). The Government and People of Benue State. Benue State Gazette. Benue State Ministry of Information
- Dubaja, R. C. (1976). Brewers dried grain as nutrient source in diet of pregnant sows.
- Gohl, B. O. (1981). Tropical Feeds, Feed Information Summaries and Nutritive Values. FAO Animal Production and Health Series No. 12 p. 436 – 437.

- McDonald, P., Edward, R. A., Greenhalgh, J. F. D. and Morgan, C. A. (1999). Functions of phosphorus. *Animal nutrition* 5th ed. Press pp 101 – 105.
- Merchen, N., Hassan, T. and Klopfenstein (1979). Ruminant by pass of brewers dried grains. *Protein J. Anim. Sci.* 49: 192 – 198.
- Satter, L. D. and Whitlow, L. W. (1977). Resistance of Protein in Brewers Dried Grain to Microbial Degradation in the Rumen US Brewer Association, Feed Conf. P. 7.
- TAC (2002). Makurdi weather element records. Tactical Air Command Meteorological Station.
- Vantsawa, S. O., Ogundipe, S. O. Dafwang, I. I. and Omaye, J. J. (2007). Replacing value of Dusa (locally processed maize offal) for maize in the diet of egg type chick (0-8 weeks) pak. *J. of Nutr.* 6(6): 530-533