INTAKE AND WEIGHT GAIN OF WEST AFRICAN DWARF GOATS FED *PANICUM MAXIMUM* SUPPLEMENTED WITH MULTI-NUTRIENT FEED BLOCK

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Abstract

This study was conducted to evaluate the intake and weight gain of West African dwarf (WAD) goats fed Panicum maximum supplemented with Multi-nutrient feed blocks (MNB). Twelve (12) West Africa dwarf (WAD) goats aged between 4-5 months, with average body weight of 7.08±1.83kg were used for the study. The WAD goats were randomly allotted to four dietary treatments with three goats per treatment in a completely randomized design. The animals were fed with panicummaximum supplemented with MNB without browse plant inclusion (T1), Chromolaena odorata based-MNB (T2), Tithoniadiversifolia based-MNB (T3) and Merremiaaegyptia based-MNB (T4) for 84 days. Results showed that there were no significant differences (P>0.05) in the total dry matter intake of WAD goats across the treatments. The dry matter intakes ranged from 782.83.43g/day in goats fed Merremiaaegyptia based-multi-nutrient block to 922.06g/day in goats fed multi-nutrient block without browse plant. The final weight and weight gain were significantly higher (P < 0.05) and similar (P>0.05) in animals fed Chromolaena based-MNB, Tithonia based- MNB and Merremia based-MNB while animals fed control MNB recorded the least values. The study concluded that forage based-MNBs should be fed to WAD goats as supplement since animals placed on forage based-MNBs had the best performance terms of final weight and daily weight gain.

Key words: Multi-nutrient block, feed intake, weight gain, West African Dwarf goats

Introduction

Small ruminants are one of the sources of income large enough to be used for capital investment (Akinsoyinu, 1985). They include cattle, sheep and goats. West African Dwarf (WAD) goat is a breed of coastal West and Central Africa. They are found mainly in the forest belts of the Southern Nigeria and are prolific giving birth to twins and triplets (Moruppa *etal.*, 1986). However, scarcity and fluctuation in the quantity and quality of the year-round supply of conventional ruminant feeds is one the major constraints to increasing livestock production in the developing countries (Isah, 2012). Multi-nutrient block made from locally available resources for small ruminant animals is considered as the most promising low cost feeds in Nigeria as it helps in supplying degradable protein and fermentable energy to small ruminant (Aye, 2010). Multi-nutrient block had also been demonstrated to improve dry matter intake and live weight gain in lambs on a basal diet of wheat straw (Hendratno *et al.*,1991) and maize stover (Fatine and Zanetti, 2010). This study was therefore carried out to evaluate the intake and weight gain of West African dwarf goats fed *Panicum maximum* supplemented with Multi-nutrient feed blocks

Materials and Methods

The experiment was carried out at the COLANIM Farm of Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. This site lies within the tropical rain forest vegetation zone of Southwestern Nigeria at latitude $7^0 13^1 49.46^1$N, longitude $3^0 26^1$ 11.98^{1}E and altitude 76m above sea level. The climate is humid with a mid annual rainfall of 1,037mm and average temperature of 34.7^0 C. (Google earth 2014).

The experimental diets consist of a basal diet of *Panicummaximum* supplemented with Multi-nutrient feed block. Three different forage based multi-nutrient blocks and a control (without forage) were made using cold process with little modification from palm kernel cake, urea, wheat offal, molasses, cement, salt, premix and browse plants (Table 1). Urea, salt, and water were mixed together separately (mixture 1) while the remaining ingredients (palm kernel cake, wheat offal, cement, pineapple waste, browse plant and premix) were mixed together with molasses (mixture 2). The first and the second mixture were then thoroughly mixed together by hand in a large plastic bowl. Plastic moulds were used for the casting of the multi-nutrient by compressing the mixture heavily into moulds on a concrete floor. The multi-nutrient blocks were left at room temperature for about one week to dry so as to be hard enough for handling, transportation and feeding. Samples of each multi-nutrient block was taken, pulverized and used for the chemical composition analysis according to AOAC (2005).

Twelve (12) West Africa dwarf (WAD) goats aged between 4-5 months, with average body weight of 7.08±1.83kg were used for the study. The animals were randomly assigned to four experimental multi-nutrient blocks with three goats per treatment in a completely randomized design. The treatments were multi-nutrient block without browse plant (T1), *Chromolaena odorata* based-MNB (T2), *Tithoniadiversifolia* based-MNB (T3) *and Merremiaaegyptia* based-MNB (T4). The Panicum maximum was offered to the animals on an ad-libitum basis and multinutrient block at 200g/ animal/day. The intake and weight gain were estimated as the difference between the feed offered and leftover; and difference between the final weight and that of initial weight respectively. The experiment lasted for 84 days. All data collected were subjected to one way Analysis of Variance (ANOVA), using SAS(1999) procedure. Significance differences among means were compared using Duncan's New Multiple Range Test (Duncan, 1955).

Results and Discussion

The ingredients and chemical composition of multi-nutrient feed blocks used for the experiment is shown in Table 1. There were significant differences ($P < 0.05$) in the means of the chemical components across the treatments with MNB without browse plant having the highest dry matter and nitrogen free extract contents (94.17%, and 49.47% respectively). Crude protein content was higher in Chromolaena based-MNB and Merremia based-MNB compared to other treatments. The dry matter contents of MNBs (87.67-94.17%) obtained in this study were within the range (71.10-95.00%) reported for forage based urea- molasses MNBs (Onwuka, 1999; Aye and Adegun, 2010, Mubi *etal.*, 2011 and Isah *etal.*, 2015). The nitrogen free extract of the blocks (44.26-49.47%) reflected the energy content of the block which could be as a result of addition of molasses to the block. The crude protein contents of the MNBs determined was lower than the range reported by Tekeba *etal.*, 2013 and Isah *etal.*, 2015 for urea-molasses forage based MNBs. Variations observed could be due to the differences in the chemical composition of the various forages used. However, the crude protein contents obtained across the treatments were above 8% crude protein stated by Norton (1994) as limit required by rumen microbes for optimum activity. Data related to feed intake and weight changes are given in Table 2. The total dry matter intake was similar ($P > 0.05$) across the treatments and the value ranged from 782.83.43g/day in goats fed Merremia based-multi-MNB to 922.06g/day in goats fed MNB without browse plant. There were significant differences ($P < 0.05$) in the final weight and daily weight gain of animals across the treatments with animals on Chromolaena based, Tithonia based, and Merremia based MNBs recording higher values compared with animals fed MNB without browse plant. It could be as a result of higher crude protein content recorded for this blocks as concentration of crude protein in a feedstuff affect its digestibility (McDonald *etal.*, 1987) This demonstrated that goats fed MNB containing browse plant (forage based- MNBs) performed better than those fed MNB without browse plant. It suggests that forage based- MNBs have potential of improving rumen fermentation which supplies a better balance of nutrients to the animals for absorption (Habib *etal.*, 1991) and hence better the performance of the animals.

Conclusion

Results obtained from this study indicated that there was positive influence on the weight gain of the West African dwarf goats fed forage based multi-nutrients blocks and so can be used to increase the growth rate of small ruminants under confinement especially during the dry season.

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Table 1: Ingredients and chemical composition of multi-nutrient feed blocks

Ingredients (%)	T1	T2	T3	T4	
Molasses	10	10	10	10	
Wheat offal	39.5	29.5	29.5	29.5	
Palm kernel cake	10	10	10	10	
Pineapple waste	20	20	20	20	
Urea	10	10	10	10	
Premix	0.25	0.25	0.25	0.25	
Common salt	0.25	0.25	0.25	0.25	
Cement	10	10	10	10	
Chromolaenaodorata	0	10	0	0	
Tithoniadiversifolia	0	0	10	0	
Merremiaaegyptia	0	0	0	10	
Total	**100**	**100**	**100**	**100**	
Chemical composition (%)					SEM
Dry matter	94.17[a]	87.67[b]	89.00[b]	88.17[b]	0.90
Crude protein	9.87[b]	13.44[a]	12.91[a]	13.85[a]	0.56
Ether extract	13.33[b]	17.67[a]	12.00[b]	16.17[a]	0.94
Crude fibre	9.33	8.67	8.30	9.70	1.05
Ash	18.00[c]	21.00[b]	22.50[a]	20.00[bc]	0.81
Nitrogen free extract	49.47[a]	44.26[b]	45.89[b]	46.65[b]	2.42

[a,b,c] Mean valuesin the same row with different superscripts differ significantly (P< 0.05), SEM: Standard Error of Mean, T1: Multi -nutrient block without browse inclusion, T2: *Chromolaenaodorata*based-multi-nutrient block, T3: *Tithoniadiversifolia*based-multi-nutrient block, T4: *Merremiaaegyptia* based-multi-nutrient block

Table 2: Feed intake and weight gain of WAD goats fed *Panicum maximum* supplemented with multi-nutrient feed block

Parameters	T1	T2	T3	T4	SEM
Initial weight (kg)	7.00	7.00	7.00	7.33	0.26
Final weight (kg)	7.77[b]	9.30[a]	8.90[a]	9.57[a]	0.33
Total weight gain(kg)	0.77[b]	2.30[a]	1.90[a]	2.23[a]	0.24
Weight gain (g/ day)	9.13[b]	27.38[a]	22.62[a]	26.57[a]	2.80
Metabolic live weight ($LW_{kg}^{0.75}$)	4.47	4.81	4.73	4.95	0.12
Dry matter intake (g/day)					
MNB intake	151.02	128.08	137.52	110.43	7.59
Grass intake	771.05	767.59	700.95	672.40	25.05
Total intake	922.06	895.67	838.47	782.83	29.30

[a,b] Mean valuesin the same row with different su perscripts differ significantly (P< 0.05), SEM: Standard Error of Mean, T1: Multi -nutrient block without browse inclusion, T2: *Chromolaena odorata*based-multi-nutrient block , T3: *Tithonia diversifolia* based-multi-nutrient block , T4: *Merremia aegyptia* based-multi-nutrient block