

PERFORMANCE OF WEST AFRICAN DWARF (WAD) GOATS FED *Moringa oleifera* LEAF MEAL

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Abstract

A feeding trial of 90 day duration was conducted to determine the performance of twelve West African Dwarf (WAD) goats fed different inclusion levels of *Moringa oleifera* leaf meal (MOLM). The animals aged between 10 – 12 months were randomly divided into 4 treatment groups of 3 animals each and housed individually in cement floored pens provided with feeder and drinker. Four treatment diets (T1, T2, T3 and T4) were formulated to contain 0, 5, 10 and 15% MOLM in addition to other constituents (cassava peel, brewers dried grain (BDG), palm kernel meal (PKM), maize offal, bone meal and salt). The diets were allotted to the 4 animal groups in a Completely Randomized Design. Each animal received the designated diet on 3% body weight basis in addition to a forage sward made of mostly *Panicum maximum*, *Aspilia africana* and *Alchornea cordifolia*. Parameters evaluated were average daily feed intake, average daily weight gain and feed conversion ratio. Results showed that average daily feed intake differed significantly ($P < 0.05$) with goats fed 15% MOLM diets having the highest intake (495.19 g/d). Similarly average daily weight gain was highest (46.00 g/d) for animals fed T4 diet (15% MOLM). FCR was however best for does fed T4 diet (10.77). Incorporation of MOLM in diets of WAD goats generally enhanced performance. Diet T4 promoted the best relative performance among the treatment diets and is therefore recommended for production of WAD goats in South East Nigeria.

Introduction

The West African Dwarf (WAD) goat is the dominant breed of small ruminants in the humid zone of Eastern Nigeria. However, production of this indigenous breed of goat, with great potentials to alleviate the animal protein inadequacy in the tropics is faced with various challenges. Ahamefule and Elendu (2010) identified feed shortage as a major constraint to their production during the dry season. This is derived from the fact that the extensive system of goat production in Nigeria encourages the raising of WAD goats on range (Ahamefule *et al.*, 2005). This production system subjects this indigenous breed to severe nutritional stress especially during the dry season when the natural pastures and post-harvest crop residues are depleted in nutrients and can barely sustain their maintenance. Adegbola (2002) reported that poor quality roughages fed to ruminants without supplementation during the dry season caused considerable weight losses and general poor performances. Globally attention is being shifted to multi-purpose tree species (MPTS) such as *Moringa oleifera* to improve animal nutrition.

Moringa oleifera is a multi-purpose tree that has considerable fodder yield in the tropical humid forest zone of Nigeria during the wet and dry seasons (Fadiyimu *et al.*, 2011). However, the value of the foliage and its benefits as a high-quality supplement to low-quality roughages in

ruminant feeding systems have not been fully known nor widely exploited (Fadiyimu *et al.*, 2011). This study, therefore, was designed to investigate the effect of *Moringa oleifera* leaf meal on growth performance of WAD goats.

Materials And Methods

Experimental site and Management of Animals: The experiment was conducted at the Sheep and Goat unit of the Teaching and Research farm of Michael Okpara University of Agriculture, Umudike. Twelve WAD goats of about 10 – 12 months of age were used for this experiment. Prior to the trial, the animals were dewormed and sprayed against external parasites. The goats were quarantined for 21 days and subsequently fed for a preliminary period of 21 days. The ration fed was the control diet (Table 1) in addition to fresh forage sward (comprising *Panicum maximum*, *Aspilia africana* and *Alchornea cordifolia*) for acclimatization. This was done to build up each animal's appetite for concentrate diet. After the preliminary feeding period, the twelve WAD goats were randomly divided into four (4) groups of three (3) animals each. The groups were randomly assigned the 4 treatment diets (T1, T2, T3, and T4) in a Completely Randomized Design (CRD). The animals were housed individually in well ventilated cement floored pens equipped with feeders and drinkers. Each animal received

designated treatment diet in the morning for 90 days. Feed offered was based on 3% body weight per day. The animals in addition were fed 2kg fresh forage sward of *Panicum maximum*, *Aspilia africana* and *Alchornea cordifolia* later in the day. Regular access to fresh drinking water was made available. Feed offered and refused were recorded on a daily basis. Initial weights of the animals were taken at the beginning of the trial and weekly

subsequently.

Experimental Diets: Fresh *Moringa oleifera* leaves used for the trial were obtained from Ihitte Uboma and Obowo L. G. As., both in Imo State, Nigeria. *Moringa oleifera* leaves were subsequently air-dried before milling with hammer mill and used at 0%, 5%, 10% and 15% levels in the formulation of four experimental diets represented as T1, T2, T3 and T4.

Table 1: Composition of the experimental diets

Ingredients	Dietary levels (%)		T3	T4
	T1	T2		
Maize offal	30.00	30.00	30.00	30.00
Cassava peel meal	20.00	20.00	20.00	20.00
Palm kernel cake	22.00	22.00	22.00	22.00
Brewer's dried grain	25.00	20.00	15.00	10.00
<i>Moringa oleifera</i> leaf meal	0.00	5.00	10.00	15.00
Bone meal	2.00	2.00	2.00	2.00
Salt	1.00	1.00	1.00	1.00
Total	100	100	100	100

Table 2: Proximate compositions of the experimental diets (% DM basis)

	Diets			
	T1	T2	T3	T4
Dry matter	88.15	90.47	90.92	90.61
Crude protein	17.07	18.79	19.38	20.20
Crude fibre	16.83	17.93	18.21	18.63
Ether extract	4.19	3.76	3.25	3.56
Ash	16.22	16.56	16.94	17.02
Nitrogen free extract	33.84	33.43	32.71	31.20
Gross energy (Kcal/g)	3.54	3.64	3.61	3.64

Data Analysis: The data collected in this study were subjected to Analysis of variance (ANOVA) appropriate for Completely Randomized Design (Steel and Torrie, 1980). Differences between treatment means were separated using Duncan Multiple Range Test (Duncan, 1955).

Results And Discussion

Table 3 shows the performance of WAD goats fed diets containing *Moringa oleifera* leaf meal. The diets influenced positive weight changes ($P < 0.05$) among the experimental groups. Average daily feed intake (ADFI) differed significantly ($P < 0.05$) among the treatment groups. Value for the animals fed control diet (T1) compared ($P > 0.05$) with those of T2 and T3, but however differed ($P < 0.05$) significantly from that group fed T4 diet. Goats that received T4 diet had highest average daily gain of 46.00g/d. Treatments had no significant ($P > 0.05$) effect on final weight, however values obtained for total weight gain and average daily weight gain were significantly ($P < 0.05$) affected by treatments diets. The respective values for T3 (4.02kg; 44.66g) and T4 (4.14kg; 46.00g) were similar ($P > 0.05$) but however higher ($P < 0.05$)

than the values obtained for T1 (2.90kg; 32.22g) and T2 (3.15kg; 35.00g); these latter values did not differ ($P > 0.05$) from each other. Total weight gain obtained in this study is lower than the range (3.78-5.92 kg) reported for WAD goat by Oni *et al.* (2010), but favourably compared with the values of 30.60 - 44.23g/day obtained by Ukanwoko *et al.* (2013) for same breed. These differences may be due to the experimental diet used, experimental location and season in which the experiment was conducted. Animals on T4 and T1 had the highest and lowest growth rates respectively and this may be attributed to the high feed intake and feed utilization of the animals on T4 relative to T1 diet. Dry matter intake (DMI) is an important factor in the utilization of feed by ruminants and is a critical determinant of energy intake and performance (Devendra, 1997). This improvement in intake with *Moringa oleifera* leaf meal supplement is in agreement with results reported by Ahaotu *et al.* (2013). The significant dry matter intake obtained in the diet containing 15% MOLM may be due to its higher protein quality, greater palatability and higher protein content of the diet. This is in line with the result obtained by Adegun and Aye (2013)

that diet with higher protein content increase intake.

The values obtained for daily DMI%BWT concentrate and forage intakes showed no significance ($P>0.05$); the values increased from the control diet T1 to T4. At 3% body weight intake or consumption, meat-type goats would have met their dry matter requirement (Devendra and McLeory, 1982). Ranjhan (1980) reported that DM intake in goats varied from 1.5 to 3.7% of live weight; a view collaborated by Kabir *et al.* (2002). The present value falls within the range of what was recorded above.

The feed conversion ratio (FCR) differed

($P<0.05$) among treatment groups. T1 and T2 values were significantly ($p<0.05$) higher than T3 and T4; even though there was no statistical ($p>0.05$) difference between the latter, T4 had the least FCR indicating a better feed conversion ratio. The superior feed efficiency of diets T3 and T4 over the other diets is a reflection of the observed higher feed utilization and indeed higher growth rates of goats fed the respective diets. The present value however compared favourably with the observations of Ukanwoko *et al.* (2013) for WAD goats. Factors which influence FCR among other include breed and sex of animals as well as nutrition and environment.

Table 3: Performance of WAD Does fed diets containing *Moringa oleifera* leaf meal

Parameter	T1	T2	T3	T4	SEM
Initial weight (kg)	12.33	12.47	12.40	12.53	0.14
Final weight (kg)	15.23	15.62	16.42	16.67	0.28
Total weight gain (kg)	2.90 ^b	3.15 ^b	4.02 ^a	4.14 ^a	0.20
Average daily weight gain (g/day)	32.22 ^b	35.00 ^b	44.66 ^a	46.00 ^a	2.22
Average daily feed Intake (g/day)	448.26 ^b	454.81 ^{ab}	487.04 ^{ab}	495.19 ^a	8.05
Total feed intake (kg)	40.34	40.93	43.83	44.57	1.36
Average daily DMI (g)	395.14 ^b	411.47 ^{ab}	442.82 ^a	448.69 ^a	8.11
DMI % BWT Concentrate	2.60	2.63	2.70	2.69	0.03
DMI % BWT Forage	0.69	0.71	0.72	0.73	0.05
Total dry matter intake	3.29	3.34	3.42	3.42	0.05
Feed conversion ratio	13.90 ^a	12.99 ^a	10.90 ^b	10.77 ^b	0.48

^{a-b}, means on the same row with different superscripts are significantly different at $p<0.05$

Conclusion

The inclusion of *Moringa oleifera* leaf meal in the diets of WAD goats generally enhanced DMI, average daily feed intake, average daily weight gain, feed conversion ratio compared with the control. Specifically however, the diet containing 15% MOLM inclusion had the best performance.

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