EFFECT OF DIFFERENT LEVELS OF *Moringa oleifera* OIL ON PERFORMANCE CHARACTERISTICS OF PREGNANT GOAT

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ABSTRACT

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This study was carried out to evaluate the effect of different levels of Moringa oleifera oil on feed intake and digestibility coefficient of pregnant Goat . The pregnant West African Dwarf Goat (Doe) were assigned to three experimental Diets A, B and C in a Latin square Design model for a eight week period. The experimental Diet A (control) had no inclusion of Moringa oleifera oil while Diets B and C had 0.25g/kg and 0.5g/kg Moringa oil inclusion respectively. There were significant differences in the feed intake of all the parameters evaluated. While the DM, CP and CF digestibilities of the experimental animals were similar (P>0.05). However, there was significant difference in the ether extract digestibility of the experimental animals. In conclusion, the inclusion of Moringa oleifera oil holds a good potential in the diet of pregnant West African Dwarf goat.

Keywords: Moringa oleifera, Feed intake, Digestibility coefficient, Pregnant West African Dwarf Goat.

INTRODUCTION

Increase in demand for animal protein is on the high side in Nigeria as a result of increase in human population at a geometric progression while the available protein is at arithmetic progression. Hence there is need to improve the productivity of small ruminant animals (Goats) through better feeding and management. Opara *et al*. (2005)
Feed is the single largest cost associated with improvement of small ruminants, and it accounts for 60% or more of total production cost. It goes without saying that nutrition exerts a very large influence on flock reproduction, milk production, lamb and kid growth. Late-gestation and lactation are the most critical periods for ewe and doe nutrition, with lactation placing the highest nutritional demands on ewes/does. Nutritional level largely determines growth rate in lambs and kids. Lambs and kids with higher growth potential have higher nutritional needs, especially with regards to protein. Therefore, animals receiving inadequate diets are more prone to disease and will fail to reach their genetic potential (Susan, 2003).
Feeding goats well is of fundamental importance for the success of the whole goat enterprise. Good nutrition is a prerequisite for good health, good reproduction, high milk yield, fast growth rates and a successful goat system, (Peacock, 1996). However, provision of good nutrition is limited by food procurement problems (Chidibelu and Njondjou, 1997) couple with poor nutrient content of crop residues. Nutritional constraints of most crop residues include: low content of nitrogen (N), poor digestion and low intake, such that productive performance of tropical animals is often poor. It has been recognised that intake and utilisation efficiency of crop residues are influenced by the rate of rumen fermentation (Van Soest, 1982) and the balance of nutrients absorbed in the intestines. Improvement in the nutritive value, removal of nutritional limitations to rumen fermentation and a balanced supply of nutrients to host animals would result in an improvement in animal productivity. Majority of the ruminants in tropical Africa are raised on native pastures and crop residues (Tchinda *et al., 1993*). During the dry season, the natural pastures and crop residues available for ruminants after crop harvest are usually fibrous and devoid of most essential nutrients including proteins, energy, minerals and vitamins which are required for increased rumen microbial fermentation and improved performance of the host animal (Dixon and Egan, 1987; Osuji *et al.,* 1995). Since small ruminant animal could not meet their entire nutritional requirement especially during the dry season. This calls for the inclusion of essential oil for optimum performance. M*oringa oleifera* oil which is also known as Ben oil Or Behen Oil is an essential oil which reduces rumen ammonia production and increase protein by-pass for proper feed utilization in small ruminant animal. (Gassenschmidt *et al*., 1995; Newbold *et al.,* 1999).
However, the high percentage of unsaturated fatty acid (oleic acid 74.68%) in *Moringa oleifera* oil makes it desirable in terms of nutrition (Mensink and Katan, 1990). The monounsaturated nature of oleic acid in *Moringa oleifera* oil is also associated with decrease in coronary Heart disease (Yusuf *et al*., 2006). *Moringa Oleifara* oil is known for its Anti-bacterial, Anti-fungal, Anti- pyretic, Anti-oxidant, Anti-aging, anti-inflammatory properties (Ezeamuzle *et al*., 1996) hence its inclusion in the diet of goat will reduce cost of feeding, increase the

performance of WAD goat as well as increase the health status of the consumer of goat bye product. Therefore, the thrust of this study was to evaluate the efficacy of different levels of *Moringa oleifera oil* on the performance characteristics of West African dwarf goat.

METHODOLOGY

Site of the experiment
The experiment was carried out at the Animal Pavilion of the Department of Animal Production, University of Ilorin, Nigeria.

Collection of *Moringa oleifera* leaves
Fresh *Moringa oleifera* leaves were collected or harvested in Ijapo estate, Akure, Ondo state. The leaves were defoliated from the stalk, air dried under shade and milled to increase the surface area.

Processing and preparation of *Moringa oleifera* oil
Cold extraction method was used, thus; milled *Moringa oleifera* leaves were soaked with petroleum ether of 60^{0C} at room temperature for at least 24 hours but shaken every 5 hours for homogeneity of the mixture in a 10L Keg that was well covered. The mixture was decanted using Muslin cloth and the filtrate was distilled using Soxhlet apparatus to obtain the oil.

Experimental diets and animal management
Before the arrival of the animals the pens were washed and disinfected using Izal and morigad respectively.
The Experimental diets include Treatments A (0g) B (0.25g) and C (0.5g) of *Moringa oleifera* oil inclusion on a daily basis per kilogram of the diet per animal. The Animals were given feed and water *ad-libitum* throughout the period of the experiment.

Animal management
The pregnant WAD does used for the experiment were purchased from kara market in kwara State. The animals were treated against ecto and endo parasites using Ivomec.

Feed intake and digestibility coefficient
The feed intake of each animal was measured daily for eight weeks and the difference between the feed given and the left over were recorded. The digestibility coefficient was determined during the last two weeks of the experiment

Chemical analysis
The experimental diets A, B and C were subjected to proximate analysis using the method of A.O.A.C (2000)

Statistical analysis
All data collected were subjected to analysis of variance of a Latin square Design Model. Means were separated using Duncan (1955) multiple range test.

RESULTS AND DISCUSION

The dry matter percentage of Diet C with 91.49 was the highest among the experimental Diets (Table 3). This was followed by Diet B with 88.75 and the least was recorded for Diet A (87.6 %). Additionally Diet C had the highest crude protein (8.17%), followed by Diet B and the least was Diet A with 7.47%. The numerical increase in the level of crude protein as the oil levels increase is unclear. The percentage ether extract of the Diet C was the highest with 7.78%, followed by Diet B and the least was Diet A with 0.88%. The highest percentage of ether extract in Diets B and C could be due to the inclusion levels of *Moringa oleifera* oil (Table 3). The highest dry matter intake was noted in animals on Diet C (0.5g kg^{-1} of *Moringa oleifera* oil inclusion) with a value of 336.6 7g day^{-1}, followed by animals on Diet B with 213.33g day^{-1} and the least was recorded in animals on Diet A with 200.0 g day^{-1} (Table 4).
The Crude Protein intake was similar to that of the DM intake. There was no significant difference ($P<0.05$) in DM, CP and ash intake of animals on Diet A and Diet B. But there were significant differences ($P< 0.05$) in animals on Diet A and Diet C, Diet B and Diet C. The EE intake (Table 4) in Diet C was the highest with 26.19g/day followed by Diets B and A. However, there were significant differences ($P< 0.05$) between Diet A and Diet B, Diet A and Diet C and Diet B and Diet C. The crude fibre intake of animals on Diet C (0.5g kg^{-1} of *Moringa oleifera* oil inclusion) with a value of 126.05g day^{-1}, followed by Diet B (88.73g day^{-1}) and Diet A had the least (7.68g day^{-1}). The NFE intake also followed the same trend. The inclusion of *Moringa oleifera* oil (Table 4) in the experimental diet of the animals showed that animals on Diet C (with 0.5g kg^{-1} of moringa oil inclusion) had the highest dry matter intake, crude protein intake, crude fibre intake, ash and nitrogen free extract intake than animals on Diets B and A (control).This result was in line with the findings of Cardozo *et al.* (2006) who reported that essential oil stimulate the intake of feed.
The intake of dry matter in Diet C (336.67g day^{-1}) which was the highest among the Diets conformed with the work of Zotti, *et al. (2012)* who used blend of Castor Oil and Cashew Oil inclusion in the diet of cattle .This also

collaborate with the report of Yang *et al.* (2010). It is likely that animals on Diet C benefited from a better interaction between metabolic and nutritional factors Tolkamp, (1982). The dry matter digestibility coefficient of the animals on Diet C was the highest with 98.31% followed closely by Diet B and Diet A (Table 5). The percentage CP and CF digestibilities followed the same trend as the dry matter digestibility. But there was no significance difference (P<0.05) in the DM, CP and CF digestibility of the experimental Diets A, B and C. The percentage ether extract digestibility of the animals on Diet C with 99.31% was the highest followed by Diet A and Diet B had the least. There was significant difference (P<0.05) in animals on Diet A and Diet B, Diet B and Diet C and no significant difference (P< 0.05) between Diet A and Diet C.

The animals on Diet C with 0.5g kg^{-1} of *Moringa oleifera* oil showed no significant different (P<0.05) in the digestibility of dry matter, crude protein and crude fibre (Table %5) . This result was in line with several researches carried out on effect of essential oil on digestibility (Meyer *et al*., 2009; Malecky *et al*., 2009; Santos *et al*., 2010). This result supported the work of Benchaar *et al*. (2006), who supplemented diets of lactating Holstein cows with essential oils (0 vs. 2 g d^{-1}; EO) and Monensin (0 vs.350 mg d^{-1}; MO). It showed that apparent digestibility of dry matter, organic matter and fibre were similar among diets (P<0.05). In similar study, Gonzalez *et al*. (2009) showed that diet containing 30 parts per million (ppm) monensin in lambs had no effect on digestibility of DM, CF and ash. Yang *et al*. (2007) reported that total digestibility of DM, Ash, CF and were not influence in Holstein cows fed diets with 5mg d^{-1} of garlic oil

CONCLUSION AND IMPLICATION

Based on the result of this experiment, the inclusion of *Moringa oleifera* oil in the diet of West African Dwarf Goat improves feed intake and digestibility coefficient of the animal. Based on the result of this experiment, Diet C with 0.5 g kg^{-1} *Moringa oleifera* oil inclusion had the best performance in terms of feed intake and digestibility coefficient. It could therefore recommended that farmers should use *Moringa oleifera* oil at 0.5 g kg^{-1} inclusion in the diet of pregnant West African Dwarf Goat .

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Table 1: Composition of the basal diets

Ingredients	Percentage
Cassava waste	53.00
Groundnut cake	10.00
Rice husk	35.00
Vitamin premix	1.00
Salt	1.00
Total	100.00

Table 2 : Composition of the Experimental Diets

Treatment	A(g) Control	B(g) Low	C(g) High
Animal	3	3	3
Moringa oleifera oil	-	0.25	0.5

Table 3: Proximate Composition of the Experimental Diets (DM basis)

Treatments (%)	A (control)	B (O.25g kg^{-1})	C (0.50/g kg^{-1})
Dry matter	87.60	88.75	91.49
Crude Protein	7.47	7.77	8.17
Crude Fibre	38.42	41.59	37.44
Ether extract	0.88	2.66	7.78
Ash	12.99	11.86	11.57
Nitrogen free extract	10.41	14.89	25.61

Table 4: Feed intake of the experimental animals (G Day^{-1})

Treatments	A (Control)	B (0.25g/kg)	C (0.50g/kg)	±SEM
Dry matter intake	200.00[a]	213.33[a]	336.67[b]	16.03*
Crude Protein intake	14.94[a]	16.58[a]	27.51[b]	1.55*
Crude Fibre intake	7.68[a]	88.73[b]	126.05[c]	3.97*
Ether extract intake	1.76[a]	5.67[b]	26.19[c]	1.26*
Ash intake	25.98[a]	25.30[a]	38.95[b]	2.10*
Nitrogen free extract intake	20.82[a]	31.77[b]	86.22[c]	2.23*

Means on the same row carrying the same superscript are not significantly different (P> 0.05)

Table 5: Digestibility coefficient of the experimental animals

Parameters (%)	Diet A	Diet B	Diet C	±SEM
Dry matter digestibility	96.85	97.33	98.31	0.78
Crude Protein digestibility	97.74	97.52	98.71	0.68
Crude Fibre digestibility	97.99	97.36	98.72	0.56
Ether extract digestibility	94.11[b]	86.70[a]	99.31[b]	2.91*

Means on the same row carrying the same superscript are not significantly different (P> 0.05)