

EFFECT OF NEEM LEAF MEAL ON PERFORMANCE OF PREGNANT WEST AFRICAN DWARF (WAD) DOES

Babatunde, M. O.¹, Adewumi, O. O.², Adelusi, O. O.³, & Aderinboye, R. Y.³

¹*Livestock Science and Sustainable Environment, World Bank Centre of Excellence in Agricultural Development and Sustainable Environment, Federal University of Agriculture, Abeokuta, Nigeria.*

²*Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria*

³*Department of Animal Nutrition, Federal University of Agriculture, Abeokuta, Nigeria*

Corresponding author:- mosesolayemi64@gmail.com, **Phone number:** +234-706-277-5374

Target Audience: Smallholder Ruminant Farmers, Modern Intensive Ruminant Animal Producers and Animal Scientists

ABSTRACT

A 150-day study was conducted to determine the performance and pregnancy rate of intensively managed West African dwarf goats to concentrate supplement containing varying levels of neem leaf meal (NLM). Twelve (12) West African Dwarf does with an average live weight of 11. 15.70 ± 0.81 kg were used in a Completely Randomized Design with animals grouped into three treatments of four replicates each balanced for weight. The animals were fed *Panicum maximum* in the morning with a daily supplementation of 350g concentrate diet containing varying levels of neem leaf meal at 0, 2.5, and 5%. Daily feed intake (1217.11g/day) of goats increased ($P < 0.05$) and daily weight gain (46.14g/day) of goats increased ($P > 0.05$) with inclusion of *A. indica*. However, the feed conversion ratio of the animals fed neem leaf meal increased significantly ($P < 0.05$) compared with the animals in the control. This study, however, concluded that neem leaf supplementation in reproducing traditionally managed WAD goats enhanced pregnancy development. Neem leaf inclusion at 2.5% in West African dwarf goat's diet had effects on the overall performance of the animals with a potential improvement in feed conversion ratio.

Keywords: *Azadirachta indica*, WAD goats, reproduction, performance

INTRODUCTION

Increase in global human population has introduced the challenge of providing quality animal protein for their feeding. In recent years, there has been growing interest in identifying potentially important feedstuffs to supplement the available low nutrient feeds (Tona *et al.*, 2014) for ruminant feeding in the tropics. Goats constitute a very important part of the rural economy in Nigeria, with more than 95% of the rural households keeping goats (Ukpabi *et al.*, 2000). Goat rearing has been found equally rewarding under both intensive and semi-intensive systems of management (Shalander, 2007). The major problem being faced by developing countries especially Nigeria is the ever increasing population without a corresponding increase in animal protein production. Animal products contribute only 15 to 20% of the total protein intake of an average Nigerian contrary to 33% recommended by (FAO., 1987). This wide margin between the recommended protein intake and the average consumption rate has resulted in an ever-increasing demand for animal protein by the Nigerian populace. The neem plant (*Azadirachta indica*) is a non-leguminous multi-purpose tree which belongs to the family *Meliceae*. Its common English names include neem tree and margosa tree (Arbonnier, 2002). The neem tree is a drought tolerant plant and is known to do well in areas with long dry seasons, even with rainfall as low as 130mm per annum (Gowda and Sastry, 2000). It is also known to thrive in almost any type of soil and tolerate a wide soil pH range of between 4 and 10 (Arbonnier 2002; Girish and Shankara, 2008). The neem tree is therefore often used in afforestation programmes, especially in semi-arid regions. Neem leaves incorporation into ruminant feeds will help increase the utility of the plant and help alleviate the severe feed inadequacy experienced in the dry tropics during the dry season. Hence, this study was designed to evaluate the effect of neem meal leaf on growth performance of West African Dwarf (WAD) does during pregnancy.

MATERIALS AND METHODS

The experiment was carried out at the small ruminant unit of the Directorate of University Farms (DUFARMS), Federal University of Agriculture Abeokuta, Ogun state, Nigeria. Twelve (12) West African Dwarf (WAD) goats does, in their 2nd parity, aged 1-2 years, with an average weight of 11 were used in this study. The goats were housed intensively in well ventilated pens with concrete floors. The experiment was set up as a completely randomized design (CRD) with three levels of Neem Leaf Meal (0%, 2.5%, and 5.0%) added to the concentrate feed (maize (15%), cassava peel (15%), palm kernel cake (32%), wheat offal (24%), groundnut cake (10%), bone meal (3%) premix (0.5%) and salt (0.5%)). Each treatment was having four (4) replicates each. Concentrate was given to the animals at 5% of their body weight and *Panicum maximum* as basal diet, while clean water was provided *ad libitum* intake. The feeding trial lasted for 90days. Each goat was examined sonographically using a portable ultrasound machine with a 3.5 MHz curvilinear transducer (Kaixin KX 2000^R, Xuzhou, China) at the Veterinary Teaching Hospital, FUNAAB. The machine was fitted with a 3.5MHz curvilinear and 7.0MHz linear transducers. Each transducer has four windows of frequency range. In addition, the machine was programmed with software for obstetric and cardiac calculations, as well as having a digital imaging and communication in medicine (DICOM) facility for image storage. Basic preparation included clipping of the hairs around the ventral abdomen and application of acoustic gel. Fresh neem leaf was harvested from neem trees found at Directorate of University Farms (DUFARMS). The leaves was separated from their twigs, air-dried and turned regularly for period of 14 days until the leaves was brittle and thoroughly dried. All the leaves were ground in a hammer mill (1-mm screen) to form the Neem Leaf Meal (NLM). The weights of the animals were taken at the commencement of the experiment and weekly for body weight change. Data collected included the following. The weights of the experimental animals were taken before the commencement of the experiment and it was done by using spring balance scale - 20kg capacity and the final weight of the goats were taken at the end of the experimental period of 12 weeks using spring balance scale 20kg capacity. The weight gain was determined by subtracting the initial weight of does from their final weight and the feed consumption was determined by taking the weight of total dietary concentrate fed to does daily and weight of concentrate refuse each day by the does throughout the experimental period. The difference between total concentrate refuse from total concentrate given daily gives the feed consume per day. The pregnancy rate was determined by counting the number of does that were confirmed pregnant in each treatment through scanning. Data collected during the experimental period was subjected to one way analysis of variance (ANOVA) in completely randomized design using SAS (1999) and the means separated using Duncan multiple range test of the same software at 5% level of significance.

RESULTS AND DISCUSSION

Approximately two (2) does from each treatment carried their pregnancy. Table 1 shows the performance characteristics of West African dwarf goats fed experimental diet. The initial weight, final weight, weight gain, daily weight gain, concentrate intake, and feed conversion ratio were not significantly ($P>0.05$) different. However, grass intake, total feed intake and daily feed intake were significantly ($P<0.05$) different. The animals showed an improvement in the final weight over the initial weight. The highest value (16.50kg) for weight gain was observed in the control diet and the least value (15.75kg) was observed in the diet with 5% neem leaf inclusion. Likewise, the highest value (46.14g) for daily weight gain was recorded in the treatment with 2.5% neem leaf inclusion and the lowest value (38.69) was observed in the diet with 5.0% neem leaf inclusion. Animal fed with the control diets were superior in their total feed intake and daily feed intake. The feed conversion ration ranged from 28.29-37.65. However, the result showed that T₂ had the best feed utilization of 28.29, while the poorest value (37.65) was observed in T₃.

Table 1: Performance characteristic of West African dwarf does fed experimental diets (%)

Parameters	Levels of inclusion of neem leaf meal g/kg			SEM	P-VALUE
	0	2.5	5.0		
Initial Weight (kg)	12.63	12.50	12.50	0.57	0.99
Final Weight (kg)	16.50	16.38	15.75	0.66	0.68
Weight gain (kg)	3.88	3.92	3.25	0.31	0.78
Daily weight gain (gday-1)	46.13	46.14	38.69	4.54	0.78
Concentrate intake (kg)	27.16	27.13	26.36	0.20	0.18
Grass intake (kg)	75.08 ^a	74.24 ^{ab}	73.48 ^b	0.25	0.01
Total feed intake (kg)	102.24 ^a	101.36 ^{ab}	99.85 ^b	0.43	0.02
Daily feed intake (gday-1)	1217.11 ^a	1206.69 ^{ab}	1188.63 ^b	5.13	0.02
Feed Conversion Ratio	28.56	28.29	37.65	3.78	0.37
Pregnancy rate	50.00	50.00	50.00	4.62	0.47

^{abc} Means on the same row having different superscripts are significantly different ($p < 0.05$); T₁ = 100% concentrate; T₂ = 2.5% *neem leave meal* (NLM) + concentrate; T₃ = 5% *neem leave meal* (NLM). SEM – Standard error of means

The growth performance in this current study showed that the weight gain of the animals were not significantly different. Final weight obtained in this study is higher than the values (8.80 – 11.00kg) recorded by Anaeto *et al.* (2013) but fell within the values (10.42 – 17.25kg) recorded by Bawala *et al.* (2007). The result of this study on weight gain is in agreement with the report of Nkoku and Evbuomwan (2014) that efficient utilization of nutrients in diets that supply adequate energy and protein is required for optimum growth performance of ruminants. Final weight obtained in 2.5% inclusion level of neem leaf meal is higher than the result of (Hossain, 1994) who reported 3.33 and 3.70% for cattle fed neem leaves and neem seeds respectively in 28 days of treatment. The highest daily weight gain (46.14g/day) value recorded for animals fed 2.5% inclusion level of neem meal leave is close to the value of (52.0g/day) recorded by Paengkoum P, *et al.* (2010).

CONCLUSION AND RECOMMENDATIONS

From the results of this study, it can be concluded that the supplement containing up to 2.5% Neem leaf meal can be fed to West African Dwarf goat without any deleterious effect on pregnancy development while resulting in birth of viable kids of higher body weights. Neem leaf meal-based supplement can be used to achieve moderate growth in West African Dwarf goat in the dryseason. I recommend that supplement containing up to 2.50% neem leaf meal may be used to feed pregnant does in the dry season. Further research should be conducted to determine the effect of neem leaf meal on rumen microbial population and intestinal helminthes.

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