

FEED POTENTIALS AND EFFECT OF SOUR SOP (*Annona muricata*) LEAF MEAL ON GROWTH PERFORMANCE OF WEST AFRICAN DWARF GOAT

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ABSTRACT

A 63 day study was conducted to evaluate the feed potentials and effect of Sour sop (*Annona muricata*) leaf meal (AMLM) on growth performance of West African Dwarf (WAD) weaner goats. Chemical analysis of *Annona muricata* leaf meal showed high values of metabolisable energy, dry matter, ash, and crude fiber of 2563.5Kcal/Kg, 93.91%, 10.62% and 16.20% respectively, a relatively high level of nitrogen free extract (42.39) and crude protein (20.41) which indicates that *Annona muricata* is suitable for feeding ruminants. Nine (9) WAD goats were grouped into three and assigned three diets containing 0%, 10%, and 20% *Annona* leaf meal. Formulated feeds were offered at 3% of body weight in the morning and Gmelina leaves later in the day. Feed intake was recorded daily while weight gain was weekly. At the end of the study, weight gain, feed intake and feed conversion ratio were determined, results showed that feed intake was significantly higher in group 1(0%AMLM) and lower in group 3(20%AMLM). However, no significant ($P>0.05$) differences were observed among the groups on weight gain and feed conversion ratio proving that the diet treatment had no significant effect on the goats. Therefore, *Annona muricata* leaf meal can be used in goat's diets without compromising performance.

Keywords: sour sop, leaf meal, goat, growth performance.

INTRODUCTION

Livestock production is a very important part of agricultural sector in many tropical countries, representing up to 40% of the agricultural gross domestic products (Steinfeld *et al.*, 2006). Goat is one of the important domestic animals primarily owned by small-holder farmers and pastoralist, which significantly contribute to the economy and food supply of the poorest sectors of the society (Okello *et al.*, 1996).

The tropics is characterized with seasonal shortage in the quality and quantity of forage from natural pasture which has continuously led to low productivity in goat industry of the peasant farmers, who cannot afford the cost of forage conservation (Ukanwoke *et al.*, 2012). To optimize production, goats fed grasses and roughages are supplemented with concentrates which has also increased the cost of production. Use of cheaper, lesser known and unconventional feed supplements may represent the low-cost route to improved animal performance.

In this regard, many attempts have been made to evaluate the chemical composition and

nutritional potential of some common legumes and browse plants as feed supplements (Akinsoyinu and Onwuka, 1988; Alawa *et al.*, 1990; Oduguwa *et al.*, 1997). Alternative feed resources with potentials include *Mimosa invisa* (Nwogu and Fapohunda, 2002), *Tephrosia candida* (Odedire and Babayemi, 2008) and *Tithonia diversifolia* (Odonsi *et al.*, 1996).

Sour-sop (*Annona muricata*) commonly known as custard apple is a tropical fruit bearing tree of the Annonaceae family, widely cultivated for its edible fruits and is often becoming naturalized beyond their native range of tropical America and Africa (Wagner *et al.*, 2014a). The leaves are glossy, dark and generally evergreen; it's highly adaptable to all weather conditions. Apart from its use as food crop, the leaves, seeds and many of the plant parts of *Annona muricata* are used in traditional medicine for treatment of kidney problems, fever with antispasmodic, antidiarrhetic, and parasitocidal activity (Hanelt *et al.*, 2001; Orwa *et al.*, 2009).

Sour sop leaves were reported to contain 89% dry matter, 11% moisture, 25% crude protein, 15% ash, 22% crude fiber, 21% fat, 17%

carbohydrate (Usunobun *et al.*, 2015a). Phytochemicals present in *Annona muricata* leaves include flavonoids, alkaloids, cardiac glycoside, tannins, triterpenoid, saponin and reducing sugar. These phytochemical could be of nutritional, clinical and veterinary relevance at considerable levels. This study was undertaken to determine the nutrient composition of sour sop leaves and its effect on growth performance of West African dwarf goats.

MATERIALS AND METHODS

The study was conducted at the sheep and goat unit of Federal College of Agriculture Ishiagu, Ebonyi State. Sour sop leaves were sourced within the college premises and were identified at Ebonyi State University herbarium by Mr. Nwankwo O.E. The leaves were air-dried and milled, proximate analysis was carried out at Michael Okpara University, Unmudike; three (3) experimental diets were formulated to meet the nutrient need of weaner goats Aduku, (1999) using maize offal, wheat offal, cassava peel, palm kernel cake, bone meal and common salt. The sour sop leaf meal was included at 0%, 10% and 20% forming the treatments used in the study.

Nine (9) weaner goats of 4-5 months of age and average weight of 9.69 ± 1.9 were grouped into three groups of three animals each and housed in concrete-floored pens. The animals were treated with ivermectine and oxytetracycline at the onset of the study against worm infestation and microbial infections. Each group of animals was assigned a diet treatment as indicated above for 63 days; the goats were weighed initially and weekly thereafter. Formulated feed was offered every morning at 3% of their body weight and remnants were weighed later to determine feed intake. Gmelina leaves were also offered at noon as forage, while fresh water was made available all through. Initial body weight, Final body weight, Body weight gain, Daily feed intake and Feed conversion ratio were determined.

Data collected from the study was subjected to analysis of Variance and means separated with Duncan's multiple range test at $P > 0.05$ (SAS, 1995).

RESULTS AND DISCUSSION

The result of proximate analysis of *Annona muricata* leaf meal on dry matter basis is

presented in Table 2. The result revealed high dry matter, low moisture which indicates good nutrient profile of the leaf meal and shelf life in terms of storage; high crude protein makes it a suitable material since protein is an expensive nutrient in animal feeds. Low ether extract also point to its suitability and keeping quality while high crude fiber makes it a suitable feed for ruminants since they can well utilize fiber sources. High Ash indicates availability of minerals which are essential for life, nitrogen free extract, translates to Energy which is crucial in animal's life. From the result, sour sop leaf is a potential feed ingredient for ruminants.

The result of growth performance of West African Dwarf Goat fed *Annona muricata* is shown in Table 3. The result indicated significant differences ($p < 0.05$) in the Initial and final weight of the goats with the highest values in 20% AMLM (11466.7g and 12647.0g), and lowest values in 0% AMLM (7.67 and 9.39kg). However these differences were not attributed to treatment effect. Feed intake was significantly higher in 0% AMLM and lowest in 20% AMLM indicating the degree of acceptability of the various feeds which declined with the inclusion of sour sop leaf meal. Feed intake has been observed to be governed by some factors such as dietary crude protein, palatability, gut fill, body fat and health factors (Ukanwoko 2007). This is true as the sour sop diets had better crude protein than the control diet; also the goats were observed avoiding the leaf particles that were not well milled suggesting the leaf was not palatable probably due to its characteristic odour or taste. Nevertheless, there was no significant difference in the weight gain and the feed conversion ratio, which means though the animals ate little of diets 2 and 3, it had sufficient nutrients to support normal performance. Therefore the feed had a positive significant effect on the growth of goats, suggesting that sour sop leaves can be used successfully as low-cost feed material in goat diets.

CONCLUSION

Goat nutrition in the tropics has been a challenge due to seasonal changes in quality and quantity of pasture and forage resources. Supplementation of grasses with concentrates enhances profitable goat production but it is expensive to be practiced by local farmers. Tropical tree leaves

have potentials to supplement grasses in goat nutrition and most of them are still fresh when the grasses would have become fibrous and are abundant without cost therefore reduces the cost of production with improved animals' performance. Proximate analysis of sour sop leaves revealed high nutrient composition which was also tested as feed stuff for goats up to 30% inclusion of the leaf meal. The result revealed improved growth performance with reduced feed intake. Hence sour sop leaves can be successfully used in goat feeding to improve animals' performance.

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Table 1: Gross Composition of the experimental diets (g/100g DM)

Ingredients	0%AMLM	10%AMLM	20%AMLM
<i>Annona murica</i>	0.00	10.00	20.00
Cassava peel	36.00	36.00	39.00
Wheat offal	18.00	15.00	11.00
Maize offal	23.00	19.00	15.00
Palm kernel cake	20.00	17.00	12.00
Bone meal	2.00	2.00	2.00
Common salt	1.00	1.00	1.00
Vitamin premix	0.30	0.30	0.30
Calculated Analysis			
Crude Protein	11.00	12.00	12.63
Crude fibre	10.00	11.00	12.00
TDN	90.60	90.03	89.45

TDN: total digestible nutrient

Table 2: Proximate Composition of *Annona Muricata* Leaf Meal

PARAMETERS	AML
Dry matter	93.91
Moisture content	6.09
Crude protein	20.39
Ether extract	4.31
Crude fibre	16.20
Ash	10.62
Nitrogen free extract (NFE)	42.39
Total Digestible Energy	87.04

Table 3: Growth Performance of West African Dwarf Goats fed *Annona muricata* Leaf Meal

PARAMETERS	0%AML	10%AML	20%AML	SEM	pValue
Initial body weight(g)	7.67 ^b	9.93 ^{ab}	11.47 ^a	0.38	0.02
Final weight(g)	9.39 ^b	11.48 ^{ab}	12.65 ^a	0.52	0.11
Weight gain(g)	1.72	1.55	1.18	0.28	0.73
Total feed intake(g)	13.43 ^a	9.89 ^b	7.39 ^c	0.87	<0.001
average daily feed intake(g)	0.72 ^a	0.53 ^b	0.40 ^c	0.04	<0.001
feed conversion ratio	8.22	5.23	6.54	0.66	0.25

a, b, c means in the row with different superscripts are significantly different (p<0.05)
AML = *Annona muricata* leaf meal