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Growth Performance of Indigenous Rabbits (*Oryctolagus cuniculus*) Fed with Graded Levels of *Gmelina Arborea* Leaf Meal.

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ABSTRACT

The study was conducted within 49 days in Rabbitry research unit of the Department of Animal Science, Kebbi State University of Science and Technology, Aliero. The aim is to determine the effect of feeding graded levels of Gmelina arborea leaf meal on the performance of weaner rabbits, also the proximate composition of the experimental diets containing 10%, 20% and 30% inclusion level of GLM was also determined. A total number of 24 weaner rabbits of initial average live weight of 0.65-0.70kg (650-700g) in a completely randomized Design (CRD), the means was separated by Duncan multiple range test (DMRT) and Tuckey Test. The treatments consists of four (4) experimental diets; A (control), B (10% GLM), C (20% GLM) and D (30% GLM) respectively. Results shows that there were no significant differences (P>0.05) between the rabbits fed the GLM and control diets as well in all the performance measurement considered. In terms of proximate composition of the experimental diets, there were significant differences in almost all the organic composition of the diets with treatment D and C having the highest composition. There is only insignificancy in ash contents of the experimental diet. It was concluded that GLM could be added up to 30% or more in rabbit's diet without any adverse effect on performance.

Keywords: *Growth, Rabbit, Gmelina, Graded Level and Leaf Meal*

Background of the study

More than half of the Nigerians have low animal protein intake, which influenced their general well-being and health status. The problem may not be due to insufficient number of livestock needed to meet the recommended animal protein intake but the low quality and quantity of feed available for animal consumption throughout the year (1). Livestock production is increasing at the rate below 5% while human population is increasing at the rate above 10% (2). Nigeria as one of the developing nations with high population is not an exception to this global phenomenon. Previous report by CBN (1993) has shown that North America, Western and Eastern European countries consume 66, 39 and 33g of animal protein/head/day respectively. Whereas in African countries, FAO estimated the average animal protein consumption in Nigeria to be 7.4g per capita/day as compared to 38g per capita/day of animal protein consumed in South Africa. Inadequate supply of proteins from such traditional livestock as cattle, goat, sheep, pig and poultry has led to a shift of emphasis towards enhanced productivity of these animals (3, 21). As a contingent plan, the search for more economical source of animal proteins makes rabbit production attractive (4).

Rabbits have a number of attributes such as short generation interval, high fecundity, rapid growth rate, genetic diversity, and ability to utilize forages, high quality proteins, low cost management requirements, and adaptation over a wide range of ecological environment which enhance its production (5). (6) Reported that rabbit has a peculiar digestive physiology which permits the use of forages and agro-industrial by-products, thus making it a noncompetitive species with man for cereals and legume grains. Rabbits fit well into a balanced farming system and also complement well with vegetable growing. Excess and waste from vegetable gardens and kitchen goes to feed the rabbits, whereas their manure is used to fertilize gardens, thus forming a profitable cycle and aiding the balance of nature (7). These qualities of the animal species, besides more others, make rabbit breeding one of the solutions for animal protein deficiency (8; 9).

Studies have shown that rabbits can thrive on a number of tropical forages supplemented with concentrates (10;

11). Among the available forage alternative, *Gmelina arborea* leaf meal has been identified as appropriate applicant due to its growth promoting agent. *Gmelina arborea* is cheap, abundant and available in many parts of Nigeria (12).It is under-utilized by man, which may help to reduce cost of production and establish a sustainable livestock development in Nigeria, especially in areas with a prolonged dry season (13). *Gmelina arboria* leaves are green, pale yellow to cream colored and soft to moderately hard that are edible to livestock. Nutritionally, *Gmelina arborea* contains 21.1% crude protein, 19.0% crude fibre and 8.0% inorganic minerals element especially nitrogen and potassium. These can supplement the limiting nutrients for Rabbit production especially during the dry season when the forages are scarce and have low nutritive value in the tropics. The inclusion of *Gmelina arborea* leaf meal in Rabbit diets may enhance the growth performance, carcass yield and reduce cost of production.

Description of problem

Global livestock production is constrained by the inadequate supply of forages for optimum production. At the same time land devoted for forage production does not likely to increase in the near future due to urbanization, industrialization etc. in this respect, abundantly available plants possess immense potential as livestock feed resources (14).There is the problem of inadequate supply of animal protein from conventional sources like cattle, sheep and goat (14). This brings competition for grains and legumes between man and animals. Hence, suggest the need to find alternative species with less competition for scarce feed resources. However, there is scarce information on the effects of *Gmelia arborea* leaf on growth performance and carcass yield. This effect may result into the increased utilization *Gmelia arborea* as dietary protein supplements in the study area. Thus, the current study was design to such effect.

Justification

In spite of the advantages of rabbit over other livestock, feed cost and scarcity still limit profitable rabbit production in the country. (20) Reported that the cost of feed accounts for about 80% of the total cost of production of farm animals. This is due to unavailability of grains and high cost of feed ingredients. During dry season, there is shortage or unavailability of forage feed materials. Thus, trees and fodders (browse plants) are important in providing nutrients to grazing livestock in arid and semi-arid environment where feed supply is a major constraint to livestock production (15). *Gmelina arborea* is a browse plant that is not consumed by man. The use of *Gmelina arborea* leaf meal in rabbit feed will reduce competition, eliminate seasonality and increase availability of rabbit and their products at an affordable price for human consumption thereby increasing the level of animal protein intake of Nigerians with low financial status. Results from the study are expected to provide useful information needed by the local rabbit producers and researchers in the study area, so that can be fully utilized.

MATERIALS AND METHODS

Study Area

This study was conducted at the Rabbitry research unit of the Department of Animal Science, Kebbi State University of Science and Technology, Aliero. Aliero is located within latitude 12^0 06^0 North and longitude 4^03^010' of the equator. Aliero Local Government area is geographically found in the South Eastern part of Kebbi State. The average rainfall is 750mm and the dry season starts in March and ends in May. The major ethnic groups are Fulani, Hausa, Arawa, Kabawa, Gimbanawa and Zabarmawa. However, Aliero is an agrarian town with about 70% of the population engaged in Onion farming (16).

Management of Rabbits, diets and design

A total of twenty-four (24) apparently healthy indigenous Rabbits was used for this experiment. They were sourced from Gwandu local government area of Kebbi State, Nigeria. The rabbit were randomly allocated to four (4) treatments: basal diets + 10% GLM, basal diets + 20% GLM, basal diets + 30% GLM and basal diets only (control) labeled as A, B, C, and D. Rabbits in each treatment groups were further subdivided into three (3) subgroup of two (2) rabbit to serve as replicate in a completely randomized design (CRD). Feed and water were given *ad libitum*. Other routine management operation was carried out as described by (20), such as medication, washing of feeders and drinkers for supply of feed and clean water.

Table 1: The Composition of basal diet.

Ingredients (kg)	Treatments			
	A	**B**	**C**	**D**
Wheat bran	23.8	23.8	23.8	23.8
Maize	36	36	36	36
Ground nut cake	36	36	36	36
Bone meal	3.0	3.0	3.0	3.0
Premix	0.8	0.8	0.8	0.8
Salt	0.4	0.4	0.4	0.4
Total	**100**	**100**	**100**	**100**

Collection and processing of *Gmelina arborea* leaves

Fresh leaves of *Gmelina arborea* was sourced within the University community, Kebbi State University of Science and Technology, Aliero, Kebbi State. The fresh leaves was allowed to dry under room temperature for a period of 7 days. The dried leaves were grounded into powder (leaf meal), and incorporated in the experimental diets. The rabbits in group B, C and D was offered10%, 20% and 30% GLM respectively, while group A was kept as control.

Data collection

The experimental Rabbits was weighed at the onset of the experiment and subsequently on weekly basis for a period of seven (7) weeks. The feed consumption, weight gain and feed conversion ratio was observed throughout the period of experiment. Proximate composition of the experimental diet was also analyzed.

Statistical analysis

The data obtained from this experiment was subjected to SPSS V.16.0 using General Linear Model (multivariate analysis) as described by Singh (2003), and the means was separated by means of Duncan multiple Range Test (DMRT) and Tuckey Test (17).

RESULT AND DISCUSSION

Table 2: Proximate composition of experimental diets containing graded levels of *G. arborea*

Treatments	Proximate parameters					
	DM	Ash	Lipid	CP	CHO	CF
A(0%)	94.00	11.05^{b}	3.05^{c}	9.28^{c}	65.72^{a}	4.00^{b}
B(10% GLM)	94.00	13.00^{a}	4.05^{b}	9.28^{c}	62.72^{b}	4.50^{b}
C(20%GLM)	94.00	10.00^{c}	5.05^{a}	10.59^{b}	62.41^{b}	5.50^{a}
D(30%GLM)	93.00	13.50^{a}	5.05^{a}	12.51^{a}	56.50^{c}	5.50^{a}
SE	0.764	0.451	0.289	0.099	0.312	0.289

abc= mean values along the same row with different superscript are significantly different (p< 0.05).
GLM= *Gmelina* leaf meal; DM= Dry Matter; CP= crude Protein; CHO= Carbohydrate; CF= Crude Fibre.

The proximate composition of the experimental diets shows that there is no significant different (p>0.05) in all treatments with respect to dry matter content. The ash content shows significant difference in treatment D and B having the highest with 13.50 and 13.00 respectively. The lipid content shows significant difference (p<0.05) across the treatment with treatment D and C had highest value followed by B and A. The crude protein in the experimental diet shows significant difference (p<0.05) in treatment D having the highest value of 12.51 while in treatment A and B having the lowest value of 9.28%. The carbohydrate content ranges from 56.50% - 65.72% with treatment A which had the highest and treatment D having the lowest value. This result also shows significant difference (p<0.05) across all the treatments with treatment D and C having the highest value (5.50%) while (4.00%) is the lowest in treatment A, this findings agree with the finding of Nzikou *et al*. (2009).

Table 3: Growth performance of rabbits fed feed containing graded levels of *Gmelina arborea*

Treatments	Means of Tested Parameters				
	IW	FW	BWG	TFI	FCR
A(0%)	0.65	1.76	1.13	4.09	3.60
B(10%)	0.65	1.75	1.13	3.76	3.32
C(20%)	0.63	1.82	1.18	4.33	3.66
D(30%)	0.63	1.72	1.06	4.13	3.87
SE	0.019	0.032	0.30	0.22	0.14

abc= mean values along the same row with different superscript are significantly different (p< 0.05).
IW= Initial Weight; FW= Final Weight; BWG= Body Weight Gain; TFI= total Feed Intake; FCR= Feed conversion Ratio.

The result shows no significant difference (P>0.05) obtained in the feed intake of rabbit fed *Gmelina arborea* leaf meal (GML) among all the treatments throughout GML inclusion as lowest as (0.30kg) was recorded in treatment C and D with the least 0f (0.20kg) respectively. the conduct of this experiment. Although there was decrease in the feed intake with the increasing level of

This may likely due to the breed used in the conduct of the experiment (genetic make-up), or other

environmental factor which favors the experiment. Similar result was obtain by Iheukwumere (2004) who recorded a significant difference in rabbits fed with 5% level of GML inclusion in the diet. Furthermore, the result shows no significant difference (P>0.05) in the body weight gain of the experimental rabbits, having (1.13) in treatment A, (1.13), (1.18), and (1.717) in B, C and D respectively. So also, from the result on Feed conversion ratio, no significant difference (P>0.05) in all the treatments. This findings disagreed with the findings of Amaefule and Obioha (2001).

Conclusion and Applications

The result of the experiment reveals poor intake of the experimental diet during the conduct of the experiment, this could be attributed to the acclimatization effect as the digestive system of early weaned rabbits is not well developed (18), the feed intake was simultaneously increased as the rabbits increase in age. The highest total feed intake (4.33kg) in treatment C indicates better utilization of *Gmelina arborea* leaf meal. With regards to the body weight gain, there was no significant differences obtained as (1.13kg), (1.13kg), (1.18kg) and (1.06kg) in treatment A, B, C and D respectively. This could be attributed to good utilization of the inclusion levels of *Gmelina arborea* leaf meal in B and D in the experiment.

Despite the intake and body weight gain by the rabbits during the period of experiment a better feed conversion ratio was observed higher in D (3.87) throughout the seven weeks of the experiment this indicate that they can convert *Gmelina* leaf meal effectively as higher in 30% inclusion level, though is higher than (3.00kg) reported by (19).

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