



## Research Article

# Growth Response and Apparent Nutrient Digestibility of Rabbits Fed *RHIZO* (*Rhizophora mangle*) PITH

ON Wariboko<sup>1</sup>, DN Onunkwo<sup>2\*</sup>, NA Tambari<sup>1</sup>, BC Kornom<sup>1</sup>, PN Nnadi<sup>1</sup> and JC Okonkwo<sup>3</sup>

<sup>1</sup>Department of Agricultural Science, Ignatius Ajuru University of Education, Rivers State

<sup>2</sup>College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, Abia State

<sup>3</sup>Department of Animal Science and Technology, Nnamdi Azikiwe University, Awka, Nigeria

\*Corresponding author: donunkwo1@gmail.com

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### ABSTRACT

Experimental evidences have shown that *R. mangle* possess important bioactive and medicinal potentials hence the study to investigate growth response and apparent nutrient digestibility of rabbits fed diet containing the pith of red mangrove (*Rhizophora mangle*). The study was carried out at the teaching and demonstration farm of Ignatius Ajuru University of Education (Ndele campus) Port-Harcourt, Rivers State, Nigeria. The experimental diet was formulated to which extracted *Rhizophora* pith was added at different inclusion levels (0%, 5%, 10% and 15%). Twenty-four clinically certified healthy weaner rabbits of mixed breeds with initial body weight (BW) of about 0.5kg were used in the feeding trial that lasted for 8 weeks (56 days). Six rabbits (two rabbits per replicate were randomly distributed to 4 treatments (T<sub>1</sub>- control 0% *Rhizophora* pith), (T<sub>2</sub>- 5% *Rhizophora* pith), (T<sub>3</sub>- 10% *Rhizophora* pith), and (T<sub>4</sub>- 15% *Rhizophora* pith). Parameters measured include feed intake, weight gain and feed conversion ratio. Data were analyzed using one way ANOVA using the general linear model of statistical analysis for sciences while differences among means were determined using Duncan's multiple tests. The findings of the study showed that rabbits fed diets with 10 and 15 % rhizopith gained weight (P<0.05) faster than those fed the control diet. Feed efficiency increased with levels of rhizopith in the diets with rabbits on 15% rhizopith being most efficient. Crude protein digestibility decreased (P<0.05) with increased level of rhizopith. It was concluded that inclusion of 5% rhizopith in diets for weaner rabbits supported improved growth and nutrient digestibility.

**Key words:** Growth response, Apparent digestibility, Rhizopith and Rabbit Does

### INTRODUCTION

Rabbits play an important role in the supply of animal protein to the Nigerian populace. They are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Egba, *et al.*, 2014). Rabbits can utilize unconventional feedstuffs and diverse forage legumes such as *Crotalaria retusa* (Yashim *et al.*, 2016). To make rabbit rearing more viable researches have been conducted to identify alternative substances used for rabbit feed production, but the search for alternative feed resources for rabbit farming as a way of reducing production costs, improving carcass quality and making livestock products more readily available to the populace have continued to gain momentum in recent years (Amata, 2014).

*Rhizophora mangle* is an important indigenous West Africa herbal plant with unique medicinal properties

commonly used throughout its area of distribution. Experimental evidences have shown that *R. mangle* possess important bioactive and medicinal potentials (Berenguer *et al.*, 2006). Several studies have revealed its ethno-veterinary and ethno-biotic importance such as antimicrobial properties (Baker *et al.*, 1993), hypoglycemic effect, treatment of stomach aches and rheumatic pains, and treatment of hepatic oxidative stress and toxicity (Pearce *et al.*, 2007). This is due to its numerous phytochemical properties such as steroids, flavonoids, alkaloids phynols, saponins, and phenols (Lesile, 2003). More so, the influence of mangroves on reproductive health and their performance enhancement attributes has been reported by Lesile (2003) to be due to the following phytochemicals; Alkaloids, Liginin flavonoids, lipids, benzenoids, steroids, alkanes, tannin and saponins. On the aerial parts, some crystalline lignin including phyllantive and phypopyllanthine revealed wonderful overall increased

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reproductive performance in human and animals (Lesile, 2003). The use of phytochemical extracts to improve the reproductive function and overall performance of animals (rabbits and man) had long been reported (Yakubu *et al.*, 2003; Ratnasorija and Dharmasiri, 2000). Previously, tropical ethno-medical and ethno veterinary plants and other products with propensity to limit and/or enhance reproductive function in animals have been reported (Yahaya and Ajuogu, 2014; Yahaya *et al.*, 2015). Therefore, this study was designed to evaluate the growth performance and apparent digestibility of rabbits fed *Rhizo* (*Rhizophora mangle*) pith.

## MATERIALS AND METHODS

The experiment was conducted at the Rabbitry section of the Teaching and Research Farm of Ignatius Ajuru University of Education Ndele Campus, Rivers State, Nigeria. The experimental test diet was formulated as presented in Table 1 to which the *R. mangle* pith was added at different inclusion levels to meet the nutrient requirements of growing rabbits. The *R. mangle* pith is composed of soft, spongy parenchyma cells, which store and transport nutrients throughout the plant and it was obtained from young harvested *R. mangle* plants. The extracted pith was sundried and crushed to about 2mm size before they were added. The young *R. mangle* plants were obtained from Krakra-ama community in Asari-Toru Local Government Area, Rivers State.

Twenty four (24) clinically certified healthy weaner rabbits, of mixed breeds with initial body weight (BW) of about an average of 0.5kg were used in the feeding trial that lasted for 8 weeks (56 days).

The rabbits were housed in galvanized wire (40 × 50 × 35 cm) cages provided with feeders and manual watery system, in a well-ventilated building and were kept under the same managerial, hygienic and environmental conditions. A period of 14-16 hours of day light was provided. Feed and water were available all the time *ad libitum* during the experimental period. The gross and proximate composition of the formulated concentrate feed is presented in Table 1 and 2 respectively. The crude protein content of the feed was observed to be within the range recommended by NRC (1984) for growing rabbits. Clean fresh water was available for rabbits all the time. Manure was dropped from the cages on the floor and were collected and removed daily. The animals were fed twice daily at 08.00 hours and at 16.00 hours.

### Digestibility trial

Twelve rabbits were assigned to the four experimental diets. Faeces from each rabbit were collected on day 8, 9 and 10 in labelled polyethylene bags and stored at -10°C. Composition of feed and faecal samples were determined using the techniques outlined by AOAC (1990). Faecal apparent digestibility of DM, CP, CF, EE

and nitrogen free extract (NFE) were determined for each diet.

All data generated were subjected to one way analysis of variance (ANOVA) using the general linear model of statistical analysis for sciences (SAS, 2000) while differences among means were determined using Duncan's multiple tests (Duncan, 1955).

**Table 1:** Gross composition of the experimental diet

Ingredients	Treatment (%)			
	T1	T2	T3	T4
Rhizopith	0	5	10	15
Groundnut cake (GNC)	10	10	10	10
Maize	13	13	13	13
Palm kernel cake (PKC)	27.4	27.4	27.4	27.4
Soya bean meal (SBM)	3	3	3	3
Wheat bran (WB)	40	40	40	40
Guinea corn	2	2	2	2
Bone meal (BM)	2	2	2	2
Lysine	0.5	0.5	0.5	0.5
Methionine	0.5	0.5	0.5	0.5
Salt	0.3	0.3	0.3	0.3
Premix	0.3	0.3	0.3	0.3

**Table 2:** Proximate compositions of the formulated concentrate feed

Nutrient	Concentrate	NRC range
Dry matter (%)	90.14	90.80
Crude fiber (%)	18.00	Not less than 7.8%
Crude protein (%)	21.93	Not less than 16.0%
Ether extract (%)	7.05	Not less than 4.0%
Ash (%)	17.83	> 6.0%
Gross energy (MJ/kg)	5.38	> 3.0MJ/kg
Nitrogen Free Extract (%)	55.21	Not less than 35.0%

## RESULTS AND DISCUSSION

The crude protein content of the feed was observed to be within the range recommended by NRC (1984) for growing rabbits. This result is comparable with the levels reported in similar earlier studies such as Ojebiyi *et al.* (2013). Other proximate components were also similar, suggesting comparable feeding values.

The results of the growth response of weaner rabbits fed diet containing rhizophora mangle pith is presented in table 3. The growth rates were generally lower than in rabbits fed conventional diets but conformed to the general trend in developing countries (Cheeke, 1986; Aduku *et al.* 1988; Alawa *et al.*, 1989; Balogun and Etukude, 1991). As shown in the digestibility study, the mechanisms directing the growth responses observed in the rabbits appear to be unrelated to nutrient digestibility. Although the growth rates of rabbits fed diets containing 15 and 20% rhizopith were better, there was no advantage in digestibility of rhizopiths diets over the control. La Van Kinh *et al.* (1997) indicated that fermentation of soluble sugars to organic acids and alcohol may have negative effects on nutritive value.

**Table 3:** Growth response of weaner rabbits fed diet containing pith extracted from *R. mangle*

	Level of rhizopith in diet (%)			
	0	5	10	15
Weight gain, g/day	16.2 <sup>b</sup> ± 1.50	16.0 <sup>b</sup> ± 1.10	18.0 <sup>a</sup> ± 1.40	19.9 <sup>a</sup> ± 1.33
Feed intake, g/day	68.8 ± 0.22	64.6 ± 0.29	67.0 ± 0.25	63.3 ± 0.21
Feed conversion	4.20 <sup>a</sup> ± 0.22	4.03 <sup>a</sup> ± 0.31	3.72 <sup>c</sup> ± 0.12	3.10 <sup>d</sup> ± 0.21

**Table 4:** Nutrient digestibility of weaner rabbits fed diet containing pith extracted from *R. mangle*

Digestibility (%)	Level of rhizopith in diet (%)			
	0	5	10	15
Crude protein	81.03 ± 0.57	81.25 ± 0.98	82.58 ± 1.00	81.64 ± 0.80
Ether extract	82.51 ± 0.37	83.84 ± 0.42	83.21 ± 0.54	83.80 ± 0.32
Crude fibre	83.96 ± 1.47 <sup>a</sup>	81.89 ± 1.20 <sup>b</sup>	85.26 ± 1.37 <sup>c</sup>	78.60 ± 1.40 <sup>c</sup>
Nitrogen free extract	83.20 ± 0.54	82.72 ± 0.50	83.62 ± 0.67	83.67 ± 0.57

### Nutrient digestibility

The results of the apparent nutrient digestibility of weaner rabbits fed diet containing rhizopith is shown in table 4. There were no differences ( $P > 0.05$ ) in the apparent nutrient digestibility of CP, EE or NFE in rabbits fed the different diets (Table 2). Apparent digestibility of CF decreased ( $P < 0.05$ ) with increase in the level of rhizopith in the diets.

### Conclusions

The finding from this study show that rhizopith is a good feed resource for rabbits and can be included in such diets up to 15% without a significant adverse effect on performance and protein digestibility. Therefore, the inclusion of rhizopith in diets for weaner rabbits supported improved growth and nutrient digestibility.

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