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# RESPONSE OF GROWER RABBITS FED DIETS CONTAINING ROASTED KARAYA GUM TREE (*Sterculia setigera*) SEED MEAL

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## ABSTRACT

This study was carried out to determine the response of weaned rabbits to roasted *Karaya* gum tree seed meal in a twelve weeks experiment. Three diets were formulated with control diet (I) having 0 % *Karaya* gum tree seed meal (KGSM) while diets II and III had 5 % and 10 % KGSM respectively. Thirty-six heterogenous mixed sexes of weaned rabbits with average initial weight of 525 g were allocated to the three diets in completely randomized design with twelve rabbits per treatment. At the end of the twelve weeks, digestibility trial was conducted. Feed intake and weight gains were determined. Feed intake and weight gains were significantly (P< 0.05) higher in diet containing 5 % KGSM. Feed conversion ratio was lower (P< 0.05) in treatment containing 5 % KGSM than control and 10 % KGSM diets. Nutrient digestibility was significantly (P< 0.05) higher in diet containing 0 % roasted KGSM (control) than treatments with 5 % and 10 % KGSM. However, the values for nutrient digestibility of diet containing 0 % roasted KGSM (control) and treatment with 5 % KGSM were numerically within close range indicating 5 % level of inclusion is comparable to 0 % inclusion. Nutrient digestibility decreased with increase (10 %) in roasted KGSM in the diet. This experiment had revealed that up to 5 % level of inclusion of roasted *Karaya* gum tree seed meal can be incorporated in the diet of rabbit without negative effects on growth performance and nutrient digestibility.

**Keywords: Roasted; Karaya; seed; Performance; Digestibility.**

## INTRODUCTION

Price of most conventional feed ingredients is high sequel to stiff competition for them directly by man and industrial usage (Ojebiyi *et al*., 2008). While extensive livestock production system lack adequate nutrients for satisfactory productivity, intensive rearing systems are faced with escalating price of conventional feed ingredients thus raising the cost of production (Tewe, 2004). Presently, Maize that is a major conventional feed ingredient is facing competition between man, livestock and industries and therefore, is no longer economically viable using it in livestock feed. Escalating cost of conventional ingredients has been the prime stimulant for continue search for alternatives (Onimisi *et al*., 2008). The search for alternatives that would reduce cost of production is therefore necessary.

Use of unconventional feedstuffs in animal feed has been recommended (*Rabiu et al*., 2021) to reduce competition and cost of production. Such unconventional ingredients include seeds of tropical trees that are not competed for. However, such unconventional ingredients have to be available, cheap, easy to obtain, nutritionally adequate and safe for inclusion in the diet without detrimental effects on the health of animal or man that would consume the animal. Utilisation of some of these tropical seeds is subjected to some inherent constrains of particular importance are problems associated with anti-nutrient factors (Wafer *et al*, 2021). Presence of anti-nutritional factors such as phytate, oxalate, hydrocyanide and nitrate in some seeds hinder animals from benefiting from them nutritionally (El-Mahmood *et al*., 2008).

The unconventional feed ingredient focused in this study is *Karaya* gum tree seed. *Karaya* gum tree (*Sterculia setigera*) is a wild plant that is wide spread in tropical Africa (Agishi, 2004). It produces seeds in pods which are less utilized by man and animals. Research on the seeds of this plant could help to reveal the potentials of the seeds as feed ingredient for incorporation in livestock feed. Hamidu (2012) had reported *Karaya* gum tree to contain active metabolites such as tannin, flavonoids, saponin, phenolics and glycosides. Different processing methods to detoxify anti-nutrients include roasting or toasting, soaking in water, fermentation, addition of alkaline salt, extruding and blanching (Ayanwale, 2004). The study adopted roasting as a method of processing to detoxify the anti-nutrients of the seed. This research work therefore was carried out to determine the growth performance and nutrient

digestibility of grower rabbits fed diets containing roasted *Karaya* gum tree seed meal.

## MATERIALS AND METHODS

This experiment was conducted at the Rabbitry unit of Federal College of Wildlife Management, New Bussa, Niger State, Nigeria, with Latitude N $9^0$49'.36" and Longitude E $4^0$34".15 (GPS, 2021). Matured seeds of *Karaya* gum tree were collected within New Bussa and its environs. The collected seeds were cleaned to be free of unwanted particles and properly air-dried. The seeds were coarsely milled to allow heat to get to particles appropriately, and roasted in open frying pan heated by naked fire from dried wood at about $75^0$ C for thirty (30) minutes with constant stirring. Thereafter, they were milled with hammer mill for inclusion in the diets. Three experimental diets were formulated in which diet I served as control with 0 % *Karaya* gum tree seed meal (KGSM) while diets II and III contained 5 % and 10 % roasted seed meal respectively (Table 1).

**Table 1: Composition of the Experimental Diets**

| **Composition (%)** | **Diets** | | |
|---|---|---|---|
| | **I (0 % KGSM)** | **II (5 % KGSM)** | **III (10 % KGSM )** |
| Maize | 42.00 | 37.00 | 32.00 |
| Roasted KGSM | 0.00 | 5.00 | 10.00 |
| Soya bean Cake | 14.50 | 13.50 | 12.50 |
| Full fat soya | 15.00 | 14.00 | 14.00 |
| Rice offal | 24.00 | 26.00 | 27.00 |
| Bone meal | 3.50 | 3.50 | 3.50 |
| Vitamin / premix | 0.30 | 0.30 | 0.30 |
| Lysine | 0.20 | 0.20 | 0.20 |
| Methionine | 0.20 | 0.20 | 0.20 |
| Salt | 0.30 | 0.30 | 0.30 |
| **Total** | **100.00** | **100.00** | **100.00** |
| **Calculated composition:** | | | |
| % Crude protein | 17.19 | 17.16 | 17.12 |
| % Crude fiber | 12.34 | 12.40 | 12.52 |
| M.E. (Kcal/kg) | 2607 | 2608 | 2605 |

KGSM = *Karaya* gum tree seed meal, M.E = Metabolisable energy

Thirty-six heterogenous mixed sexes of weaned rabbits with average initial weight of 525 g were used for the experiment. Each treatment had triplicates with four animals per replicate, housed in wooden/wire hutches of 60 cm × 60 cm × 50 cm (length × breadth × height) in a well-ventilated block (7 m ×7 m) pen. The animals were allotted to the three treatment diets in a completely randomized design experiment. Two weeks adjustment period was given for adaptation followed by twelve weeks experimental period. Feed and water were served *ad-lib*. Feed intake and weight gains were determined over the twelve weeks period followed by one week digestibility period. Two animals from each replicate were randomly selected and transferred to metabolism cages for digestibility trial. They were allowed two days adjustment period and faecal samples were collected for five days. The faecal samples collected were properly dried to constant weight, weighed and stored in plastic bags for proximate composition. Raw and roasted *Karaya* gum tree seed meal, feed and faecal samples were analysed for nutrient composition according to Association of Official Analytical Chemists (AOAC, 2000) method. All data collected were subjected to analysis using statistical analysis system (SAS) package while means were separated using Duncan's Multiple Range Test as contained in the same package.

## RESULTS AND DISCUSSION

The ingredients composition of the experimental diets is presented in Table 1 while nutrient composition of raw and roasted seed meal and the experimental diets is presented in Table 2.

**Table 2: Proximate Composition of Diets, Raw and Roasted *Karaya* Gum Tree Seed Meal**

| Parameters (%) | Raw KGSM | Roasted KGSM | Diets | | |
|---|---|---|---|---|---|
| | | | I (0 % KGSM) | II (5 % KGSM) | III (10 % KGSM) |
| Dry matter | 93.17 | 94.84 | 93.89 | 93.30 | 94.36 |
| Crude fibre | 6.76 | 6.35 | 11.96 | 12.12 | 12.68 |
| Crude protein | 18.72 | 18.53 | 16.75 | 16.94 | 16.66 |
| Ash | 2.56 | 6.58 | 11.77 | 11.64 | 12.83 |
| Ether extract | 18.90 | 16.83 | 6.56 | 7.16 | 7.30 |
| Nitrogen Free Extract | 46.23 | 46.55 | 46.85 | 45.44 | 44.89 |

KGSM = *Karaya* gum tree seed meal

The results had shown that roasting had effect on the nutrient composition of the seeds. There was slight increase in the dry matter content of the roasted seeds. This could be due to the exposure of the crushed seed particles to heat which would have decreased the moisture content by evaporation thereby increasing the dry matter. Similarly, ash and nitrogen free extract also increased which could also be due to increase in dry matter content. Ether extract, crude fibre and crude protein decreased due to effect of heat. Heat would have liberated some oil from the seed to reduce the ether extract content. The crude fibre and the crude protein of the diets were similar and were within the range recommended for growing rabbit.

The results of the performance of rabbits fed experimental diets are presented in Table 3.

**Table 3: Performance of Rabbits Fed Diets Containing Roasted *Karaya* Gum Tree Seed Meal**

| Parameters | Diets | | | **SEM** | **LOS** |
|---|---|---|---|---|---|
| | I (0 % KGSM) | II (5 % KGSM) | III (10 % KGSM) | | |
| Initial body weight (g) | 525.00 | 525.00 | 525.00 | 0.124 | NS |
| Final body weight (g) | 2065.00$^{b}$ | 2130.00$^{a}$ | 2030.00$^{b}$ | 13.666 | * |
| Total weight gain (g) | 1540.00$^{b}$ | 1605.00$^{a}$ | 1505.00$^{b}$ | 13.650 | * |
| Average daily gain (g) | 18.33$^{b}$ | 19.11$^{a}$ | 17.91$^{c}$ | 0.163 | * |
| Daily feed intake (g) | 62.11$^{b}$ | 63.40$^{b}$ | 68.00$^{a}$ | 0.492 | * |
| Total feed intake (g) | 5217.10$^{c}$ | 5325.60$^{b}$ | 5712.0$^{a}$ | 232.826 | * |
| Feed conversion ratio | 3.39$^{ab}$ | 3.32$^{a}$ | 3.80$^{b}$ | 0.042 | * |

$^{a, b, c}$ Means on the same row with different superscripts were significantly (P<0.05) different

LOS = Level of significance, NS = Not significant, * = Significant, SEM = Standard error of mean, KGSM = *Karaya* gum tree seed meal

Significantly (P<0.05) higher daily feed intake and higher total feed intake were recorded in diets containing roasted *Karaya* gum tree seed meal. This could be due to the aroma of the seeds which might have attracted the rabbits to take more feed than those on diet without roasted *Karaya* gum tree seed meal. Increased roasted *Karaya* gum tree seed meal in the diet led to increase in aroma and palatability and consequently feed intake. This is in line with the observation of Yusuf *et al.* (2021). However, average daily gain and total weight gain were significantly (P<0.05) higher in treatment fed diet with 5 % roasted *Karaya* gum tree seed meal. The values were significantly (P< 0.05) different between the treatments. Similarly, feed conversion ratio followed the same trend with weight gains. The daily feed intake and daily weight gain were better than those recorded by Adeyina and Apata (2008), Carew *et al.* (2008) and Onimisi *et al.* (2008) on effects of dietary level of cocoa bean shell on nutrient digestibility, organ weight and serum metabolites of weaner rabbits, nutrient composition and feed value of *Tephrosia bructeolata* seed meal for rabbits. A preliminary study, growth performance, and

carcass characteristics of young rabbits fed steamed castor bean cake based diets. Significantly (P<0.05) higher daily feed intake, higher weight gain and better feed conversion ratio is an indication that 5 % roasted *Karaya* gum tree seed meal had no detrimental effect on these parameters. The results of the nutrient digestibility of rabbits fed experimental diets are presented in Table 4.

**Table 4: Nutrient Digestibility of Rabbits Fed Diets Containing Roasted *Karaya* Gum Tree Seed Meal**

| Parameters (%) | Diets | | | **SEM** | **LOS** |
|---|---|---|---|---|---|
| | I (0 % KGSM) | II (5 % KGSM) | III (10 % KGSM) | | |
| Dry matter | 79.50[b] | 79.74[a] | 69.18[c] | 0.48 | * |
| Crude fibre | 79.93[a] | 79.74[b] | 69.19[c] | 0.02 | * |
| Crude protein | 79.93[a] | 79.76[b] | 69.18[c] | 0.19 | * |
| Ash | 79.93[a] | 79.95[a] | 69.17[b] | 0.46 | * |
| Ether extract | 79.94[a] | 79.75[b] | 69.18[c] | 0.08 | * |
| Nitrogen free extract | 79.93[a] | 79.74[b] | 69.18[c] | 0.31 | * |

[a, b, c] Means on the same row with different superscripts were significantly (P<0.05) different

LOS = Level of significance, * = Significant, SEM = Standard error of mean, KGSM = *Karaya* gum tree seed meal

Table 4 shows the nutrient digestibility of rabbits fed diets containing roasted *Karaya* gum tree seed meal. From the results, all the nutrients in the feeds were relatively (more than 60 %) digested. Digestibility of the nutrients was higher in diets containing 0 % roasted KGSM with the exception of dry matter. The values for diets I and II were numerically within close range but were significantly (P< 0.05) different. Digestibility decreased with increase in the KGSM in the diet. Inclusion of roasted KGSM beyond 5 % (10 %) had led to decrease in nutrient digestibility which could mean negative effect on nutrient digestibility. This could be probably as a result of residual effect of anti-nutritional factors of the seed and possibly from the amino acid imbalance. It could also be due to high lignin and cellulose fraction of the fibre of roasted KGSM. This agreed with Agbo (2003) who stated that the lignin and cellulose fraction of the dietary fibre of cooked cowpea made the total cell wall, hemi-cellulose and dry matter highly digestible compare to uncooked cowpea.

## CONCLUSION AND RECOMMENDATIONS

From the results obtained in this study, it is evident that up to 5 % roasted *Karaya* gum tree seed meal can be incorporated in the diets of weaned rabbits without any deleterious effect on performance and nutrient digestibility. This will reduce dependency and competition on conventional feed ingredients. However, beyond 5 % level of inclusion may have negative effect on growth performance as well as nutrient digestibility of rabbits. Further studies are recommended on effects on haematological and serum biochemical indices as well as on economic advantage of using the seed. Further studies are also recommended on effects of the seed on other animals.

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