



**PERFORMANCE OF RATS FED PROCESSED MATURED AND IMMATURED NYPA PALM  
(*Nypa fruiticans*) FRUIT NUT MEAL**

**\*Ukam, V. E., \*Agwunobi, L. N. and \*Oko, O. O. K.**

**\*Department of Agricultural Education, Cross River State College of Education, Akamkpa.**

**\*Department of Animal Science, University of Calabar.**

**\*Ukamvictor2016@gmail.com 08068537978, 09060453845.**

**Abstract**

Forty two male weanling albino rats of Wistar strain of six rats per group were randomly allotted to seven experimental diets, consisting of a control diet and six other diets of same combinations of nypa palm fruit nut meal. Nypa palm fruit nut meal at two maturity stages and three processing methods provides energy in the formulation to maize in a 2x3 Factorial experiment in a Completely Randomized Design at 100% level of inclusion per diet. The diets were fed to the animals for 3 weeks with feed and water given *ad libitum*. The result showed that feed intake and feed conversion ratio were significantly different ( $P < 0.05$ ) among treatment diets, and rats fed the matured sun-dried treatment recorded the highest feed intake of 11.86g. There was no significant difference ( $P > 0.05$ ) in weight gain among sample diets. However, rats fed the matured sun-dried sample recorded the highest weight gain of 1.97g and was numerically better compared to the control diet. No mortality was recorded throughout the entire study and this justifies the practical possibility of utilizing nypa palm fruit nut meal as an energy source replacement in diets for monogastric animals.

**Key words:** Performance, rats, processed immature, processed matured, Nypa palm fruit nut meal.

**Introduction**

The use of non-conventional feedstuff in the formulation of livestock ration has become very necessary due to the comparative soaring cost of conventional energy sources. Maize and sorghum which forms bulk in livestock rations are becoming scarce due to its use by man for diversified products, effects of climate change, draught, insurgency in major grain growing regions of Benue State and North Eastern parts of Nigeria. As an alternative to the scarcity of cereal grain and availability, there is an abundance of Nypa palm growing wild and bearing bunches of fruits along the coastal fringes of the Qua River in Akpabuyo Local Government Area of Cross River State (Ukam *et al.*, 2012). Also, large expanse of these plants are seen along the coastal fringes of Bayelsa, Rivers, Akwa Ibom, Cross River and has covered an estimated area of 821km<sup>2</sup> in four states in Nigeria (Isebor *et al.*, 2003).

Nypa fruiticans is abundant in regions where they grow but their fruits are under-utilized and lacks scientific attention (Prasad *et al.*, 2013), Chemical evaluation of nypa palm fruit nut meal revealed the seed is rich in Carbohydrate high in fibre, low in ether extract, mineral elements, protein and anti-nutritional factors (Osabor *et al.*, 2008; Ukam *et al.*, 2012; Ukam *et al.*, 2013). Being high in Carbohydrate, the nypa fruit nut meal is comparable of providing a good energy replacement for conventional feeds in livestock



feeding. Thus, this study was carried out to evaluate the performance of rats fed processed immature and matured nypa palm fruit nut meal in order to determine a better maturity stage, processing method and its use in ration formulation for monogastric animals.

## **MATERIALS AND METHODS**

### **Location of the study**

The research study was conducted in the Animal House of the Department of Biological Sciences, University of Calabar. The research unit is located at latitude 4°58' N of the Equator and longitude 8°17' E of the Greenwich Meridian. It has an annual temperature range of 25-30°C, rainfall range of 1260-1280mm and a relative humidity of 53-93 per-cent respectively (Okon *et al.*, 2009).

### **Experimental materials**

The test materials (Nypa palm fruits) were harvested from the mangrove swamp forest of the Cross River Estuary at Esuk Mba village in Akpabuyo Local Government of Cross River State, Nigeria. Two stages of maturity (matured and immatured nypa fruits) were used for the preliminary study. The fruits were dehusked and sliced into halves using a cutlass and the nuts removed from the fruit using kitchen knife. The nuts were cracked roughly using kernel cracker and the products milled using hammer mill to give a fine texture. Each of the matured and immatured nypa fruits were divided and processed as sun-dried, toasted and autoclave to six different treatments as follows:

- i. Matured sun-dried nypa palm fruit nut meal (MSNPFM).
- ii. Matured toasted nypa palm fruit nut meal (MTNPFM).
- iii. Matured autoclaved nypa palm fruit nut meal (MANPFM).
- iv. Immatured sun-dried nypa palm fruit meal (ISNPFM).
- v. Immatured toasted nypa palm fruit nut meal (ITNPFM).
- vi. Immatured autoclaved nypa palm fruit nut meal (IANPFM).

The various processed meals were stored in juts bags in a cool and dry place till their use.

### **Formulation of experimental diets**

Seven (7) experimental diets were formulated such that diet one (1) served as control with maize (100 percent), while the other six (6) consisting of two maturity stages and three processing methods replaced with maize at 100 percent inclusion levels (Table 1)

**Table 1: Composition of experimental diets for rats**

| Ingredients    | Treatments/level of inclusion |                                                       |                                                   |                                                      |                                                        |                                                |                                                        |
|----------------|-------------------------------|-------------------------------------------------------|---------------------------------------------------|------------------------------------------------------|--------------------------------------------------------|------------------------------------------------|--------------------------------------------------------|
|                | Control diet (Diet 1)         | Matured sun – dried nypa palm fruit nut meal (MSNPFM) | Matured toasted nypa palm fruit nut meal (MTNPFM) | Matured autoclaved nypa palm fruit nut meal (MANPFM) | Immatured sun- dried nypa palm fruit nut meal (ISNPFM) | Immatured toasted nypa fruit nut meal (ITNPFM) | Immatured autoclaved nypa palm fruit nut meal (IANPFM) |
|                | 100%                          | 100%                                                  | 100%                                              | 100%                                                 | 100%                                                   | 100%                                           | 100%                                                   |
| Maize          | 76.44                         | -                                                     | -                                                 | -                                                    | -                                                      | -                                              | -                                                      |
| Nypa           | -                             | 70.50                                                 | 70.50                                             | 70.50                                                | 70.50                                                  | 70.50                                          | 70.50                                                  |
| Soya bean meal | 6.04                          | 10.78                                                 | 10.78                                             | 10.78                                                | 10.78                                                  | 10.78                                          | 10.78                                                  |
| Crayfish dust  | 4.02                          | 5.22                                                  | 5.22                                              | 5.22                                                 | 5.22                                                   | 5.22                                           | 5.22                                                   |
| Rice bran      | 3.00                          | 3.00                                                  | 3.00                                              | 3.00                                                 | 3.00                                                   | 3.00                                           | 3.00                                                   |



|                   |         |         |         |         |         |         |         |
|-------------------|---------|---------|---------|---------|---------|---------|---------|
| Groundnut oil     | 5.00    | 5.00    | 5.00    | 5.00    | 5.00    | 5.00    | 5.00    |
| Bone meal         | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    |
| Periwinkle meal   | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |
| Vit/Min. Premixes | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    |
| Common salt       | 0.50    | 0.50    | 0.50    | 0.50    | 0.50    | 0.50    | 0.50    |
| Total             | 100.00  | 100.00  | 100.00  | 100.00  | 100.00  | 100.00  | 100.00  |
| Cal values        |         |         |         |         |         |         |         |
| C.P(%)            | 12.00   | 11.90   | 11.90   | 11.90   | 11.90   | 11.90   | 11.90   |
| M.E (Kca/kg)      | 3354.44 | 3285.00 | 3285.00 | 3285.00 | 3285.00 | 3285.00 | 3285.00 |

\*Premix contains the following: Vit=A 8,800,000 i.ur, Vit.=D<sub>3</sub> 1,600,000 i.u; Vit. E=500,000 i.u; Vit. K=200mgr; Vit. B<sub>1</sub>= 1,500 mgr; Vit. B<sub>2</sub>=4,000mgr; Vit. B<sub>6</sub> = 1,500mgr Vit. B<sub>3</sub>=15,000mgr; Vit. B<sub>12</sub>=10mgr; panthothenic acid =5,000mgr; folic acid=500mgr ; biotin =20mgr ; choline chlorine =200gr; antioxidant=125gr; Mn=80gr; Zn= 50gr; Fe =20gr; Cu=5gr; I =12gr; Se=200mgr; Co =200mgr.

### Management of experimental rats

A total of 42 male Albino rats consisting of six (6) rats per treatment were selected based on body weight at the age of 21±2 days, for the 21 days study in a 2x3 factorial experiment in a completely randomized design at 100% level of inclusion per diet. Each treatment was replicated twice with three rats per replicate and the rats were housed individually in metabolic cages. Water and feed were given *ad libitum*.

### Data collection and analysis

Body weight was taken weekly, while feed intake was recorded daily by weighing the feed served and the left over with the quantity spilled over after 24 hours and the difference calculated.

Data generated were analyzed using Analysis of Variance (ANOVA) in a Completely Randomized Design. Significant differences between means were separated using Least Significant Difference (Steel and Torrie, 1980).

### Results and discussion

Table 2 shows the performance of rats fed processed matured and immatured nypa palm fruit nut meal. There was a significant ( $P<0.05$ ) difference in feed intake among the treatment diets. The lowest feed intake of 10.02g was obtained from rats fed the immatured autoclaved sample while the highest feed intake of 11.86g was recorded for rats fed the matured sun-dried sample. Generally, mean daily feed intake obtained in the study was lower than the 15g per rat for a day of dietary intake for Sprague-Dewleg and Fisher male rats (NRC, 1995). The lower feed intake might be due to the coarse and high fibre content of the diets which depressed feed intake by the rats.

Weight gain of rat were not significantly ( $P>0.05$ ) different among sample diets. Rats fed on the matured toasted sample recorded the lowest weight gain of 1.46g, while rats fed matured sun-dried sample recorded the highest weight gain of 1.97g. In the matured sample (MSNPFM, MTNPFM, MANPFM) a gradual decrease in weight gain was observed from the matured sun-dried to the matured autoclaved nypa palm fruit nut meal while an increased in weight gain was observed in the immatured sample (ISNPFM, ITNPFM, IANPFM). The better weight gain recorded in the matured sun-dried processed method (MSNPFM) compared to the control might be due to a higher efficiency of utilization of the sample diets.



The feed conversion ratio was significantly ( $P < 0.05$ ) different among the dietary treatments. The lowest feed conversion ratio of 5.44 was obtained for rats fed the control diet while the highest value of 7.33 was recorded for rats fed the matured toasted sample. The higher feed conversion ratio obtained in the test diets compared to the control might be due to the high fibre content in nypa palm fruit nut meal which affected the breakdown of edible proteins in the various diets (Osabor *et al*., 2008; Ukam *et al.*, 2012; Ukam *et al.*, 2003).

No mortality was recorded throughout the trial period thereby showing the various processed samples of nypa palm fruit nut meals do not contain harmful factors which might affect the performance of the rats.

**Table 2: Performance characteristic of rats fed processed matured and immature nypa palm fruit nut meal with maize as reference diet.**

| Parameters               | Treatments        |                    |                     |                      |                      |                      |                     | LSD  |
|--------------------------|-------------------|--------------------|---------------------|----------------------|----------------------|----------------------|---------------------|------|
|                          | Control           | MSNPFM             | MTNPFM              | MANPFM               | ISNPFM               | ITNPFM               | IANPFM              |      |
| Initial weight/rat/g     | 23.60             | 21.61              | 26.04               | 24.47                | 23.13                | 25.83                | 24.53               | N.S  |
| Final weight/rat/g       | 60.39             | 63.05              | 59.31               | 55.45                | 57.57                | 60.54                | 59.53               | N.S  |
| Daily weight gain/rat/g  | 1.70              | 1.97               | 1.58                | 1.48                 | 1.64                 | 1.65                 | 1.67                | N.S  |
| Daily feed intake /rat/g | 9.52 <sup>c</sup> | 11.86 <sup>a</sup> | 11.67 <sup>ab</sup> | 10.70 <sup>abc</sup> | 10.24 <sup>abc</sup> | 10.57 <sup>abc</sup> | 10.02 <sup>be</sup> | 1.80 |
| FCR/rat/g                | 5.44 <sup>d</sup> | 6.02 <sup>cd</sup> | 7.33 <sup>a</sup>   | 7.13 <sup>a</sup>    | 5.85 <sup>d</sup>    | 6.44 <sup>c</sup>    | 6.07 <sup>cd</sup>  | 0.43 |
| Mortality (%)            | 0.00              | 0.00               | 0.00                | 0.00                 | 0.00                 | 0.00                 | 0.00                | N.D  |

<sup>abc...</sup> Means on the same row with different superscripts are significantly different ( $P < 0.05$ ); LSD: Least Significant Difference, FCR: Feed Conversion Ratio

## Conclusion

From the feeding trial using laboratory rats on two stages of maturity and three processing methods each on nypa palm fruit meal, it was observed that rats fed the matured sun-dried diets was the most preferred in the study. This is because the daily weight gain was numerically better compared to the control diet. It therefore stands a better chance to be utilized in diets for monogastric animals.

## Recommendation

Based on the findings of the study, it was recommended that:

- i. Modern technology should be employed in the fabrication of equipment to harness the processing of nypa fruit nuts. This will help to reduce the human labour involved in slicing and removal of the nuts which is very difficult and tedious. The government and non-governmental organizations (NGOs) can assist in this direction.
- ii. Workshops and seminars should be organized for the local communities within the nypa fruit established communities on techniques of processing the fruit into meals for farm animals. This would help the local communities manage sizeable number of farm animals at reduce cost to raise their income level thereby improving their standard of living.



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