# GROWTH PERFORMANCE OF FINISHED BROILER BIRDS AS INFLUENCED BY DIFFERENT DIETARY LEVELS OF TIGER NUT WASTE MEAL (CYPERUS ESCULENTUS)

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**Abstract**

*A total of one hundred and fifty (150) four weeks old broiler birds were used to study the growth response to diets containing different levels of tigernut wastes meal (TNWM). The birds were randomly allotted to five dietary treatments of three replicates each containing 30 and 10 birds respectively. The treatment diets comprised 0, 25, 50, 75 and 100% of tiger nut waste meal (TNWM) as replacement for maize to form treatment diets 1 (control), 2, 3, 4 and 5 respectively. The control diet and Treatment 2 (25%TNWM) showed significantly (P<0.05) higher weight gain followed by treatment 3, 4 and 5 in that order. The feed intake showed a reversed trend as consumption significantly (P<0.05) increased with increasing dietary level of TNWM. The most favourable feed conversion ratio was obtained with birds in control and treatment 2 with values that were significantly (P<0.05) higher than birds in other treatment groups. The percentage reduction in feed cost per kilogram of diet showed a drastic reduction (P<0.05) as dietary TNWM increased in the diet. However, it did not correspond with percentage savings on feed cost which showed a negative trend as dietary as dietary TNWM increased. It is concluded that up to 25% level of maize could be replaced with TNWM without any adverse effect on performance but with favourable cost savings.*

**Key words:** Tigernut waste, weight gain, feed conversion ratio, cost savings

## Introduction

The search for lesser use and underutilized fedstufs, many of which are potentially valuable as animal feed has been intensified to maintain a balance between population growth and agricultural productivity, particularly in the tropical and sub-tropical areas of the world. In Nigeria, conventional feedstuffs especially energy sources like maize, wheat, millet and guinea corn are becoming increasingly costly. This has led to the search for alternative feedstuffs for use in animal production especially poultry species, which are the main sources of animal protein in Nigeria. Such alternative feed ingredients should of necessity be available all year round; easy to be procured and processed, if need be, into usable forms and must have a comparable cost advantage over the conventional feed stuffs (Oyebiyi *et al.*, 2007). Such feed stuffs must not be a staple item for human food (Okonkwo and Adikpe, 1988). At present in Nigeria, there are many agricultural and industrial by-products that have found their usefulness in livestock feeding (Togun and Oseni, 2005).

A species that can be exploited in this direction is *Cyperus esculentus* commonly called tigernut. It possesses as much agronomic and nutritional potential as the conventionally used energy sources. Tigernut is commonly known as earth almond, *chufa, chewfa* and *Zulu* nuts in Spain. It is known in Nigeria as *Aya* in Hausa, *Ofio* in Yoruba, Akihausa in Igbo and *Isip-Isong* in Efik where these varieties (black, brown and yellow) are cultivated. Among these, only two varieties, yellow and brown are readily available in the market. The yellow variety is preferred to all other varieties because of its inherent properties like bigger size, attractive colour and fleshier body. It also yields more milk upon extraction, contains lower fat, more protein and possesses less anti-nutritional factors especially polyphenols (Okafor *et al.,* 2003). Tigernut can be eaten raw, roasted, dried, baked or can be made into a refreshing beverage called *Horchata De Chufas* or tigernut milk. In Nigeria, it can be grown virtually everywhere. Residue after milk extraction is being discarded by the beverage industries as waste, even though it is said to have high energy content. The successful exploitation of this plant would add to the feed resources available to the livestock industry in Nigeria, and will contribute in solving the problem of scarcity and high cost of feed ingredients (maize, millet, guinea corn and so

on) in livestock feed industry. It will provide feed millers and poultry farmers with readily available high quality alternative feed ingredient that is relatively cheaper thereby reducing the cost of poultry production. This research therefore is to find out the actual level of replacement of maize with tigernut waste meal that can save cost without sacrificing growth performance parameters.

**Materials and Methods**

The study was carried out at the Poultry Unit of the Teaching and Research Farm of the University of Calabar, Nigeria. The tigernut waste was collected from Olam Agro- industry, which is located in Kaduna and Benue States, all in Nigeria. The waste was further sundried and preserved in jute bags for laboratory analyses and feed formulation. The dried tigernut waste and formulated diets were analysed for their proximate composition using AOAC, 2006 methods. The dried tigernut waste meal was used to replace maize in broiler chicken diets at 0, 25, 50, 75 and 100% levels, representing treatment diets 1, 2, 3, 4 and 5 respectively, The formulation was in line with the standard nutrient requirements as recommended by NRC (2013) for each phase of the poultry birds. One hundred and fifty (150) four weeks old broiler birds were distributed in a Completely Randomised Design to their respective experimental diets. Water and feed were administered *ad libitum* throughout the period of the experiment. Proper medication and vaccination were strictly followed. Feed intake was taken daily. Initial live weight was measured at the beginning of the study, thereafter done weekly. These help in computing their weight gain and feed gain ratio. All data collected was subjected to analysis of Variance (ANOVA) using SPSS, 2012.

**Table 1:** Ingredient composition of the experimental broiler finisher diets

| | DIETS | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Ingredient (%) | 0% | 25% | 50% | 75% | 100% |
| Maize | 61.00 | 45.75 | 30.50 | 15.25 | 0.00 |
| Tigernut Waste meal | 0.00 | 15.25 | 30.50 | 45.75 | 61.00 |
| Wheat offal | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Soybean meal | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 |
| Fish meal | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Bone meal | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Oyster shell meal | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Salt | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Lysine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Methionine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| * Vitamin/mineral premix | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| **Total (%)** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** |
| **Calculated values** | | | | | |
| Crude protein (%) | 21.00 | 21.23 | 21.36 | 21.49 | 21.53 |
| ME(Kcal/kg) | 3102.50 | 3087.60 | 3080.17 | 3076.20 | 3085.90 |
| Crude fibre (%) | 5.32 | 6.54 | 6.69 | 6.82 | 7.31 |

* Vitamin/mineral premix containing the following per kg. Vitamin A, 8,000,000 IU; vitamin D3, 1,600000 IU; Vitamin E, 5,000 IU; Vitamin K, 2,000 mg; Thiamine, 1,500 mg; Riboflavin B2, 4,000 mg; Pyridoxine B6, 1,500 mg; Antioxidant, 125 g; Niacin, 1,500 mg; Vitamin B12, 10 mg; Pantothenic acids, 5,000 mg; Folic acid, 500 mg; Biotin, 20 mg; Choline chloride 200 g; Manganese, 80 g; Zinc, 50 g; Iron, 20 g; Copper, 5 g; Iodine 12 g' Selenium, 200 mg; Cobalt, 200 mg.

**Results and Discussion**

The results of the performance of finished broiler birds fed the experimental diets are presented in Table 2. The feed intake improves (P<0.05) significantly with the dietary levels of TNWM. This suggests the absence of odour and toxic factors in the TNWM. It also indicates reduction in the energy density of the diets as shown in Table 1. Monogastric animals are expected to consume more of low energy diets to meet their energy requirement (Nsa et al., 2010).

The daily weight gain values of the birds in control diet and treatment 2 were numerically similar but significantly (P<0.05) higher than that of birds in other treatment diets which tended to depress (P>0.05) as the level of dietary TNWM increases in the diets. The poor energy density of the diet as the dietary TNWM increases in the diets may have also attributed to the poor weight gain of birds on higher levels of TNW diets.

The feed conversion ratio was most favourable with birds in diets 1 and 2 with statistically similar values. Beyond this level (25% TNWM), Feed conversion ratio significantly (P>0.05) depreciated as the level of inclusion of TNWM increased in the diets. This might be an indication that broiler finisher birds have poor ability of utilising high level of TNWM in their diets. TNWM is high in fibre as indicated in Table 1. Archibong et al., 2018 reported that broiler birds have poor tendency of utilising feeds with high fibre levels. This is also reflected in the protein efficiency values as it tended to significantly (P<0.05) depressed as the level of dietary TNWM exceeded 25% of maize replacement. There was cost savings associated with the use of TNWM up to 25% but beyond this level it is unwise to use it in feeds as it shows negative returns to investments.

**Conclusion**

The results of this study have shown that replacing maize with 25% could save cost of investment without sacrificing growth performance of finished broiler birds.

**Table 2**: Growth performance of finisher broiler birds as influenced by different dietary levels of Tiger nut waste

| Treatments<br>Parameters | T1 | T2 | T3 | T4 | T5 | SEM |
|---|---|---|---|---|---|---|
| Initial live weight (g) | 100.37 | 100.19 | 100.48 | 100.92 | 100.51 | 1.52 |
| Daily weight gain(g/d/bird) | $27.52^{a}$ | $27.18^{a}$ | $25.50^{b}$ | $21.42^{c}$ | $19.21^{d}$ | 0.66 |
| Daily feed intake(g/d/bird) | $78.41^{d}$ | $79.11^{d}$ | $83.41^{c}$ | $86.97^{b}$ | $89.54^{a}$ | 0.95 |
| Feed conversion ratio | $2.85^{d}$ | $2.91^{d}$ | $3.27^{c}$ | $4.06^{b}$ | $4.66^{a}$ | 0.12 |
| Daily protein intake(g/d/bird) | 16.58 | 16.61 | 16.63 | 16.64 | 16.66 | 0.23 |
| Protein efficiency ratio | $1.66^{a}$ | $1.64^{a}$ | $1.53^{b}$ | $1.29^{c}$ | $1.15^{d}$ | 0.23 |
| Feed Cost (N/Kg) | $106.22^{a}$ | $101.06^{b}$ | $98.21^{c}$ | $95.18^{d}$ | $92.08^{e}$ | 2.58 |
| Cost/Kg weight gain | $302.64^{d}$ | $294.14^{d}$ | $321.24^{c}$ | $386.45^{b}$ | $429.20^{a}$ | 3.89 |
| Feed cost saving(%) | - | $3^{a}$ | $0.60^{b}$ | $0.21^{b}$ | $0.42^{b}$ | 0.01 |

Means within the same row with different superscripts are significantly different (p<0.05).
SEM – Standard Error of Mean.
TNW= Tiger nut waste, T1=0%TNW, T2=25%TNW, T3=50%TNW, T4=75%TNW and T5=100TNW

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