# Growth performance and carcass characteristics of broiler finisher chickens fed Utazi (*Gongronema latifolium*) leaf meal based – diets

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**Abstract**
A 28 - day feeding trial was conducted to determine the effect of dietary supplementation of utazi leaf meal (ULM) on growth performance and carcass characteristics of finisher broiler chickens. A total of 120, four weeks old chickens of Abor acre strain and of mean initial weight (440±2.55 g/bird) were allotted in a completely randomized design (CRD) to four dietary treatments with 3 replicates per treatment and each replicate had 10 birds. The experiment lasted for 28 days. Utazi leaf meal was supplemented as a feed additive at 0, 5, 10 and 15 g/kg levels to finisher diets $T_1$, $T_2$, $T_3$ and $T_4$ respectively. Feed intake was taken daily while body weight measurement was taken weekly. At the end of the feeding trial four birds per replicate were sacrifice for carcass examination. The result showed that feed intake (90.03-99.07g/bird) decreased significantly ($p<0.05$) as the level of supplementation of ULM increased across dietary treatments. Feed conversion ratio also improved significantly ($p<0.05$) as the level of utazi leaf meal increased in the diets. The final live weight (1340-1373 g/bird) and daily weight gain (30.17-32.70 g/bird/day) as well as carcass parameters (both the prime cuts and internal organs showed no significant ($p>0.05$) differences across dietary treatments, except the liver weight which significantly ($p>0.05$) increased as the level of ULM increased in the diets. The study concluded that finisher broiler chickens can tolerate ULM meal up to 15 g/kg diet without any deleterious effect on growth performance and carcass characteristics but with improved feed utilization.

**Keywords**: Carcass, chicken, finisher, growth, utazi

## Introduction

Poultry is an avian species that accounts for more than 90% of the total birds' population in the world and contributes significantly to income and employment of the populace (Biswas *et al*., 2011). Nutrition is the most important consideration in any poultry enterprise. Poultry production is a good source of animal protein and contributes immensely in boosting the consumption level of animal protein, because of its short generation interval and high growth rate (Ezeonu *et al*., 2017). The main focus of poultry production is to optimize growth performance through better growth rate and improve feed conversion efficiency. Optimum performance of birds is mainly dependent on the quality of feed, physical environment and disease outbreaks (Rentilla and Apajalahti, 2013). Availability of feed ingredients and the ability to produce high quality products in a cost - effective manner is among the major problems facing the feed industry (Chauynarong *et al*., 2011). The poultry industry in Nigeria has been greatly affected by high cost of feeds (Ogbuewu *et al*., 2011). The provision of feed alone accounts for 60-80% of the total cost in livestock production enterprises in developing countries such as Nigeria (Ademiji, 2015). There is need for poultry producers to look beyond this high cost of conventional feed ingredients that cannot sustain poultry production (Chauynarong *et al*., 2011). The incorporation of leaf meal is primarily aimed at improving the protein/vitamin level in broiler diets and hence, reducing the cost of feeds. The bioactive components in leaf meals improve

the growth performance of broiler birds (Sugiharto *et al.*, 2019).

The herbal plant of choice in this study is *Gongronema latifolium*, commonly called "Utazi" in Efik, South-South geopolitical Zone and "Asokeke" in South-East and South-west geopolitical zones of Nigeria and is utilized as a medicinal herb (Ugochukwu *et al*., 2015). As a medicinal plant, it is utilized in the treatment of stomach quandaries, typhoid, dysentery, malaria, worms and cough (Agbo *et al*., 2005). *Gongronema latifolium*, is a wild tropical creeping plant with lush deep green vegetation where it grows in swampy areas or inland valleys. The vegetation is perennial; otherwise, deciduous (Ekine *et al*., 2019). Vegetable-based feeds are rich sources of essential amino acids, vitamins and minerals. Furthermore, it has been established that green vegetables are the cheapest and most abundant source of proteins because of their ability to synthesize amino acids from a wide range of available primary materials such as water, carbon dioxide and atmospheric Nitrogen which in turn provide the necessary nutrients required by the animal for growth (Fasuyi, 2016).

Phytochemical evaluation of *Gongronema latifolium* leaves, stems and roots have revealed the presence of antinutrients such as saponins, tannins, alkaloids, flavonoids, triterpenes and glycosides (Essien *et al*., 2014). These plant parts and residual antinutrients are used by local poultry farmers for the treatment of respiratory diseases (Agbo *et al*., 2005). Therefore, this study evaluated the growth performance and carcass characteristics of broiler finisher chickens fed diets supplemented with utazi (*Gongronema latifolium*) leaf meal.

## Materials and Methods

### Location of Study

The study was conducted at the Poultry Unit of the Teaching and Research Farm, University of Calabar, Calabar. Calabar is located in the South-South region of Nigeria at latitude 4° 57'N and longitude 8°19'E with annual rainfall ranging from 1,260 to 3500 mm, temperature of 25° - 30°C, with relative humidity between 70 and 90 % and an elevation above sea level of 35 m (Nigerian Meteorological Agency, 2022).

### Collection and processing of test material

Fresh leaves of utazi (*Gongronema latifolium*) were purchased from Watt market within Calabar metropolis. Leaves were rinsed with clean flowing tap water to remove dirt and sand, and sun-dried for three (3) days to reduce the moisture content and milled to 5 mm sieve size.

### Proximate composition

The raw samples of the leaf meal and diets were taken to the National Research Institute for Chemical Technology (NARICT) Zaria, for determination of proximate composition (AOAC, 2015). Tannin was determined according to Follin Denis methods (AOAC, 1990); phytate by method of Wheeler and Farrel (1971), saponin, oxalate, cyanogenic glycosides and alkaloids as described by Iyayi *et al*. (2008). Average values were taken after triplicate determinations.

### Experimental diets

The experimental finisher diet (Table 1) was formulated to supply 20.22% CP and 3200 Kcal/kg metabolizable energy. The experimental diets were formulated according to the Aduku (2005) recommendations to meet the nutrient requirements of broiler chickens from 28-56 days. The basal diet was divided into four (4) parts designated as $T_1$, $T_2$, $T_3$ and $T_4$ respectively with utazi leaf meal (ULM) supplemented at 0, 5, 10 and 15 g/kg diet, respectively.

### Experimental birds and management

A total 120, 4 - weeks old broiler chickens Abor acre strain and of mean initial weight (440±2.55g) were assigned to the experimental treatment groups. Each

treatment group had 30 chickens with three (3) replicates of ten (10) birds each. The birds were managed under the deep litter system in line with good management practices for the duration of 28 days. All management practices/vaccination protocols were strictly followed throughout the feeding trial. Feed intake, body weight gain and feed conversion ratio were determined during the experimental period.

**Carcass characteristics**

At the end of the feeding trial, four birds per replicate were randomly selected, starved for twelve (12) hours but had access to drinking water, weighed, dressed, eviscerated and dissected for carcass evaluation. The dressed weight was determined with the use of electronic weighing balance and prime cuts and organ measurements were carried out according to Al-hert (2002) and expressed as percentages of the live weight to obtain relative weight values.

The carcass was divided into different cuts such as breast, back cut, drumstick, thighs, head, wings, shanks and neck. Weight of internal organs such as intestine, liver, kidney, heart, gizzard and lungs were also determined.

**Statistical analysis**

All data obtained from this study were subjected to one - way analysis of variance (ANOVA) for CRD, and the significant means were separated using the Least Significance Difference (LSD) method (Steel and Torrie, 1980).

**Results and Discussion**

**Proximate composition of Utazi leaf meal**

The result of the proximate composition of utazi (*Gongronema latifolium*) leaf meal as presented in Table 2 shows the dry matter, crude protein, crude fibre, ether extract, ash, and Nitrogen free extract (NFE) as 89.90, 27.28, 25.65 9.05, 7.06 and 20.86%, respectively. The crude protein content (27.28%) was close to the value (26.99 %) obtained by Machebe *et al*. (2011) for utazi leaf meal in the humid tropics. The slight variation could be due to time of harvest of the leaves and method of processing the test ingredient. The dry matter content (89.90%) was lower than 94.00% reported by Okoli *et al*., (2019) which was 96.40%. The variation observed may be attributed to differences in method of processing and species of the plant in use as the test ingredient. However, crude fibre (CF), ether extract (EE), ash and Nitrogen free extract s were closed to that reported by Machebe *et al*., (2011), crude fibre (31.86 %), ether extract (10.31 %), ash (6.79 %) and Nitrogen free extract (24.18 %).

**Anti-nutritional composition of *Gongronema latifolium* leaf meal**

The result of anti-nutritional composition of *Gongronema latifolium* (Utazi) leaf meal showed that it contains alkaloids, phenols, flavonoids, anthraquinones, tannins and saponins. Phenols had the highest concentration (14.98± 0.03 mg/100g) and the least was anthraquinones (0.63± 0.02 mg/100g) as shown in Table 3. These constituents are common in medicinal plants in varied concentrations (Sofowora, 1993). The utazi leaf meal can be used because of its antimicrobial activity (Egbung *et al*., 2011). Several plants have also been shown to exhibit antimicrobial activity against micro-organisms (Funatogawa *et al*., 2004). The leaf is highest in phenols which are generally involved in defense against ultraviolet radiation or aggression by pathogens, parasites and predators, as well as contributing to plants colours (Funatogawa, *et al*., 2004). Tannin is also very high in the leaf meal which helps to protect the leaves from fungi attack (Funatogowa *et al*., 2004).

**Growth performance characteristics**

The result of the growth performance characteristics of finisher broiler chickens (4-8 weeks) fed diets supplemented different levels of Utazi (*Gongronema latifolium*) leaf

meal is summarized in Table 4. The growth parameters were not significantly ($p>0.05$) affected by dietary treatments, except the feed conversion ratio (FCR) and daily feed intake which decreased as the supplementation levels of the leaf meal increased across diets. The non-significant ($p>0.05$) effect on the growth parameters of birds fed control diet and those fed experimental diet agrees with the report of Ekine *et al*. (2019) who reported non-significant ($p>0.05$) differences among treatments on the final weight, total weight gain and daily weight gain of the birds. However, this was contrary to the finding of Ani *et al*. (2013) who reported significant ($p<0.05$) differences among treatments on the daily weight gain, final weight, and total weight gain. This variation could be due to supplementation levels of Utazi leaf meal in the diets of broiler birds. Feed intake significantly ($p<0.05$) decreased with increasing levels of Utazi leaf meal up to 15g/kg in the diet. This finding does not support the observation by Ani *et al*. (2013) who reported that feed intake was not significantly ($p>0.05$) affected by the level of Utazi meal in the diets. The feed conversion ratio was significantly ($p<0.05$) influenced by the diet and tended to improve as the level of Utazi leaf meal supplementation increased in the diet as shown in (Table 3) except in treatments T1 (control) with the value (3.14). Thus, this finding is similar to that of Ani *et al*. (2013) who reported significant ($p<0.05$) differences among treatments on feed conversion ratio as the level of Utazi leaf meal increases in the diet. This implies that the birds were able to convert the feed into flesh as the level of Utazi leaf meal supplementation increases in the diet. The feed conversion ratio (FCR) was significantly ($p<0.05$) influenced by the diet and tended to improve as the level of *Gongronema latifolium* (utazi) leaf meal supplementation in the diet increases as shown in Table 3. Thus, this finding agrees with Ani *et al*. (2003) who reported significant ($p<0.05$) difference among treatment groups for feed conversion ratio as the level of *Gongronema latifolium* (utazi) leaf meal increased in the diet. This implies that the birds were able to convert the nutrients present in the leaf meal for healthy growth. However, the results contradicted the results by Nsa *et al*. (2023) who observed poorer feed conversion ratio when bitter leaf meal was added to broiler finisher diets. This could be because of differences in the leaf chemical compositions.

**Carcass characteristics of broiler birds fed Utazi leaf meal**

The result of the carcass characteristics of broiler birds fed diets containing Utazi leaf meal is presented in Table 5. The carcass characteristics and internal organs were not significantly ($p>0.05$) affected by the dietary supplementation of Utazi leaf meal except the liver of the broiler birds which was significantly ($p<0.05$) different between the treatment groups. The enlargement of the liver by supplementation of utazi leaf could be an indication of toxicity, since hypertrophy or hypotrophy of liver has been associated with the presence of toxins (Aderemi, 2003; Ewuola *et al,* 2003).

**Conclusion**

The study has shown that supplementing diets with utazi (G*ongronema latifolium*) leaf meal did not exert any adverse effect on the growth performance and carcass characteristics of finisher broiler chickens. The study concluded that utazi leaf meal supplementation up to 15 g/kg diet in broiler finishers enhanced feed utilization. It is therefore recommended that utazi leaf meal should be supplemented in broiler finisher diets as a way of improving feed utilization.

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Table 1: Composition of experimental diets (%)

| Ingredient | Starter | Finisher |
|---|---|---|
| Maize | 55.00 | 58.60 |
| Soybean meal | 30.00 | 24.50 |
| Wheat offal | 7.50 | 9.90 |
| Fish meal | 2.50 | 2.0 |
| Di-calcium phosphate | 2.50 | 2.50 |
| Oyster shell | 1.50 | 1.50 |
| Lysine | 0.25 | 0.25 |
| Methionine | 0.25 | 0.25 |
| Salt | 0.25 | 0.25 |
| Vitamin premix | 0.25 | 0.25 |
| Total | 100 | 100 |
| Calculated Analysis | | |
| Crude protein (%) | 23.00 | 20.22 |
| Crude fibre (%) | 4.07 | 5.03 |
| ME (Kcal/kg) | 2950.00 | 3100.05 |
| Determined Analysis | | |
| Crude protein (%) | 22.64 | 19.89 |
| Crude fibre (%) | 3.96 | 5.81 |

T1: 0 mg/kg (Control)
$T_2$: Diet with 5 g/kg *Gongronema latifolium* leaf meal
$T_3$: Diet with 10 g/kg *Gongronema latifolium* leaf meal
$T_4$: Diet with 15 g/kg *Gongronema latifolium* leaf meal
Vitamin/mineral premix contributes the following period kg:
Vit. A 10,000000 I. U ,Vit. $D_2$ 2, 00000 I. U, Vit. K 2.250 mg;
Thiamine 1.750 mg, Riboflavin $B_2$ 5,000 mgl; pyridoxine $B_6$ 2.750mg,
Antioxidant 125 mg; Niacin 27,500 mg, Vit. $B_{12}$ 15 mg, Pathotenic acid
7500 mg; Biotin 20 mg, Cholin chloride 400 mg, manganese 80 g; zinc 50 mg.
Iron 20 g, copper 5 g, Iodine 12 g, Selenium 200 mg, Cobalt 200 mg.

Table 2: Proximate composition of *Gongronema latifolium* leaf meal

| Parameter | % Composition |
|---|---|
| Dry matter | 89.80 |
| Crude protein | 27.28 |
| Crude fibre | 25.65 |
| Ether extract | 9.05 |
| Ash | 7.06 |
| Nitrogen free extract | 30.96 |

Table 3: Anti-nutritional composition of *Gongronem alatifolium* leaf meal

| Parameters | Concentration(mg/100g) |
|---|---|
| Alkaloids | 1.39±0.02 |
| Phenols | 14.98±0.30 |
| Flavonoids | 5.92±0.01 |
| Tannins | 11.21±0.02 |
| Saponins | 2.98±0.03 |
| Anthraquinones | 0.63±0.02 |
| Cyanogenic glycosides' | 2.31±0.01 |

Table 4: Growth parameters of broiler birds fed utazi (*Gongronema latifolium*) leaf meal

| Parameters | $T_1$ (0 g/kg) | $T_2$ (5 g/kg) | $T_3$ (10 g/kg) | $T_4$ (15 g/kg) | SEM |
|---|---|---|---|---|---|
| Initial weight (g/bird) | 446.50 | 436.50 | 436.50 | 439.50 | 4.21 |
| Final weight (g/bird) at 6 weeks | 1820.00 | 1703.50 | 1780.00 | 1780.00 | 2.96 |
| Total weight gain (g/bird) | 1373.50 | 1267.00 | 1344.00 | 1340.50 | 8.82 |
| Average weight gain (g/bird) | 32.70 | 30.17 | 32.00 | 31.02 | 0.96 |
| Daily feed intake (g) | 99.07a | 94.71b | 92.29$^{c}$ | 90.03$^{d}$ | 1.53 |
| Feed conversion ratio | 3.03$^{b}$ | 3.14$^{a}$ | 2.87$^{c}$ | 2.82$^{d}$ | 0.04 |
| Mortality (%) | 0 | 0 | 0.5 | 0.5 | 1.0 |

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

Table 5: Carcass characteristics of broiler birds fed Utazi (*Gongronema latifolium*) leaf meal

| Parameter | $T_1$ (0 g/kg) | $T_2$ (5 g/kg) | $T_3$ (10 g/kg) | $T_4$ (15 g/kg) | SEM |
|---|---|---|---|---|---|
| Initial weight (g/bird) | 1890.02 | 1890.32 | 1892.50 | 1890.58 | 8.11 |
| Dressed weight (g/bird) | 1483.67 | 1488.06 | 1474.45 | 1467.47 | 11.84 |
| Dressing % | 78.50 | 78.72 | 77.91 | 77.62 | 6.09 |
| Carcass cuts (% Live weight) | | | | | |
| Breast | 17.89 | 17.63 | 17.80 | 17.69 | 1.35 |
| Back cut | 13.66 | 13.60 | 13.61 | 13.61 | 0.99 |
| Drumstick | 10.36 | 10.34 | 10.33 | 10.32 | 1.18 |
| Thighs | 12.41 | 12.40 | 12.41 | 12.43 | 1.97 |
| Head | 2.60 | 2.60 | 2.60 | 2.55 | 0.06 |
| Wings | 9.41 | 9.38 | 9.41 | 9.39 | 0.67 |
| Shanks | 4.33 | 4.32 | 4.31 | 4.30 | 0.16 |
| Neck | 5.13 | 5.11 | 5.10 | 1.14 | 0.17 |
| Internal organs (% Live weight) | | | | | |
| Intestine (full content) | 7.80 | 7.82 | 7.82 | 7.85 | 1.01 |
| Liver | 2.66$^{b}$ | 2.68$^{b}$ | 2.72$^{ab}$ | 2.78$^{a}$ | 0.11 |
| Kidney | 0.19 | 0.19 | 0.19 | 0.16 | 0.03 |
| Heart | 0.60 | 0.60 | 0.59 | 0.58 | 0.03 |
| Gizzard | 1.90 | 1.90 | 1.89 | 1.90 | 0.07 |
| Lungs | 0.50 | 0.49 | 0.49 | 0.50 | 0.02 |

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