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Effects of *Gongronema latifolium (UTAZI)* as a feed additive on the performance, organ weights, serum enzymes and lipid profile of broiler chickens

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***Target Audience:** Researchers, Animal Nutritionist, Scientists and Farmers*

Abstract

This study examined the effects of dietary Gongronema latifolium leaf meal (Utazi) on the performance and serum biochemicals of broiler chickens. One hundred and fifty (150) unsexed broiler birds were used for the experiment, that lasted for eight (8) weeks. Five (5) dietary treatments; T1 (control), T2, T3, T4, and T5 at 0%, 0.2%, 0.4%, 0.6% and 0.8% inclusion of Utazi, were used, respectively. Each treatment was replicated thrice (3) with 10 birds per replicate. The study revealed that the dressing percentage (%) was significantly (P<0.05) affected by the treatments. However, the final weights (g), weekly weight gains (g), weekly feed intake (g), organ weights (g) and feed conversion ratio showed no significant (P>0.05) difference across the treatments. The results further showed a significantly higher level of the enzymes Aspartate Aminotransferase (AST), Alanine Transaminase (ALT) and Alkaline Phosphatase (ALP) in the control (T1) and T2. The study concluded that Gongronema latifolium leaf meal can be included in broiler feed formulation at a rate of 0.8% (800gm/100kg feed) with no adverse effects, but rather helps liver function and improves the immunity of broilers. It is therefore, recommended to include 0.8% of Gongronema latifolium leaf meal in broiler feed formulation.

***Keywords:** Gongronema latifolium; Serum Enzymes; Serum Lipids; Broiler chicken*

Description of Problem

Proper diet, medication and preventive measures are tools used by farmers to ensure the survival and good performance of their animals. In a bid to reduce costs, various cheap locally available feedstuff found to have some medicinal properties, have been added to poultry diets to replace the need for expensive medications and some of these ingredients have yielded amazing results in the performance of the farm animals.

The use of natural herbs to prevent or cure various diseases is not a strange phenomenon in human history. With the improved knowledge about different Medicinal plants, it has helped to control various diseases in both man and animals. The use of herbal feed additive is gaining importance in animal production due to the ban on the use of certain antibiotics, that has harmful residual effects and are cost effective. A number of feed additives like probiotics, prebiotics, organic acids and plant extracts have been found to have beneficial effects on animal production. Medicinal herbal properties to improve digestibility, antimicrobial, anti-inflammatory, anti-oxidant and immune-stimulant activity must be exploited in the feeding of animals, as well as safe food product for human beings. The challenge of standardized dosages of herbal feed additives requires further research, to make it more acceptable (3).

Gongronema latifolium is one of these plant species whose leaves and other plant part has

shown remarkable effects in humans and animals. *Gongronema latifolium* is highly nutritive with high amounts of proteins and carbohydrates and has antibacterial properties (1, 2).

Gongronema latifolium belongs to the family *Asclepiadaceae*. It is an edible nutritional/ medicinal plant mostly found in the rain forest zones in Nigeria and other tropical African countries (4). It is known to the natives as "Utazi" and "Arokeke" in South Eastern and South Western Nigeria, respectively. It is also found in South America, and has moderate representation in North and South-East Asia. *Gongronema latifolium* has long been recognized as an African traditional remedy for a variety of ailments, such as hypertension, diabetes mellitus, malaria, mental and intestinal disorders. In the United States, *Gongronema latifolium* leaves are incorporated into a tea blend that is mainly marketed to diabetes mellitus patients. Several pharmacological activities of *Gongronema latifolium* extracts have been studied and reported, which provided experimental support for the empirical ethno-pharmacological use of this plant in folk medicine. For example, anti-inflammatory, antifungal, anti-laxative and anti-diabetic activities have been reported (3)

Over the past two decades, different parts of *Gongronema latifolium* have been found to contain saponins, anthraquinones, alkaloids, β-sitosterol, sitostenone, lupenyl esters, pregnance ester, glucosides, and essential oils (5)

With the knowledge of the many benefits *Gongronema latifolium* has for humans, and its chemical contents as reported in numerous research materials, it is expected that it will have positive effects on farm animals, as extract or as feed additives. This study therefore, is to determine the effects of *Gongronema latifolium* as a feed additive on the Performance, lipids and serum enzymes profile, and visceral organ weights of broiler chickens.

Materials and Methods

A total of One hundred and fifty (150) unsexed broiler chicks were weighed, and randomly assigned into the various experimental units, in a Completely randomized Design. The experiment had five (5) dietary treatments, and each treatment was replicated three (3) times with 10 birds per replicate. The animals were raised in a deep litter management system, and the experiment lasted for a duration of eight (8) weeks. T1(Control) had zero inclusion of *Gongronema latifolium*, while T2, T3, T4 and T5 had 0.2%, 0.4%, 0.6% and 0.8% inclusions, respectively. The experimental ingredient, *Gongronema latifolium* leaves, were purchased fresh from a local market, air dried and then ground to powder form to be incorporated with the other feed ingredients used for each treatment.

Within the experimental period the birds were weighed on weekly basis, while feed consumption was recorded on daily basis. At the end of the experiment, one bird per replicate was randomly selected, and starved for an hour, weighed, and then slaughtered. The carcass was then dressed and weighed, and the various organs and body parts were excised for weighing and characterization. Blood samples were collected for analysis to determine the serum lipid profile (Total cholesterol, HDL-C, LDL-C and Triglycerides) and enzymes (Aspartate Aminotransferase, Alanine Transaminase and Alkaline Phosphatase). The data collected were analyzed using One-way Analysis of Variance on SPSS version 20 to determine significant differences, and the significant means were separated, using the Duncan Multiple Range Test (DMRT).

Table 1 – Composition of broiler starter diets

Ingredient	(Control)	(TRT 2)	(TRT 3)	(TRT 4)	(TRT 5)
Maize	40.95	40.75	40.55	40.35	40.15
Palm kernel cake	7.50	7.50	7.50	7.50	7.50
Soya bean meal	13.00	13.00	13.00	13.00	13.00
Groundnut cake	14.00	14.00	14.00	14.00	14
Fish meal	7.75	7.75	7.75	7.75	7.75
Wheat bran	7.00	7.00	7.00	7.00	7.00
Soya bean oil	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
D-L Methionine	0.50	0.50	0.50	0.50	0.50
Lysine	0.50	0.50	0.50	0.50	0.50
Vitamin/Mineral premix	2.50	2.50	2.50	2.50	2.50
Utazi leaf	0.00	0.20	0.40	0.60	0.80
Salt	0.30	0.30	0.30	0.30	0.30
Total	**100**	**100**	**100**	**100**	**100**
Analyzed nutrient composition.					
Crude Protein %	**22.89**	**23.10**	**23.00**	**23.50**	**24.05**
ME Kcal/Kg	**2815.43**	**2800.10**	**2864.54**	**2870.50**	**2799.32**
Crude fibre %	**4.38**	**4.82**	**4.87**	**4.82**	**4.89**
Oil %	**6.75**	**6.67**	**6.59**	**6.78**	**6.49**

Table 2 – Composition of broiler finisher diets

Ingredient	(Control)	(TRT 2)	(TRT 3)	(TRT 4)	(TRT 5)
Maize	51.50	51.30	51.1	50.90	50.70
Palm kernel cake	5.00	5.00	5.00	5.00	5.00
Soya bean meal	10.00	10.00	10.00	10.00	10.00
Groundnut cake	10.00	10.00	10.00	10.00	10.00
Fish meal	7.70	7.70	7.70	7.70	7.70
Wheat bran	5.00	5.00	5.00	5.00	5.00
Soya bean oil	4.00	4.00	4.00	4.00	4.00
Bone meal	3.00	3.00	3.00	3.00	3.00
D-L Methionine	0.50	0.50	0.50	0.50	0.50
Lysine	0.50	0.50	0.50	0.50	0.50
Vit/Mineral premix	2.50	2.50	2.50	2.50	2.50
Utazi leaf	0.00	0.20	0.40	0.60	0.80
Salt	0.30	0.30	0.30	0.30	0.30
Total	**100**	**100**	**100**	**100**	**100**
Analyzed nutrient composition					
Crude protein %	**20.08**	**19.91**	**21.62**	**19.21**	**20.57**
ME kcal/kg	**3014.35**	**3001.00**	**3003.81**	**3027.02**	**3002.05**
Crude fibre %	**4.10**	**4.20**	**3.98**	**4.19**	**4.00**
Oil %	**6.89**	**8.01**	**7.75**	**7.94**	**7.06**

Results and Discussion

The results indicated that there are no significant differences in weekly weight gain, weekly feed intake and feed conversion ratio across the treatments. However, the numerical values indicate higher performance records in the birds fed with *Gongronema latifolium* compared to the control which conforms to the findings of (6).

The findings on the dressing percentages were significantly higher in the 0.8% (T5) inclusion level, which agrees with the reports of (6).and thus, can be concluded that *Gongronema latifolium* leaf meal helped the birds produce more edible portions than the control diet. The results further indicate that there was no significant (P>0.05) difference in the liver, spleen, gizzard, heart and lung weights across the treatments. This conforms to the reports of (6) that the *Gongronema latifolium* leaf meal had no negative effects on any of the internal organs of the treated birds. The variations in the organ weights may be due to normal organ to body weight ratios and not exposure to toxicity, as reported (7).

The results on Table 5showed significantly higher (P<0.05) levels of the enzymes; Aspartate Aminotransferase (AST), Alanine Transaminase (ALT) and Alkaline Phosphatase (ALP) in the Control (T1) and the lowest inT5, which tends to suggest the beneficial nature of *Gongronema latifolium* leaf to the broilers, and implies that *Gongronema latifolium* as a feed additive in broiler diets helped in various protective liver functions such as metabolism and synthesis. According to reports by (8, 9 and 10), higher AST, ALT and ALP levels above the normal, may indicate liver damage.

No significant difference (P>0.05) was observed in serum total cholesterol and low-density lipoprotein across treatments. However, triglycerides and high-density lipoprotein showed significant differences (P<0.05) amongst treatments, but did not indicate any definite trend, in relation to the varying levels of inclusion of *Gongronema latifolium*in the diets. This finding tends to suggest that *Gongronema latifolium* leaf may not play any significant role in the metabolism of lipids. Lipid metabolites in the chicken blood, including the levels of triglycerides, total cholesterol, and lipoprotein fractions, are sensitive indicators of effective fat metabolism in the organism, according to (11).

Table 3: Effect of different levels of *Gongronema latifolium* on the performance of broilers

Parameters	T1 (0%)	T2 (0.2%)	T3 (0.4%)	T4 (0.6%)	T5 (0.8%)
Initial weight (g)	43.5±0.29	43.5±0.29	43.5±0.50	43.5±0.29	43.5±0.15
Final weight(g)	1855.43±114.16	1933.50±31.15	1812.20±63.27	1860.00±64.66	1907.00±2.65
Weekly Weight gain (g)	226.50±14.23	236±3.93	221.09±7.95	227.06±8.08	232.94±0.39
Weekly Feed Intake (g)	449.34±0.00	448.05±0.00	450.57±0.00	447.69±0.00	450.15±0.00
Feed Conversion Ratio	2.00±1.25	1.9±0.32	2.04±0.71	1.98±0.73	1.93±0.03

[a b c], means in the same row with the same superscripts are not significantly (P>0.05) different.

Table 4: Effect of different levels of *Gongronema latifolium* on visceral organ weights and dressing percentage

Organs	T1 (0%)	T2 (0.2%)	T3 (0.4%)	T4 (0.6%)	T5 (0.8%)
Liver (g)	38.34±3.20	40.07±5.58	44.78±3.42	39.07±2.65	38.58±1.29
Spleen (g)	1.65±0.38	1.93±0.31	1.57±0.09	1.50±0.04	2.28±0.54
Gizzard (g)	71.18±5.66	60.90±15.27	75.95±9.31	61.89±9.02	66.81±7.07
Heart (g)	9.75±1.38	11.13±1.18	7.80±1.21	11.22±0.97	9.36±0.96
Lungs (g)	10.46±0.86	11.24±2.28	8.71±1.07	11.54±1.58	12.09±1.10
Dressing %	68.74^{c}±2.02	76.99^{ab}±1.10	71.67^{bc}±1.82	74.57^{abc}±3.03	78.16^{a}±0.56

$^{a\,b\,c}$, means in the same row with the same superscripts are not significantly (P>0.05) different

Table 5: Effect of different levels of *Gongronema latifolium* on serum enzymes and lipids

Parameter	T1 (0%)	T2 (0.2%)	T3 (0.4%)	T4 (0.6%)	T5 (0.8%)
AST (u/L)	34.33^{a}±3.38	34.67^{a}±1.76	28.67^{ab}±5.49	28.00^{ab}±4.93	21.00^{b}±1.73
ALT (u/L)	17.00^{a}±2.65	14.67^{ab}±1.20	8.40^{c}±2.81	13.60^{abc}±0.32	9.77^{bc}±0.43
ALP(u/L)	169.33^{a}±1.45	173.67^{a}±4.70	150.33^{b}±7.69	148.67^{b}±0.88	150.00^{b}±1.16
T.C (mmol/L)	5.03±0.32	5.33±0.23	4.80±0.12	4.93±0.30	5.13±0.66
TG (mmol/L)	1.19^{b}±0.25	1.04^{b}±0.04	1.59^{a}±0.05	1.23^{b}±0.07	1.29^{ab}±0.10
HDL (mmol/L)	2.33^{ab}±0.20	2.73^{a}±0.04	1.91^{b}±0.18	2.02^{b}±0.07	2.33^{ab}±0.29
LDL (mmol/L)	1.67±0.45	2.01±0.06	1.04±0.29	1.88±0.03	1.59±0.58

$^{a\,b\,c}$, means in the same row with the same superscripts are not significantly (P>0.05) different.

Note Meanings; AST – Aspartate Aminotransferase; ALT – Alanine Transaminase; ALP – Alkaline Phosphatase; T.C – Total Cholesterol; TG – Triglycerides; HDL – High-Density Lipoprotein; LDL – Low-Density Lipoprotein

Conclusion and Applications

1. The results showed that *Gongronema latifolium* leaf meal can be included in broiler feed formulation at a rate of up to 0.8% with no adverse effects on the serum enzymes and lipids profile.
2. It confirms that *Gongronema latifolium* leaf meal helps liver function and improves the immunity of broilers.

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