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Performance Of finisher broilers fed antibiotic and *Gongronema Latifolium* leaf extract (GLLE)

Nwosu C. I.[1], Igugo R.U.[1], and Ezike C. O[2]

1. *Department of Animal/Fisheries Science and Management, Enugu State University of Science and Technology (ESUT), Agbani, Enugu State, Nigeria.*
2. *Department of Animal/Fisheries Science and Management, Enugu State University of Science and Technology (ESUT), Agbani, Enugu State, Nigeria.*

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Corresponding Author's E-mail Address:

irenkemnwosu@gmail.com

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ABSTRACT

This study was conducted to investigate the response of broiler finisher chickens to aqueous Gongronema latifolium leaf extract (GLLE) as an antibacterial agent. A total of 96 broiler finisher birds were used for the study. G. latifolium was incorporated in the water at the rate of 0g (antibiotic only), 10g, 15g 20g respectively to 4 treatments ($T_1 - T_4$) groups in a completely randomized design (CRD) of 24 broilers per treatment, replicated three times with eight birds per replicate. The growth parameters and carcass characteristics were studied. The result revealed that there was no significant ($P>0.05$) differences in final body weight, daily weight gain, daily feed intake and FCR between the antibiotic fed chickens and the G. latifolium fed chickens. Similarly, the differences were not significant ($P>0.05$) about most carcass characteristics, except ($P<0.05$) for weights of neck and gizzard. The result thus suggests that G. latifolium (Utazi) can substitute antibiotic additive as a growth promoter in broiler production.

1.0. Introduction

The use of antibiotics to enhance growth performance of poultry birds have been a world-wide practice, (Dhama and singh 2010). The effect has been positive when used as feed additives or in water. However, its use is being decried because it appears to create antibiotic-resistant bacteria in humans that can be transferred through several different ways such as raw meats, consumption of meats, as well as ingestion through airborne bacteria, Food & Water Watch (2015). This has led to the World Health Organization publishing list of essential antimicrobials for human medicine, Ugochukwu, and Conoume, (2008). In this regard, the use of antibiotics in animal feed and water to promote growth was banned in Europe and has generated concerns in the other developed communities.

Given the concerns, the use of antibiotics as feed additives have raised and the ban in the livestock industry, research is ongoing to find a suitable alternative(s), Yan, *et al.,* (2011). In Nigeria local vegetables are rich in protein, vitamin, minerals and anti-bactericidal effect, (Alabi, and Lawal, 2004; Ikpeme, 2012); these leafy vegetables are medicinal because they have beneficial effects such as anti -allergic, anti-cancer, anti-oxidants, anti-inflammatory, anti-viral, antibacterial, and anti-leukemic and vasodilator activities, Asuama, N. Alexandra (2015). Consequently, research is ongoing to find the beneficial effect of *Gongronema latifolium* (Utazi) as one of these local sources. (Okafor, 2005; Kubmarawa *et al.* 2007) had reported that

G. latifolium is one of the cheapest leafy vegetables and most available sources of essential proteins, vitamins, minerals and essential amino acids that can boost the physiological status of birds and promote their growth.

In the above light, some researchers, (Machebe et al., 2011a; Machebe et al., 2011b; Ani et al., 2013) carried out researches using various graded levels of *G. latifolium* extract (GLLE) to show its efficacy in promoting growth and improve carcass yield as an antibacterial, vitamin and mineral feed additive. Their results did not include antibiotic control for comparison. Thus it became necessary to compare these levels with an antibiotic additive to study its anti-bactericidal effect.

2.0. **Materials and Methods**

2.1. Experimental Site

The experiment was carried out at the Teaching and Research Farm, Poultry Unit of the Department of Animal Science, Faculty of Agriculture and Natural Resources Management, Enugu State University of Science and Technology, Agbani. It is located in Nkanu West Local Government Area of Enugu State with latitude 06° 20'N and longitude 07°35'E. The area is marked by tropical weather of wet and dry seasons. The wet season begins in March and ends in October while the dry season commences in October and ends in February. The mean rainfall ranges from 1500mm to 1800mm. The temperature in the dry season ranges from 20°C to 38°C and in the wet season the range is 16°C to 28°C. The vegetation of the area is a rain forest, characterized by stunted trees and pockets of woodland and secondary forest consisting of few shrubs and dispersed large trees and climbers.

2.2. Experimental Material

Fresh leaves of *G. latifolium* were purchased at Ogbete Main market, Enugu. The leaves were rinsed in clean water to remove dirt and sand. They were later air-dried under room temperature for ten days. The dried leaves were later ground to powdery form and stored under room temperature in sealed plastic bottles for use. On a daily basis, a total of 45g of the powdery G. latifolium leaves was soaked in 3 litres of warm water, that is, 10g/litre; 15g/litre and 20g/litre for 24 hours for proper mixing, then sieved for use every morning.

2.3. Proximate Composition

The proximate, mineral and vitamin composition of the *G. latifolium* are shown in tables 1, 2 and 3 below. The laboratory analysis was according to the standards outlined by AOAC (1995).

The percentage composition of the formulated broiler finisher diet is shown in table 4 below.

2.4. Experimental Birds and Management

A total of ninety-six clinically healthy finisher broiler chickens were used for the study. The birds were reared

Table 1: Proximate composition (%)

Proximate	**Composition**
Crude protein	21.33
Crude fibre	17.12
Ether extract	8.20
Ash	8.07
Nitrogen free extract	34.24
Moisture	11.04

Table 2: Mineral composition (mg/100g)

Mineral	**Composition**
Nitrogen	21.7
Sodium	10.80
Iron	9.50
Potassium	55
Iron	11.10
Phosphate	110

Table 3: Vitamin composition (mg/100g)

Mineral	**Composition**
Beta carotene	5.34
Vitamin E	6.72
Vitamin C	13.20

together for four weeks in a deep litter system. The floor was washed, disinfected and covered with absorbent litters

Table 4: Percentage composition of experimental diet (%)

Ingredient	**Percentage**
Maize	34.5
Wheat offal	10.6
Cassava root meal	8.67
Ground nut cake	21.65
Palm kernel cake	16.05
Fish meal	3.53
Bone meal	4.00
Methionine	0.25
Lysine	0.25
Salt	0.25
Vitamin mineral premix	0.25
Total	**100**
Proximate composition	
Crude protein	21.19
Crude fibre	6.67
Ether extract	9.50
Ash	6.80
Moisture	6.16
Nitrogen free extract	49.68
Metabolizable energy(Kcal/kg)	2970

*Vit A – 10,000.00 i.u., D3-2,000,000 iu., Vit. E 20,000 i.u., Vit. K 2,250mg, B1-0.75g., B2-5g., Nicotinic acid – 25g., Calcium pantothenate 12.5g., B12- 0.015g., K3-2.5g., E-25g., Biotin – 0.050g., Folic acid –1g., Manganese 64g., Choline chloride 250g., Cobalt-0.8g., Copper 8g., Manganese 64g., Iron –32g., Zn-40g., Iodine-0.8g., Dlmethionie- 50g, Selenium 0.6g., Lysine 120g., Antioxidant 125g.

some days before the broilers arrived. Kerosene lamps and electric bulbs were used as sources of heat and light. Proper vaccination schedules for the birds were strictly adhered to during the experimental period.

2.5. Experimental Procedure

At four weeks of age, ninety-six clinically healthy birds were randomly allotted into one of four treatment groups, each treatment having 24 birds with three replicates each containing eight birds in a completely randomized design (CRD). The treatments received varying levels of *G. latifolium* leaf extract (GLLE) as follows: treatment 1 (T_1), 0g but Bioneoxyl antibiotic; treatment 2 (T_2), 10g; treatment 3 (T_3), 15g; treatment 4 (T_4), 20g. The extract was administered through their drinking water having 10,15, 20g of GLLE per litre of water, respectively. The Antibiotic "Bioneoxyl" was administered in water according to the manufacturer's recommendation (0.025mg in 1litre of water) and given to birds in T_1. The experiment lasted for twenty-eight days after brooding.

2.6. Data Collection and Analysis

Data were collected on the following parameters:

2.6.1. Feed intake: Data on feed intake were collected daily. It was calculated as the difference between the total feed given and the amount of leftover.

2.6.2. Weight gain: This was gotten from the difference between the final weight and the initial weight

*2.6.3. Feed Conversion Ratio***:** The feed conversion ratio was determined by dividing the values of the feed intake by values of weight gain.

2.6.4. Carcass Yield Evaluation

At the end of the feeding trial, three birds, one per replicate were randomly selected, starved of feed overnight and slaughtered by cutting the jugular vein to allow proper bleeding. The slaughtered birds were de-feathered and eviscerated to evaluate their carcasses. The following different cut-up parts were weighed: thigh, drumstick, liver, gizzard, neck, heart, breast and head. The weights of the head, breast, drumstick, thigh, neck were measured in (g).

2.7. Statistical Analysis

Data obtained from the response variables were subjected to a one-way analysis of variance (ANOVA), and significantly different means were separated using Duncan Multiple Range Test using SPSS, Version 20, for window PC.

3.0. Results

3.1. Weight Gain

The results of the evaluation of the effects of GLLE on the growth of broiler finishers are presented in table 5 below.

Table 5 shows the effect of varying dietary levels of *Gongronema latifolium* leaf extract (GLLE) on the growth performance of broiler finishers. Total live weight (TLW) at eight weeks was highest in T_1(2918g), that is, birds fed only antibiotic additive. The least Total Live Weight (TLW) was with birds placed on 20g GLLE (T4;2617g), though the differences were not significant (P>0.05). This was contrary to the works of Ani *et al.,* (2013) who found increases in TLW as the amount of GLLE increased and Machebe *et al.,* (2011b) who found increases in TLW up to 30ml GLE and decrease at 60ml GLLE inclusion.

Table 5: The Growth Performance of Broiler Finisher Chickens Fed Varying Levels of *G. latifolium* Leaf Extract and Antibiotics in Drinking Water

Parameters/Treatments	T_1(0g)	T_2(10g)	T_3(15g)	T_4(20g)	SEM
Initial Live Weight at Four Weeks (g)	814	809	803	819	±0.56
Final Live Weight at Eight Weeks (g)	2918	2833	2665	2617	±15.22
Average Daily Weight Gain (ADWG) (g)	75	72	67	64 ^{ns}	±5.10
Daily Feed Intake (g)	283.21	273.21	258.93	255.54	±6.73
Total Feed Intake (g)	7930	7650	7250	7155	±7.56
Feed Conversion Ratio	3.77	3.78	3.89	3.98	±0.57
Mortality	0	0	0	0	

(±)SEM = Standard error of the mean.

3.2. Feed Intake and Conversion

The daily feed intake though highest with birds on antibiotic additive and lowest with birds fed 20g GLLE nominally, was not significantly (P>0.05) different. This trend was observed in all other parameters like total feed intake and feed conversion ratio.

3.3. Carcass Yield

From table 6, carcass weight was highest in T_1 (2064g) and lowest in T_4 (1895g). This followed the same pattern observed for the live weight, which was highest for T_1 (2918g) and least for T_4 (2617g). These differences were, however, not significant (P>0.05). The weights obtained were similar to that of Ani *et al.,* (2013) but higher than those obtained by Machebe *et al.,* (2011a&b).

3.4 Primal Cuts

Table 7 showed that the primal cuts of the birds fed on antibiotics (T_1) had higher values in all characteristics; heart (12g); breast (558.67g); thigh (132g); head (78.67g); neck (117.67g) and liver (36.33g) than birds fed on *G. latifolium* (T_2, T_3 and T_4). These higher values were not significantly (P>0.05) different except only in the neck. On the other hand, among the *G. latifolium* treatments, the birds in T_1 (10g) had significantly (P<0.05) heavier neck weight than T_3 (15g) and T_4 (20g) but similar in all other cuts.

Table 6: The Carcass Weight of Broiler Finisher Chickens Fed Varying Levels of G. latifolium Leaf Extract and Antibiotics in Drinking Water

Parameters	T_1(0g)	T_2(10g)	T_3(15g)	T_4(20g)	SEM
Live weight (g)	2918	2833	2665	2617	±15
Carcass weight (g)	2064	2021	1901	1895	±32.14
Dressing %	70.73	71.34	71.33	72.41	±1.24
Daily Feed Intake (g)	283.21	273.21	258.93	255.54	±6.73
Feed Conversion Ratio	3.77	3.78	3.89	3.98	±0.57

(±)SEM = Standard error of the mean.

Table 7: The Primal Cuts of Broiler Finishers Fed Varying Levels of Gongronema latifolium Leaf Extract and Antibiotics in Drinking Water

Parameters/Treatments	T_1(0g)	T_2(10g)	T_3(15g)	T_4(20g)	±SEM
Breast (g	558.67	532.3	547.00	533.00	±10.61
Drumstick (g)	125.67	122.67	119.33	117.67	±2.13
Thigh (g)	132.00	131.00	120.67	123.33	±2.13
Head (g)	78.67	73.67	75.33	72.67	±1.49
Neck (g)	117.67^{a}	88.33^{ab}	77.67^{b}	81.67^{b}	±6.24

a,b: Means having different superscripts on the same row are significantly (P<0.05) different.
(±)SEM = Standard error of the mean

3.5. Organ Weights

In table 8, birds in T_1 (0g), that is antibiotic fed, had significantly (P<0.05) bigger gizzard (64.67g) than birds on *G. latifolium* treatment (T_2, T_3 and T_4) with weights of (51.67g, 50.33g and 48.33g) in that order respectively. The differences among the *G. latifolium* treated birds were not significant (P>0.05). This agrees with the work of Machebe *et al.,* (2011a) who found no significant (P>0.05) difference in weight of gizzard for broiler birds fed varying levels of *G. latifolium*. Similarly, there was no significant (P>0.05) difference in the various weights for liver and heart among the treatment groups.

Table 8: The Organ Weights of The Broiler Finishers Fed Varying Levels of Gongronema latifolium Leaf Extract and Antibiotics in Drinking Water

Parameters/Treatments	T_1(0g)	T_2(10g)	T_3(15g)	T_4(20g)	±SEM
Gizzard (g)	64.67^{a}	51.67^{b}	50.33^{b}	48.33^{b}	±2.37
Liver (g	36.33	36.3^{ns}	36.00	36.33	±0.49
Heart (g)	12.00	10.33^{ns}	11.33	11.00	±0.49

a,b: Means having different superscripts on the same row are significantly (P<0.05) different.
(±)SEM = Standard error of the mean

4.0. Discussion

It was observed that no significant (P>0.05) difference existed among treatments in final body weight, total body weight gain, daily body weight gain, feed intake and conversion ratio. The growth parameters reported in this study were higher than earlier reported findings (Ani *et al.,* 2013; Machebe *et al.,* 2011b). This could be attributed to higher feed intake by the finisher birds in this study than those of the studies conducted by the researchers even when feed conversion ratios were comparable.

The higher values of the growth parameters in this study over earlier studies were in the inverse proportion, that is, the lower the quantity of GLLE the higher the growth parameter in the current study unlike studies of Ani *et al.,* (2013) and Machebe *et al.,* (2013b) that showed linear relationship. This may be as a result of the source of GLLE used as the proximate compositions of GLLE showed that it is rich in protein of high biological value (Ali and Ibiam 2014; *Agbo et al.,* 2009). Further, the comparable performance of broilers fed *G. latifolium* to antibiotic fed broilers suggests the beneficial effect of *G. latifolium* on growth. Okafor (2005) and Kubmarawa, *et al.* (2007) had reported that *G. latifolium is* one of the cheapest and most available sources of essential proteins, vitamins, minerals and essential amino acids that can boost the physiological status of birds and promote their growth (Ugochukwu *et al.* 2003; Okafor 2005; Agbo *et al.,* 2005). The inclusion of *G. latifolium* in the broiler diet might have resulted in better gut and overall health status, more efficient nutrient utilization, healthy development and better growth response of the treated birds. This is contrary to earlier work of Pervez and Abdul (2011) who studied the effect of ten (10) different types of antibiotics additives on growth performance of broilers. They found a significant positive difference (P<0.5) of the antibiotic additives over the control diet, which had none.

The absence of mortality in the treatment groups tends to corroborate the report of Mensah *et al.,* (2008) that *G. latifolium* is known to contain essential compounds that can strengthen the immune system and serve as antibiotics for the treatment of common pathogenic strains in birds. Later, Dhama and Singh (2010) suggested that it has some antimicrobial effect thus it can be used in the prevention and treatment of many diseases that can cause death in farm animals [Agbo *et al.,* 2005; Ugochukwu *et al.,* 2003; Kubmarawa *et al.,* 2003. Earlier, Gamaniel and Akah (1996) had reported that the leaf extract of *G. latifolium* showed moderate antibacterial activity against Staphylococcus *aureus, Salmonella enteritidis, Salmonella choleraesius, Listeria monocytogenes and Pseudomonas aeruginosa*. The live weights of birds fed *G. latifolium* in this study were higher than those reported (Machebe *et al.,* 2011a; Machebe *et al.,* 2011b; Ani *et al.,* 2013). The above may have resulted in the superior carcass yield observed in this study. According to Bamgbose and Niba (1998), carcass yield is an indication of the quality and utilization of the ration. Hence the higher average daily feed intake observed in this study T_1(283.21g); T_2(273.21g); T_3(258.93g) and T_4(255.54g) as against the average value of 200g for

the various treatments by Ani *et al.,* (2013) with similar feed conversion ratio and Machebe *et al.,* (2011a&b) may have contributed to the superior carcass yield.

The increased sizes of the liver and gizzard implied that *G. latifolum* was not toxic to the birds. Iweala, (2009) reported that *G. latifolium* is not toxic to the liver and because it can reduce the level of liver enzymes in the blood, its role is rather protective and not destructive to the liver. Again, Okafor (2005) reported that *G. latifolium* contains flavonoids which have been implicated as the major constituent that gives it hepatoprotective properties. He further reported that flavonoids exert a membrane-stabilizing action that protects the liver cells from injury.

5.0. Conclusion and Application

i. The results presented revealed that antibiotics additive were not significantly (P>0.05) better than *Gongronema latifolium* leaf extract as growth and carcass characteristics enhancers in broiler production.

ii. However, antibiotics use in drinking water nominally improved growth and carcass characteristics of broilers better than *G. latifolium* leaf extract.

iii. The record of no mortality at the finisher phase also indicates that *G. latifolium* may have some antimicrobial effect for use as an additive.

iv. It is concluded therefore that *G. latifolium* leaf extract can reduce the dependence on antibiotics use as growth, carcass and health enhancers in broiler production.

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