# PERFORMANCE CHARACTERISTICS OF ISA-BROWN PULLETS FED GRADED LEVELS OF *PHYLLANTHUS NIRURI* LEAF MEAL AS AN ADDITIVE AT CHICK PHASE

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## ABSTRACT

This study was conducted to determine the effect of graded levels of Phyllanthus niruri leaf meal (PNLM) as additive on the performance of pullets at chicks phase. Four hundred and eighty (480), 3 weeks old pullets weighing between 204.38-215.63g were fed diets containing Phyllanthus niruri leaf meal for 35 days in a completely randomized design experimental layout. Treatments were composed of T1 (0% PNLM), T2 (antibiotics), T3 (0.2% PNLM), T4 (0.3% PNLM), T5 (0.4% PNLM) and T6 (0.5% PNLM) replicated 4times at 20 birds per replicate. Parameters evaluated were final body weight, weight gain, feed intake and feed conversion ratio. Significant ($p<0.05$) differences were observed in the values of final body weight, weight gain, feed intake and feed conversion ratio of the pullets. The final weight of pullets fed 0.5%PNLM were higher (552.50g) and significantly different ($p<0.05$) than those fed T1 (0%PNLM) diet (530g). Inclusion of Phyllanthus niruri leaf meal produced better results of weight gain in T6 (345g), average daily feed intake (46.03g/day/bird) in T4, feed conversion ratio (0.28) in T6 compared to T1 (0% PNLM) and those treated with antibiotics (T2). Therefore, it can be concluded that Phyllanthus niruri leaf meal can be included in the diets of pullets as an additive up to 0.5% level without any detrimental effect on the growth performances.

**Keywords**: Additive; performance; *Phyllanthus niruri* leaf meal; pullets.

## INTRODUCTION

Antimicrobials have long been used to prevent disease and increase growth and feed efficiency in intensive chicken farms. The industry is now evaluating alternatives to pharmacological therapy with the goal of improving animal performance and raising livestock farmers' economic output (Lillehoj et al., 2018). Most antibiotic growth promoters have been related to antibiotic resistance in microorganisms, as well as residues in meat, milk, and eggs. As a result, non-therapeutic options such as prebiotics, probiotics, enzymes, immunological stimulants, organic acids, and phytobiotics (herbal plants, spices, and derivatives) should be investigated as feed additions in animal production (Agyare, Boama, Zumbi and Osei, 2018).

Phytobiotics are plant-derived compounds that are incorporated into animal feed to increase livestock productivity by improving digestibility, nutrient absorption, and pathogen elimination in the animal gut (Athanasiadou et al., 2007). Phytobiotic possesses characteristic flavor and taste, primarily for its self-protection from being grazed/ eaten by animals and from pest attack. Over the years, more than 80,000 compounds have been identified so far like phenols, flavonoids, tannins, saponins, essential oils, etc. Initially, these compounds were considered as waste, anti-nutritional and

health affecting ones. Today, the approach towards them is changing globally as an antioxidants, digestive enhancer, nutraceutical and health promoting substances (Narimani-Rad et al., 2011). In view of animal production especially in monogastrics (pigs and poultry production), they are mainly used as an alternative antibiotic growth promoter (Karangiya et al., 2016).

Herbs and spices are now employed in livestock production due to their pharmacological effects, which include antibacterial, antiviral, antioxidant, anti-inflammatory, anti-fungal, antimicrobial, sedative, hunger and feed intake stimulation, and immune response activation (Toghyani, 2011). A wide range of these herbs and spices have long been utilized as antimicrobial alternatives to synthetic antimicrobials growth promoter in livestock and poultry production (Sridhar et al., 2014).

The leaf of *Phyllanthus niruri* is a promising herbal plant since it includes a variety of bioactive chemicals with high pharmacological activity. The therapeutic efficacy of *Phyllanthus niruri* has been widely used in the treatment of a number of illnesses, including liver and kidney problems, fever, jaundice, and prostrate problems (Nguyen et al., 2012). Therefore, this study was conducted to evaluate the effect of *Phyllanthus niruri* leaf meal as an alternative feed additive on pullet growth performance during the chick phase.

## MATERIALS AND METHODS

### Experimental site

The experiment was carried out at the Poultry Unit Teaching and Research Farm, The Federal Polytechnic Ilaro, Ogun State, Nigeria.

### Collection and processing of *Phyllanthus niruri* leaf meal

Plants of the *Phyllanthus niruri* species were collected in and around the Polytechnic. The leaves were plucked and air-dried for four days at room temperature (35°C) to achieve a constant weight, after which they were milled to make *Phyllanthus niruri* leaf meal.

### Experimental diet and animals

In a completely randomized design, 480 (3 weeks old) Isa brown pullet chicks were assigned to six (6) dietary regimens that were duplicated four times. In each replicate, twenty birds were raised in a deep litter house. The birds were fed and watered as needed, following conventional management procedures. The birds were weighed at the start of the study and then every week after that. The investigation lasted 35 days. The dietary treatments were; T1: (basal diet without additive); Treatment 2: (basal diet with Tylo-dox Extra WSP as antibiotics/100kg feed; Treatment 3: Diet with 0.2% (200g) of *Phyllanthus niruri* leaf meal (PNLM)/ 100kg of feed; Treatment 4: Diet with 0.3% (300g) of PNLM/100kg of feed; Treatment 5: Diet with 0.4% (400g) of PNLM/100kg of feed; Treatment 6: Diet with 0.5% (500g) of PNLM/100kg of feed.

### Management of experimental birds

The diet was created specifically to meet the nutritional requirements of pullet chicks. The pen houses were thoroughly cleaned prior to the arrival of the chicks. Body weight was assessed, then assigned to various therapies and monitored weekly for 35 days. On a daily basis, the amount of feed consumed was measured. By dividing the total amount of feed consumed by the amount of weight gained, the feed conversion ratio (FCR) was computed (Yi et al., 2018). The average values for these parameters in the treatment group were calculated and reported.

### Statistical analysis

Analysis of Variance was used to examine data on growth performance (feed intake, changes in body weight, feed conversion ratio, and mortality) (ANOVA). Duncan's new multiple range test was used to differentiate significantly different means (Duncan, 1955).

## RESULTS AND DISCUSSION

The proximate composition of *P. niruri* leaves was shown in Table 1. The leaves of the plant exhibited higher dry matter content (91.06%). According to proximate analysis, the leaves are high in glucose and energy, protein, crude fibre, mild fat, and ash. Chemical features of plants have been discovered to be responsible for their nutritional and medicinal properties (Hassan et al., 2011). Feed fibres have been shown to improve dietary mineral absorption while simultaneously reducing cholesterol absorption. Proteins are required for the synthesis/repair of bodily tissues and as enzymes, and the crude protein content of the leaf (14.74%) was in line with that obtained by Vanghan and Judd, 2003.

**Table 1: Proximate composition (g/100g DM) of *Phyllanthus niruri leaf* (PNL)**

| Nutrients | % Dry matter |
|---|---|
| Dry matter | 91.06 |
| Crude fibre | 16.90 |
| Crude protein | 14.74 |
| Ether extract | 7.55 |
| Ash | 7.33 |
| Nitrogen free extract | 44.54 |
| Neutral detergent fibre | 43.81 |
| Acid detergent fibre | 25.49 |
| Metabolizable energy (MJ/Kg) | 7.74 |

**Table 2: Gross composition of pullet chick diet containing varying levels of *Phyllanthus niruri* leaf meal**

| Ingredient | Control T1 | (antibiotic) T2 | 0.2% (PN) T3 | 0.3% (PN) T4 | 0.4% (PN) T5 | 0.5% (PN) T6 |
|---|---|---|---|---|---|---|
| Maize | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 |
| SBM | 28.00 | 28.00 | 28.00 | 28.00 | 28.00 | 28.00 |
| Fish meal (72%CP) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Wheat offal | 15.00 | 15.00 | 14.80 | 14.70 | 14.60 | 14.50 |
| Limestone | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Bone Meal | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Oyster Shell | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Common Salt | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Methionine | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Lysine | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Premix | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| **Total** | **100** | **100** | **100** | **100** | **100** | **100** |
| Calculated analysis | | | | | | |
| ME(MJ/kg) | 10.29 | 10.29 | 10.42 | 10.60 | 10.23 | 10.35 |
| Crude fibre (%) | 3.04 | 3.04 | 3.13 | 3.79 | 3.2 | 3.65 |
| Crude protein (%) | 23.15 | 23.15 | 24.61 | 26.76 | 25.31 | 28.09 |

T1: negative control of basal diet without any additive; T2: positive control diet with Tylo-dox Extra WSP as antibiotics/100kg feed; T3: Diet with 0.2% (200g) of PNLM/ 100kg of feed; T4: Diet with 0.3% 300g of PNLM/100kg of feed; T5: Diet with 0.4% (400g) of PNLM/100kg of feed; T6: Diet with 0.5% (500g) of PNLM/100kg of feed.

During the chick's phase, Isa-brown pullets fed diet with varying amounts of *Phyllanthus niruri* leaf meal (PNLM) demonstrated performance characteristics shown in Table 3. The T4 (0.3% PNLM) and T6 (0.5% PNLM) groups of pullet chicks had higher feed intake and body weight gain, respectively. At the end of the chick period, T5 (92.19g) and T4 (102.4g)

had the lowest and highest average weekly feed intakes, respectively. The birds on T6 gained the most weight (345g) ($p<0.05$), whereas those on T2 gained the least (300g). T6 had the highest feed conversion ratio (0.28), while T4 had the lowest (0.21) (as shown in Table 3). The results showed that pullets in the chick phase performed better when higher amounts of PNLM were introduced in their diet. According to Olomu (1995), protein is primarily involved in the growth of animal tissue. It's also feasible that adding more PNLM to the Isa-brown diet's meals will have a significant impact on weight gain.

**Table 3: Performance characteristics of Isa-brown pullet fed *Phyllanthus niruri* leaf meal at the end of chick phase**

| Parameters | T1 | T2 | T3 | T4 | T5 | T6 | SEM± | P-value |
|---|---|---|---|---|---|---|---|---|
| **Initial weight (g)** | 215.60[a] | 207.50 | 213.13 | 214.38 | 204.38[b] | 207.50 | 4.83 | 0.1371 |
| **Final weight (g)** | 530.00 | 507.50 | 537.50 | 533.75 | 500.00[b] | 552.50[a] | 26.77 | 0.2027 |
| **Weight gain (g)** | 314.37 | 300.00 | 324.37 | 319.37 | 304.38 | 345.00 | 26.30 | 0.2965 |
| **Av. Weekly Feed intake (g)** | 96.15[ab] | 93.08[b] | 97.09[ab] | 102.40[a] | 92.19[b] | 97.41[ab] | 1.20 | 0.1607 |
| **Feed intake (g/day/bird)** | 41.95[b] | 40.67[b] | 43.18[ab] | 46.03[a] | 40.68[b] | 43.86[ab] | 0.56 | 0.0232 |
| **FCR** | 0.31 | 0.31 | 0.30 | 0.32 | 0.32 | 0.28 | 0.03 | 0.6373 |
| **Mortality** | 0.50 | 3.00[a] | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.0004 |

[a,b]: Mean within the same row with different superscript letters were significantly different ($P<0.05$); T1: basal diet without any additive; T2: basal diet with Tylo-dox Extra WSP as antibiotics/100kg feed; T3: Diet with 0.2% (200g) of PNLM/ 100kg of feed; T4: Diet with 0.3% (300g) of PNLM/100kg of feed; T5: Diet with 0.4% (400g) of PNLM/100kg of feed; T6: Diet with 0.5% (500g) of PNLM/100kg of feed; FCR: Feed Conversion Ratio.

## CONCLUSION

1. Growth performance of birds fed *Phyllanthus niruri* leaf meal were not significantly ($p >0.05$) different across treatment groups.
2. The inclusion of *Phyllanthus niruri* leaf meal (PNLM) in pullet feed had no negative consequences and instead improved weight gain, feed intake, and mortality.

## RECOMMENDATION

*Phyllanthus niruri* leaf meal can be included in the diets of pullets as an additive up to 0.5% level without any detrimental effect on the growth performances.

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