GROWTH PERFORMANCE OF BROILER CHICKENS FED ADUSA (*Piper guineense*) LEAF MEAL

Ekim, N. D., Afolabi, K. D., Assam, E. D., and Unah, U. L.
Department of Animal Science, University of Uyo, Uyo, Nigeria.
Email of corresponding author: nsy.ekim@gmail.com Phone number: 08035472528

ABSTRACT
An experiment to evaluate the growth performance of broiler chickens fed dietary levels of adusa (Piper guineense) leaf meal (PGLM) was carried out. Actually, 105 1-day- old Chikun (?) strain chicks were randomly assigned to five (5) dietary treatments or diets with 2.5, 5.0, 7.5 and 10% PGLM inclusion levels that represented treatments or diets 2 (T2), 3 (T3), 4 (T4) and 5 (T5) respectively in a completely randomized design (CRD). Treatment 1 diet (T1) without PGLM served as the control. There are five (5) treatments with three replicates each that contained and ten (10) birds per replicate. In terms of final live weight, the highest value of 1.946kg was obtained on birds fed control diet (T1), followed by 1.867kg for 2.5% PGLM, 1.816kg for 5.0% PGLM, 1.726kg for 7.5% PGLM and 1.789kg for 10% PGLM. In conclusion, incorporating adusa (Piper guineense) leaf meal at 2.5% level was optimal for the broiler chicken's growth. Adusa (Piper guineense) leaf meal had no adverse effect on broiler chicken performance at starter phase while diet or treatment with 7.5% leaf meal elicited better feed conversion with more weight gain and the least cost of feed intake per kg body weight gain.
Keywords: Growth, Chickens, Adusa, Treatments, Optimization

INTRODUCTION

A developing country like Nigeria with high population growth is constantly faced with the challenge of animal protein deficiency. Poultry production has been identified as the fastest means of bridging the gap caused by animal protein intake deficiency. (Ahaotu *et al.,* 2019).

In order to provide solution to these challenges of animal protein inadequacy, poultry farmers have resorted to the use of synthetic growth promoters because they discovered that broilers chickens administered antibiotic supplements and growth boosters had rapid meat weight gain (Elizabeth *et al.,*2016).

However, the usage of these synthetic feed additives with high cost of purchase posed lots of adverse effects which led to its ban. Hence, there was need to direct research to plant derived feed additives such as *piper guineense* leaf meal with high nutrient contents to enhance the performance of broiler chickens in the poultry industry.

MATERIAL AND METHODS

Experimental Site and Test Ingredient Procurement

The experiment was conducted at the Teaching and Research farm of Department of Animal Science, University of Uyo, Uyo, Akwa Ibom State. Fresh adusa (*Piper guineense)* leaves were harvested directly from farms around Uyo metropolis. The leaves were plucked, washed, chopped, air dried, ground and kept in air tight container before being used to compound experimental feed.

Management of Experimental Birds

Before the arrival of the chicks, the poultry house was repaired, cleaned, washed and disinfected. At arrival, the chicks were weighed and transferred to the brooding room which had been properly heated up using kerosene lanterns. Electric bulbs alongside kerosene lanterns were used as heat sources and light providers. Also, black tarpaulin was used to cover the brooder to conserve heat. Glucose and anti-stress were added to their drinking water the first day to cushion the effect of stress induced due to transportation. Feed and water were supplied ad libitum, vitamin complex and vaccines were also administered appropriately. The birds were brooded for two weeks and at the end of the brooding period, they were randomly separated into treatment groups and weighed. Feeding of experimental diets started at the second week.

Experimental Diets

The broiler chickens were fed commercial starter diets for the first seven days to stabilize them. Thereafter, the formulated diets were fed throughout the experiment. The starter and finisher phase lasted for 28days each making a total of 56 days (8weeks). There were five treatments designated as T1 which served as the control (0% PGLM), T2 which contained (2.5%PGLM), T3 (5.0% PGLM), T4 (7.5% PGLM) and T5 (10% PGLM) respectively.

Data Collection and Statistical Analysis

The growth parameters measured included initial and final weights, feed intake. Weight gain and feed conversion ratio were calculated. Experimental design was complete randomized design (CRD). Data collected were subjected

to descriptive statistics and analysis of variance (ANOVA). Means were separated using Duncan's multiple range test according to Steel and Torrie (1980).

Table 1: Composition (% Dm) of Experimental Starter Diet

Ingredients	T_1(0)	T_2 (2.5)	T_3(5.0)	T_4(7.5)	T_5(10.0)
Maize (10% cp)	60.05	58.25	58.25	58.15	56.55
Fish meal (71%cp)	3.3	3.3	3.3	4.2	4.2
Soybean (45%cp)	30.2	30.0	28.5	25.7	25.2
P. guineense (15.5%cp)	0.00	2.50	5.00	7.50	10.00
Palm kernel cake (18%cp)	2.5	2	1	0.5	0.1
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.2	0.2	0.2	0.2	0.2
Vitamin Premix	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
Total	**100**	**100**	**100**	**100**	**100**
Calculated Nutrient Composition (%)					
Crude Protein	22.38	22.41	22.0	22.0	22.0
Ether Extract	3.3	3.2	3.2	3.2	3.2
Crude fibre	2.96	3.3	3.5	3.7	4.07
Metabolizable Energy (kcal/kg)	3,034.39	3,014.99	3,009.78	3,004.29	2,986.14

*1kg (OR 2.5kg???) of premix contains: vitamins A (5,000,000Iu), Vitamin D_3 (1,000,000 1U), Vitamin E (16,000mg), vitamin K_3 (800mg), vitamin B_1 (1,200mg), Vitamin B_2 (22,000mg), Niacin (22,000mg), Calcium panthothenate (4,600mg), Vitamin B6 (2000mg), Vitamin B_{12} (10mg), Folic acid (400mg), Biotin (32mg), Choline chloride (200,000mg), Manganese (48,000mg), Iron (40,000mg), Zinc (32,000mg), Copper (3,400mg), iodine (600mg), Cobalt (120mg), Selenium (40mg), antioxidant (48,000mg).

Table 2: Composition (% Dm) of Experimental Finisher Diet

Ingredients	T_1(0)	T_2 (2.5)	T_3(5.0)	T_4(7.5)	T_5(10.0)
Maize (10% cp)	47.52	45.64	43.92	41.68	35.92
Fish meal (71% cp)	1.00	1.00	1.00	1.00	1.00
Soybean (45% cp)	32.48	31.86	31.06	30.68	34.00
P. guineense (15.5% cp)	0.00	2.50	5.00	7.50	10.00
Palm kernel cake (18% cp)	15.00	15.00	15.00	15.00	15.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25	0.25
Vitamin Premix	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
Total	100	100	100	100	100
Calculated Nutrient Composition (%)					
Crude Protein					
Ether Extract	20.6	20.29	20.17	20.15	20.01
Crude fibre	3.44	3.35	3.29	3.17	3.13
Metabolizable Energy (kcal/kg)	3.36	3.58	3.81	3.9	4.16
	3,041.02	3,026.14	3,013.6	3,006.73	3,000.56

*1kg of premix contains: vitamins A (5,000,000Iu), Vitamin D_3 (1,000,000 1U), Vitamin E (16,000mg), vitamin K_3 (800mg), vitamin B_1 (1,200mg), Vitamin B_2 (22,000mg), Niacin (22,000mg), Calcium panthothenate (4,600mg), Vitamin B6 (2000mg), Vitamin B_{12} (10mg), Folic acid (400mg), Biotin (32mg), Choline chloride (200,000mg), Manganese (48,000mg), Iron (40,000mg), Zinc (32,000mg), Copper (3,400mg), iodine (600mg), Cobalt (120mg), Selenium (40mg), antioxidant (48,000mg).

RESULTS AND DISCUSSION

At the starter phase there were no significant difference ($p>0.05$) within the growth parameters studied across treatments. Dietary inclusion of PGLM had no significant difference on FCR but numerical differences across treatments. Inclusion of PGLM in broiler starter diet had no adverse effect on their growth performance.

Table 3: Growth Performance of Starter Broiler Chickens Fed Graded Dietary Levels of *Piper Guineense* Leaf Meal

Treatments	T1	T2	T3	T4	T5	SEM
Levels of PGLM (%)	**0**	**2.5**	**5.0**	**7.5**	**10**	
Growth parameters:						
Initial Body Weight(g)	256.83	249.53	236.37	241.37	230.53	4.34
Daily Feed Intake (g/d)	61.31	61.66	63.46	63.24	62.13	0.90
Daily Body Weight Gain (g/d)	11.37	11.84	11.83	12.88	11.63	0.62
Final Body Weight (g)	575.14	581.38	567.87	602.17	556.23	11.50
Feed Conversion Ratio	4.14	3.92	4.25	3.71	4.05	0.17
Daily Protein Intake (g)	13.72	13.82	13.96	13.91	13.67	0.19
Protein Efficiency	1.13	1.16	1.14	1.23	1.13	0.05
Daily Met. Energy Intake (g)	186.04	185.91	191.01	190.01	185.54	2.69
Met. Energy Efficiency	0.83	0.85	0.83	0.90	0.83	0.08
Cost per Kg of Feed (₦)	510.14	508.54	507.29	517.99	517.64	1.22
Cost of Feed Intake/Bird (₦)	656.85	658.54	676.12	688.01	675.45	9.81
Cost of FI/Kg BWG (₦)	2,115.38	1,991.78	2,155.98	1,920.02	2,096.44	88.44

Source: Statistical Analysis (2024). *Means on the same row are not significant. ($p>0.05$)
*PGLM--- *Piper Guineense* Leaf Meal*FI----- Feed Intake * BWG--- Body Weight Gain*SEM--- Standard Error of Means

Table 4: Growth Performance of Finisher Broiler Chickens Fed Graded Dietary Levels of *Piper Guineense* Leaf Meal

Treatments	T1	T2	T3	T4	T5	SEM
Levels of PGLM (%)	**0**	**2.5**	**5.0**	**7.5**	**10**	
Growth parameters:						
Initial Body Weight(g)	575.14	581.38	567.87	602.17	556.23	11.50
Daily Feed Intake (g/d)	93.06	89.60	87.98	90.24	90.73	0.79
Daily Body Weight Gain (g/d)	35.72^{b}	31.83^{b}	28.32^{b}	42.20^{a}	29.33^{b}	1.80
Final Body Weight (g)	1575.40^{ab}	1472.87^{b}	1361.10^{b}	1784.00^{a}	1377.67^{b}	53.75
Feed Conversion Ratio	3.52^{ab}	3.42^{ab}	3.74^{a}	2.54^{b}	3.61^{ab}	0.17
Daily Protein Intake (g)	19.17^{a}	18.18^{ab}	17.75^{b}	18.18^{ab}	18.15^{ab}	0.18
Protein Efficiency	1.41^{b}	1.45^{b}	1.31^{b}	2.08^{a}	1.39^{b}	0.10
Daily Met. Energy Intake (g)	282.99^{a}	271.14^{ab}	265.16^{b}	271.31^{ab}	272.24^{ab}	2.50
Met. Energy Efficiency	0.095^{b}	0.098^{b}	0.088^{b}	0.138^{a}	0.093^{b}	0.006
Cost per Kg of Feed (₦)	464.18	465.93	466.18	468.17	468.08	0.398
Cost of Feed Intake/Bird (₦)	845.86	1148.94	1168.53	1182.89	1189.17	71.07
Cost of FI/Kg BWG (₦)	$1,635.46^{ab}$	$1,593.47^{ab}$	$1,741.96^{a}$	$1,189.15^{b}$	$1,691.33^{ab}$	77.62

Source: Statistical Analysis (2024) a-b Means on the same row with different superscripts are significantly different. ($p<0.05$)
*PGLM--- *Piper Guineense* Leaf Meal*FI----- Feed Intake* BWG--- Body Weight Gain*SEM--- Standard Error of Mean

The growth performance of finisher broiler chickens fed graded dietary levels of adusa (*Piper guineense*) leaf meal as shown in table 4 below. There were significant differences in daily body weight gain (28.32 – 42.0g/d), final body weight (1361.10 -1784g), FCR (2.54) and daily protein intake (17.75 – 19.17g). The initial body weight and daily feed intake were similar ($p>0.05$) across treatments. The least FCR of 2.54, highest daily feed intake (42.20g/d), highest final body weight (1784g/bird), highest protein (2.08), Met. efficiency (0.138) and the least cost of feed intake per kg body weight gain (N1,189.15) was obtained on birds fed 7.5% PGLM based diet and its more economical. This increase may be due to the androgenic properties of *Piper guineense* which possess the capacity to build organs and tissues as well as muscle mass gain (Mbongue *et al.,* 2005).

CONCLUSION

Inclusion of *Piper guineense* leaf meal to broiler chicken diets had no adverse effect on their performance at the starter phase while diet with 7.5% adusa leaf meal inclusion elicited better feed conversion with more weight gain and the least cost of feed intake per kg body weight gain.

REFERENCES

Ahaotu, E. O., Patricicio, de los Rios., Ibe, L. C. and Singh, R. R. (2019). Climate change in poultry production system – A Review. *ACTA Scientific Agriculture* 3(9):113 – 117.

AOAC (1990). Official Method of Analysis, 15th Edition. Association of Analytical Chemists. Washington D.C.

Cabuk, M., Alciek, A. and Borzkurt, M. (2003). Antimicrobial properties of the essential oils isolated from aromatic plants and using possibility as alternative feed additives. National Animal Nutrition Congress. Konga Turkey, 184-187.

Duncan, D.B. (1995). Multiple Range and F-test, Biometrics. 11:1-42.

Elizabeth, E. Besong, Morufu, E. Balogun, Serges, F. A., Djobissie, Ogochuckwu, S. Mbamalus, Jacinta N. Obinna (2016). A Review of *Piper guineense* (African black pepper). *International Journal of Pharmacy and Pharmaceutical Research* 6(1): 368 – 384

Mbongue, F. G. Y; Kantchouing, P; Essame, O. J. L; and Yewah, P. M (2005). Effect of the aqueous extract of dry fruits of *Piper guineense* on the reproductive function of adult male rats. *Indian Journal of Pharmacology.* 37 (1): 30-32.

Platel, K. and Srinivasan, K. (2000). Influence of dietary spices and their active principle on pancreatic digestive enzymes in albino rats. *Nahrung* 44:42-46.

Steel R. G. D., and Torrie J. H., (1980). *Principles and Procedure of Statistics. A biometrical Approach*. 2nd Education Mcgraw-Hill Book Company, Inc. New York. 78-89.