Growth Response and Cost Benefit Analysis of Starter Broiler Birds Fed Supplemental Levels of Black Plum Leaf Meal (A case study in Ishiagu, Ivo local government area of Ebonyi state).

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Abstract**—***A research work was carried out to determine the influence of Black plum leaf meal on the growth performance and cost benefit analysis of starter broiler birds. Ninety-six (96) day old 'Sayeed' broiler birds were used for the research work. The birds were brooded for a week after which they were randomly distributed into four treatment group of twenty-four each been replicated three times with eight birds per replicate. Four different diets were formulated such that the black plum leaf meal was incorporated into the diets at the rate of 2.00%, 4.00% and 6.00% respectively, while treatment 1 served as the control with 0% level of Black plum leaf meal. Feed and water were given ad-libitum throughout the experimental period of twenty-one days. Proximate composition of the Black plum leaf meal was carried out. Birds on control diet was superior to birds in other treatments in terms of final body weight, body weight gain and feed conversion ratio, which was followed closely by those of birds in treatment 3 (4%bplm). Thus, birds in treatment 1 (control) had better performance among the treatments under review. Thus, black plum leaf meal can be added into the diet of starter broiler birds up-to the level of 6% without any detrimental effect on the bird's performance. Result for cost benefit analysis showed that birds in treatment 3 had the highest (P<0.05) profit of #528.54 when compared to the other treatments under review.*

Keywords— Growth performance, cost benefit analysis, starter broiler birds, Black plum leaf meal, proximate composition.

I. INTRODUCTION

With the current emphasis on improvement of livestock production in Nigeria, foliage plants have found an application without compromising nutritional standard (Ekenyem *et al*., 2003). The inclusion of leaves in the diet of poultry birds is becoming adaptable due to its availability and phytochemical constituents responsible for medicinal or organoleptic properties of the plant (Ugwu *et al*., 2013). It is a known fact that profitable livestock enterprise depends on the availability and affordability of feedstuff. With increased interest in foliage plants as feed ingredient, several plants have been assessed with respect to their effectiveness in yielding positive results in terms of growth and performance in poultry. Some of these plants include *Napoleon imperialis, Ipomea asorfolia, Moringa oleifera, Azadirachta indica, Ipomea purpurea* etc (Adeyina *et al*., 2014). One of such foliage plants is the *Vitex doniana. Vitex doniana* is among plants whose leaves has potentials for improving animal productive performance. It is an indigenous tropical plant distributed across tropical and sub-Saharan Africa coastal savannas and savanna woodland. The tree is none domesticated, but it is found at the centre of West African villages. The bark, leaves and roots of the plants are used in ethno-medicine for the management and treatment of numerous disorders such as microbial infection, cancer, rheumatism, hypertension and inflammatory diseases (Atawodi, 2005). The back of the stem is aromatic and serves as blood tonic. It has also been reported that the extract of *Vitex doniana* plant lowered blood pressure.

II. MATERIALS AND METHODS

The research work was conducted at the poultry unit of the Animal Production Department, Federal College of Agriculture, Ishiagu, Ebonyi State. The black plum leaves that was used for the experiment was sourced from Ishiagu town and environment all within Ebonyi state. The black plum leaves were obtained fresh, washed and then air dried for about seven days after which it was sun-dried to get a cripsy-like leafy material. The cripsy leaves were then turn to powder by means of grinding and then incorporated into the diets of the birds at the levels of 0%, 2.00%, 4.00% and 6.00% respectively.

TABLE 1
PROXIMATE COMPOSITION OF BLACK PLUM LEAF MEAL

Components	% Composition
Dry matter	89.65
Moisture	10.35
Crude protein	10.7
Crude fiber	7.68
Ether extract	2.67
Ash	8.92
Nitrogen free extract	59.68
Metabolizable energy (Kcal/kg)	2690.25

The completely randomized design (CRD) was used. Ninety-six day old "Sayeed" broiler chicks were used for the research work. Each treatment had twenty-four birds with three replicates consisting of eight birds each. Feed and water were given *ad-libitum* and vaccinations were given as at when due according to standard practices.The initial weight of the birds was taken at the beginning of the study and then subsequently on a weekly basis. Feed intake was also recorded as the difference between the quantity of feed given the previous day and the quantity that was left the next day. Feed conversion ratio was obtained as the ratio of feed intake divided by the body weight gain. Data collected were subjected to analysis of variance (ANOVA) according to procedure. Significantly different means were separated according to the method of Duncan multiple range test. Proximate analysis of Black plum leaf meal was carried out using the standard procedure of AOAC (2005). Cost benefit analysis was calculated using the following formulas;

- **Cost of bird =** Amount expended or spent on purchase of bird
- **Cost per kg of feed** = Cost of feed/25kg
- **Cost of feed consumed** = Total feed intake x cost per kg of feed/1000
- **Other cost**
- **Total cost of production**
- **Revenue** = Average final Weight of birds x cost per kg of current market price of 1kg meat of broiler/1000
- **Benefit/Profit** = Revenue – cost of production
- **Cost benefit ratio** = Cost of production/Benefit

TABLE 2
EXPERIMENTAL DIET FOR STARTER BROILERS FED SUPPLEMENTAL LEVELS OF BLACK PLUM LEAF MEAL

	Treatments			
Ingredients	**T1**	**T2**	**T3**	**T4**
Maize	52	51	50	49
Wheat offal	7.25	6.75	6.75	6.25
Soya bean meal	6.6	6.6	6.1	5.6
Full fat soya	5	5	5	5
Groundnut cake	17.5	17	16.5	16.5
Fish meal (72%)	3.5	3.5	3.5	3.5
Blood meal	3.5	3.5	3.5	3.5
Black plum leaf meal	0	2	4	6
Limestone	1.5	1.5	1.5	1.5
Bonemeal	2	2	2	2
Methionine	0.35	0.35	0.35	0.35
Lysine	0.2	0.2	0.2	0.2
Starter premix	0.35	0.35	0.35	0.35
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated value				
Crude protein (CP) (%)	23.5	23.34	23.02	22.85
MEnergy (Kcal/kg)	2872.5	2868.1	2863.86	2860.12
Crude fiber (%)	3.47	3.53	3.61	3.66
Ether extract (%)	4.55	4.49	4.46	4.44
Calcium (%)	1.25	1.27	1.29	1.29
Phosphorus (%)	0.48	0.49	0.49	0.49
Methionine (%)	0.72	0.72	0.72	0.72
Lysine (%)	1.3	1.3	1.3	1.3

III. RESULTS AND DISCUSSION

The proximate analysis showed that the black plum leaf meal (bplm) had a low crude protein value of 10.70%, high ash content of 8.92%, low ether extract value of 2.67% and a moderate level of crude fiber (7.68%). The result of growth performance and cost benefit analysis of starter broiler bird is revealed in table 3. Superior ($P<0.05$) value of 987.50g for final body weight was seen in treatment 1 (control) which did not differ ($P>0.05$) from those of birds in treatments 2 and 3 with values of 979.17g and 983.33g, while the least value of 904.17g was obtained in treatment 4 respectively. The decrease in weight of birds on *Vitex doniana* leaf meal-based diets suggest that the bioactive substance in the black plum leaf meal could not support increase in body weight to a greater extent as compared with the control. Also, it could be due to the inability of the birds at the starter phase to utilize to the fullest some of the growth promoting substances like vitamins, micro-minerals and the phytochemicals contained in the *Vitex doniana* leaf meal. The results obtained in the present study disagrees with the report of Nnamani *et al*. (2007) who observed higher weight in birds fed the *Vitex doniana* leaf meal diets. Feed intake value was highest ($P<0.05$) in treatment 2 (4%bplm) with a value of 1391.67g. But the lowest value of 1325.10g was observed in treatment 4. Birds in treatment 1 and 3 had feed intake values of 1366.68g and 1358.28g respectively. Result for feed conversion ratio showed that birds in treatment 1 had the lowest feed conversion ratio of 1.81, which happens to be the best performed treatment which was followed closely by birds in treatment 3 (1.85). Birds in treatments 2 and 4 had similar ($P>0.05$) values of 1.92 and 1.96 respectively. This result differed from those reported by Adeyina *et al*. (2017) who observed better performance in birds fed *Vitex doniana* leaf-based diet. This showed that the constituents of phytochemical

may not have contributed to the beneficial properties of *Vitex doniana* in affecting feed improvement. Data obtained for cost benefit analysis showed that there was significant difference (P<0.05) in the values obtained across the treatment groups for cost of kg of feed, total expenses and net profit. While that of cost of day-old chicks, other expenses and income from sales of birds did not differ (P>0.05). The highest (P<0.05) value for profit was obtained in treatment 3 (#528.54), while the least value of #403.17 was obtained in treatment 4. Treatment 2 had value of #496.77 which differ (P<0.05) from those of #485.35 obtained in treatment 1 respectively.

TABLE 3
GROWTH PERFORMANCE AND COST BENEFIT ANALYSIS OF STARTER BROILER BIRDS FED DIFFERENT LEVELS OF BLACK PLUM LEAF MEAL (BPLM)

Parameters	T1 (0.00%Bplm)	T2 (2.00%Bplm)	T3 (4.00%Bplm)	T4 (6.00%Bplm)	SEM
Initial body weight (g)	233.33	254.17	250	229.17	-
Final body weight (g)	987.50^{a}	979.17^{a}	983.33^{a}	904.17^{b}	13.47
Body weight gain (g)	754.17^{a}	725.00^{c}	733.33^{b}	675.00^{d}	8.79
Feed intake (g)	1366.68^{b}	1391.67^{a}	1358.28^{b}	1325.10^{c}	7.31
Daily feed intake (g)	65.08^{a}	66.27^{a}	64.68^{a}	63.10^{b}	0.5
Daily bodyweight gain (g)	35.91^{a}	34.52^{a}	34.92^{a}	32.14^{b}	0.53
Feed conversion ratio	1.81^{b}	1.92^{a}	1.85^{b}	1.96^{a}	0.03
Cost of birds at day old (₦)	560	560	560	560	-
Cost of Kg of feed (₦)	279.62^{a}	255.62^{b}	244.02^{c}	237.22^{d}	4.89
Cost of feed consumed (₦)	382.15^{a}	355.74^{b}	331.45^{c}	314.34^{d}	7.74
Other cost (₦)	350	350	350	350	-
Total cost of production (₦)	1292.15^{a}	1265.74^{b}	1241.45^{c}	1224.34^{d}	7.73
Revenue (₦)	1777.50^{a}	1762.51^{c}	1769.99^{b}	1627.51^{d}	18.7
Benefit/profit (₦)	485.35^{c}	496.77^{b}	528.54^{a}	403.17^{d}	13.98
Cost benefit ratio	2.66^{b}	2.55^{c}	2.35^{d}	3.04^{a}	0.08

^{abcd}Means on the same row with different superscripts are significantly (p<0.05) different.

Note:

* Bplm = Black plum leaf meal
* A kg of broiler meat cost #1800

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