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Research Article

Impact of Phytobiotics on Growth Performance and Cost Analysis of Starter Broiler Birds

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Abstract

The work was carried out to determine the effect of supplemental levels of moringa leaf and black plum leaf meal on the growth performance and cost analysis of starter broiler birds. A total number of one hundred and twenty (120) day old "Agrited" broiler chicks were randomly allocated to five dietary treatments, each replicated three times with eight birds per replicate in a completely randomized design (CRD). Five different diets were formulated such that diets 2, 3, 4 and 5 contained moringa leaf meal and black plum leaf meal at the levels and ratio of 1:4, 2:3, 3:2 and 4:1, while diet 1 served as the control. Proximate analysis of moringa leaf and black plum leaf meal and the experimental diets were carried out. Values obtained for final body weight was superior ($P < 0.05$) in treatment 1 with 1321.90g, which did not differ ($P > 0.05$) from 1283.09g in treatment 2 but was different from the values of 1202.86g and 1204.29g obtained in treatment 3 and 4. While, the least value of 1164.10g was observed in treatment 5. Value obtained for benefit was highest ($P < 0.05$) in treatment 1 with #887.55, while the lowest value of #672.04 was seen treatment 5. Cost benefit ratio was better optimized in treatment 1 (1.68) when compared to the least performed treatment (5) with 2.12 respectively. Thus, from the results obtained, it can be concluded that the inclusion of moringa leaf meal and black plum leaf meal at various levels and ratio of 1:4, 2:3, 3:2 and 4:1 can be tolerated by the birds at starter phase without any declining effect on the performance of the birds, with the best performance and net profit in treatment 1 respectively.

Keywords: Growth Performance; Cost Analysis; Starter Broiler Birds; Moringa Leaf Meal and Black Plum Leaf Meal

Introduction

Availability of feed is one of the prime factors considered necessary for a successful result in the livestock and poultry industry since feed alone accounts for over seventy percent of the total cost of production [1]. However, the production of broiler as a domestic bird for meat cannot be effective in the absence of adequate feed and feed ingredients in their right proportion. Thus, the bird can only perform economically well and profitably if it consumes on daily basis the appropriate amount of nutrient needed [2].

Natural antioxidants such as vitamin C, tocopherols, flavonoids and other phenolic compounds are known to be present in certain plants. Moringa *(Moringa oleifera) i*s one of such plant that has been identified to contain natural antioxidants [3]. *Moringa oleifera* is rich in bioactive compounds and may be a potential feed source as a phytogenic feed additive. Moringa leaves contain vitamins, flavonoids and carotenoids, which not only serve as essential nutrients, but also enrich poultry meat and eggs, and intensify the pigmentation of the shanks and egg yolk. It is also a good source of dietary fiber, potassium and manganese [4]. The leaves are good sources of digestible protein, β-carotene, vitamin C, calcium, iron and potassium [5]. Moreover, the antioxidant effect of *Moringa oleifera* leaf is due to the presence of polyphenols, tannins, anthocyanin, glycosides and thiocarbamates, which remove free radicals, activate antioxidant enzymes and inhibit oxidases [6].

Black plum (Vitex doniana) is among plant leaves with potential for improving performance in livestock and poultry nutrition. It is an indigenous tropical plant distributed across tropical sub-saharan, Africa's coastal savannas and savanna woodland. The tree is none domesticated, but it is often found at the centre of West African villages. *Vitex doniana* is commonly known as Black plum (English), 'Dinya' (Hausa), 'Oriri' (Yoruba) and 'Uchakoro' (Igbo) where the bark, leaves and roots of the plant are used in ethno-medicine for the management and treatment of numerous disorders such as microbial infection, cancer, rheumatism, hypertension and inflammatory diseases [7]. *Vitex doniana*, as an indigenous leafy vegetable is inexpensive but is a high-quality nutritional source, especially when used in the diets of broiler birds They are found to contain much more potassium and phosphate than calcium, magnesium, zinc and iron [8]. In view of this, the present study is conducted to determine the growth performance and cost benefit analysis of starter broilers feed replacement level of Black plumand Moringa-leaf meal.

Materials and Methods

Ingredients	T1	T2	T3	T4	T5
Maize	52.00	50.00	50.00	50.00	50.00
Wheat offal	7.75	4.75	4.75	4.75	4.75
Soyabean meal	8.15	8.15	8.15	8.15	8.15
Groundnut cake	20.00	20.00	20.00	20.00	20.00
Fish meal (72%)	3.50	3.50	3.50	3.50	3.50
Blood meal	3.50	3.50	3.50	3.50	3.50
Black plum leaf meal	0.00	1.00	2.00	3.00	4.00
Moringa leaf meal	0.00	4.00	3.00	2.00	1.00
Limestone	1.50	1.50	1.50	1.50	1.50
Bonemeal	2.50	2.50	2.50	2.50	2.50
Methionine	0.35	0.35	0.35	0.35	0.35
Lysine	0.15	0.15	0.15	0.15	0.15
Starter premix	0.35	0.35	0.35	0.35	0.35
Salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated value					
Crude protein (CP)	23.85	23.92	23.90	23.88	23.86
M Energy (Kcal/kg)	2830.40	2829.70	2829.35	2828.92	2829.70
Crude fiber (%)	3.58	3.69	3.68	3.69	3.70
Calcium (%)	1.25	1.27	1.27	1.27	1.27
Phosphorus (%)	0.56	0.56	0.56	0.56	0.56

Table 1: Experimental diet for starter broilers fed supplemental levels of moringa and black plum leaf meal.

The experiment was carried out at the poultry unit of Animal Production Technology Department, Federal College of Agriculture, Ishiagu, Ebonyi State. The moringa and black plum leaf that was used for the experiment was sourced from Ishiagu town and environment all within Ebonyi state.

The leaves were obtained fresh, washed, air-dried and then sun-dried for an hour 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.

Component (%)	Moringa leaf meal	Black plum leaf meal
Dry matter	91.86	89.06
Moisture	8.14	10.94
Crude protein	26.49	11.27
Crude fiber	7.92	7.37
Ether extract	4.31	2.60
Ash	9.62	9.38
Nitrogen free extract	43.52	58.44
Metabolizable energy (Kcal/kg)	2,816.70	2,660.85

Table 2: Proximate composition of moringa and black plum leaf meal.

One hundred and twenty (120) day old "Agrited" broiler birds were used for the research work. Each treatment had twenty-four birds with three replicates consisting of eight birds each distributed in a completely randomized design (CRD). The birds were brooded for one week. 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). Significantly different means were separated according to the method of Duncan multiple range test. Proximate analysis of moringa and black plum leaf meal were carried out using the standard procedure [9]. Cost benefit analysis was calculated using the following formula as outlined by Olabode., *et al*. [2].

- **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

Results and Discussion

Results of the performance characteristics of broiler birds fed supplemental levels of moringa and black plum leaf meal at starter phase is shown in Table 2. Birds in treatment 1 had a superior ($P < 0.05$) final body weight of 1321.90g which was similar ($P > 0.05$) to those of 1283.09g observed for birds in treatment 2. While,

Parameters	T1	T2	T3	T4	T5	SEM
Initial body weight (g)	159.17	160.84	161.25	159.59	160.42	
Final body weight (g)	1321.90^{a}	1283.09^{a}	1202.86^{b}	1204.29^{b}	1164.10^{c}	18.12
Body weight gain (g)	1162.73^{a}	1122.25^{b}	1041.61^{c}	1044.70^{c}	1003.68^{d}	15.71
Feed intake (g)	2029.38^{a}	1983.76^{b}	1964.69^{b}	1932.51^{c}	1940.94^{c}	9.88
Daily body weight gain (g)	55.37^{a}	53.44^{a}	49.60^{b}	49.75^{b}	47.79^{c}	0.96
Daily feed intake (g)	96.64^{a}	94.47^{a}	93.56^{a}	92.02^{b}	92.43^{b}	0.60
Feed conversion ratio	1.75^{b}	1.77^{b}	1.89^{a}	1.85^{a}	1.93^{a}	0.02
Cost of birds at day old (₦)	465.00	465.00	465.00	465.00	465.00	-
Cost of kg of feed (₦)	336.00^{a}	322.70^{b}	320.00^{b}	318.50^{b}	316.00^{b}	2.05
Cost of feed consumed (₦)	681.87^{a}	640.16^{b}	628.70^{b}	615.50^{c}	613.34^{c}	6.92
Other cost (expenses) (₦)	345.00	345.00	345.00	345.00	345.00	-
Total cost of production (₦)	1491.87^{a}	1450.16^{b}	1438.70^{c}	1425.50^{d}	1423.34^{d}	6.71
Revenue (₦)	2379.42^{a}	2309.56^{b}	2165.15^{c}	2167.72^{c}	2095.38^{d}	27.99
Benefit/Net profit (₦)	887.55^{a}	859.40^{b}	726.45^{d}	742.22^{c}	672.04^{e}	22.04
Cost benefit ratio	1.68^{b}	1.69^{b}	1.98^{a}	1.92^{a}	2.12^{a}	0.05

Table 3: Growth performance and cost benefit analysis of starter broiler birds fed supplemental levels of Moringa and Black plum leaf meal.

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

the least value of 1164.10g was observed in treatment 5. Birds in treatments 3 and 4 had similar ($P > 0.05$) values of 1202.86g and 1204.29g. The progressive decrease of final body weight across the group could be due to the inability of the birds to extract necessary nutrients like vitamin and minerals from the test ingredients for their growth. Also, it connotes that the bioactive substance in moringa and black plum could not support increase in body weight to a greater extend when compared to the control. The present study contradicts the findings of some researchers [8,10].

Who observed higher weight in birds fed *Vitex doniana* leaf meal-based diets. Also, other researchers observed higher body weight when dietary moringa leaf meal was used in broiler birds [11,12]. But, was similar to the findings of Olugbemi., *et al*. [13]. (2010), where they observed lower body weight in diets fortified with moringa leaf meal in broiler birds. Treatment effects showed that daily feed intake had superior ($P < 0.05$) value of 96.64g in treatment 1, which did not differ ($P > 0.05$) from the values of 94.47g and 93.56g obtained for daily feed intake in treatments 2 and 3. The least value of 92.02g was observed in treatment 4, which was similar ($P > 0.05$) to that of 92.43g obtained in treatment 5. There was a progressive decrease in the values obtained for daily feed intake across the treatment group. These could be due to the presence of anti-nutritional factors in the moringa and black plum leaves used during the research work. Similar observation was reported by Gakuya., *et al*. [14] who working with *Moringa oleifera* leaves in broiler birds noted a decreased feed consumption. Also, Olabode., *et al.* [2] observed decline in feed consumption across the treatment group when black plum leaf meal was used to fortify diet offered to broiler birds at starter phase. Better turnover of feed to meat was observed in treatment 1 with a value of 1.75 which was followed by birds in treatments 2 with 1.77, while those in treatments 5, 4 and 3 had values which were similar ($P > 0.05$) to each other with values of 1.93, 1.85 and 1.89. These results disagree with the report of Adeyina., *et al*. [15] who observed better performance in birds fed *Vitex doniana* based diet. Also, Atuahene., *et al*. [16] reported higher feed conversation efficiency where moringa leaf meal was used to fortify diets given to broiler birds. Data

obtained for cost benefit analysis revealed that there was significant ($P < 0.05$) effect of the test ingredient across the treatment group for cost of kg of feed, total cost of production, revenue, benefit and cost benefit ratio. While cost of day-old chick and operational cost were same across board. Superior ($P < 0.05$) value of #2379.42, #887.55 and 1.68 was obtained for revenue, benefit and cost benefit ratio in treatment 1. This report contradicts the report of Olabode., *et al*. [2] where they observed higher revenue and net profit when black plum leaf meal was used to fortify diet given to broiler birds.

Conclusion

It can be drawn from the research work that the inclusion of moringa and black plum leaf meal is viable in broiler birds at starter phase at the ratio of 1:4, 2:3, 3: 2 and 4:1 respectively as seen from the results obtained in the experiment with the best performance in treatment 1.

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