GROWTH PERFORMANCE AND FEED COST BENEFITS OF BROILER CHICKENS FED GRADED LEVELS OF BRIMSTONE (*Morindalucida* Benth.) LEAF POWDER AS DIETARY PHYTOGENIC ADDITIVE

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Abstract

The study determined the growth and feed cost benefits of broiler chickens fed graded levels of Morinda lucida leaf powder (MLP) using a total of 180 day-old broiler chicks (Arbor acre). They were weighed and randomly grouped into four dietary treatments of 3 replicates with 15 chicks each. The dietary treatments consisted of the control (basal diet), control+1g /kgMLP, control+2g/ kgMLP and control+3g/kgMLP diets. Body weights, feed intake and feed conversion ratio (FCR) of the birds were taken on a weekly basis and the feed cost benefits was calculated at the end of each experimental phase.The experiment was laid out in a completely randomized design and data obtained were subjected to one-way analysis of variance. Results obtained showed that inclusion of MLP at 1 and 2g/kg significantly increased ($p<0.05$) the final body weight at starter phase but had no effect ($p>0.05$) on finisher's final weight. Also, feed intake was significantly high ($p<0.05$) in birds on 1g/kgMLP (1528.43g) at starter phase but not significantly influenced ($p>0.05$) by MLP inclusion at finisher phase. FCR on the other hand was not significantly influenced ($p>0.05$) by MLP inclusion at the two phases of the experiment. Cost of feed per kg weight gain was significantly lowered ($p<0.05$) at the finishing phase in birds fed 1g/kg and 2g/kg MLP (₦364.50 and ₦353.48). Inclusion of MLP at 1 and 2g/kg improved feed cost benefit of broiler chickens at finishing phase with no deleterious effect on growth performance.

Keywords: Broilers, Performance, *Morinda lucida*, Starter, Finisher

Introduction

The use of phytogenic additives in poultry production has produced encouraging results that has helped researchers to discover various plant materials that perform various actions like growth stimulation, gut modulation, antibacterial and anti-inflammation. Researchers who reported improved growth performance and cost benefit of poultry birds to phytogenic additives attributed their findings to interaction of phytogenics with intestinal microflora (Lin, 2011), stimulatory effects of phytogenic substances on digestive secretions which result in increase in digestion efficiency (Platel and Srinivasan, 2004) as well as increased feed intake due to improvement in the dietary palatability resulting from the enhanced flavour or odour, emanating from the essential oils present in the plant materials used (Frankic *et al.*, 2009). However, major challenges being faced in the use of phytogenic additives is the determination of the exact quantity of the plant materials to be used to achieve the targeted objective. *Morinda lucida* is an important medicinal plant in African traditional medicine and has been reported to contain important phytochemicals that improve performance (Oduola *et al*., 2010).

The study investigated the growth performance and feed cost benefit of broiler chickens fed graded levels of Brimstone (*Morinda lucida* Benth) leaf powder as phytogenic additives in the diets.

Materials and Methods

Preparation of the test ingredient

Morinda lucida leaf sourced from Emere village, Camp, Abeokuta, Ogun State, Nigeria was properly identified at the Department of Forestry, Federal University of Agriculture, Abeokuta, Nigeria. The harvested leaves were washed, air dried under shade for 2 weeks until the moisture content was below

10% and greenish colour retained, milled into powdery form, sieved using 0.10 mm sieve and stored separately in air tight bag inside a refrigerator till time of use.

Experimental birds and management

The feeding trial was carried out at Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. One hundred and eighty day-old chicks (Abor acre) were purchased from a reputable hatchery in Ibadan, Oyo State, Nigeria. On arrival, the initial weight of the birds were taken and randomly allotted into 4 experimental treatments of 45 birds each. Each treatment group was replicated thrice to have 15 chicks per replicate. The birds were all subjected to standard routine management during the brooding and rearing stages of the experiment. Feeds and water were provided to the birds *ad libitum*. The birds were raised in a standard deep litter poultry pen.

Experimental diets and design

Four different diets were formulated such that the control treatment groups were fed diet containing 0% inclusion level of *M. lucida* leaf powder (MLP) while experimental birds in the second, third and fourth treatment groups received diets containing 1, 2 and 3 g/kg feed *M. lucida* leaf powder (MLP) respectively. The experiment was laid out in a completely randomized design. The gross composition of the experimental diets was shown on Table 1.

Table 1: Gross composition (%) of the experimental diets for starter and finisher phases.

Ingredients	**Starter** (0-4 weeks)	**Finisher** (4-8 weeks)
Maize	52.00	57.00
Wheat Offal	3.00	6.00
Groundnut Cake	17.00	21.00
Soyabean Meal	20.00	9.00
Fishmeal (72% CP)	3.00	2.00
Bone Meal	2.50	2.50
Limestone	1.50	1.50
Common salt	0.25	0.25
DL-Methionine	0.30	0.30
L-Lysine	0.20	0.20
Vit-Min Premix*	0.25	0.25
Total	**100.00**	**100.00**
Determined Analysis		
Crude Protein (%)	23.92	21.39
ME (kcal/kg)	2916.38	2924.18
Ether Extract (EE) (%)	4.04	4.13
Crude Fibre (CF) (%)	3.48	3.43

Data collection

Growth performance

Weekly data was collected for growth parameter indices using the following formula:

$$\text{Weight gain per bird (g)} = \frac{\text{Final weight (g)} - \textit{Initial weight (g)}}{\text{Number of birds}}$$

$$\text{Feed intake per bird (g)} = \frac{\text{Feed suppl ied (g)} - \text{Feed leftover (g)}}{\text{Number of birds}}$$

$$\text{Feed conversion ratio} = \frac{\text{Amount of feed consumed (g)}}{\text{Weight gain (g)}}$$

Feed cost benefit

The feed cost benefit analysis was based on the methods of Anigbogu *et al.* (2010). The formula used for calculating cost benefit parameters includes;

$$\text{Cost of feed/kg (₦/kg)} = \frac{\text{Total cost of feed (₦)}}{\text{Quantity of feed (KG)}}$$

Cost of feed consumed/kg weight gain = feed conversion ratio X cost of feed per kg

Cost of feed intake = quantity of feed consumed (kg) X cost of feed per kg (₦)

Statistical Analysis

Data obtained from the study were subjected into One-way Analysis of Variance (ANOVA) in a Completely Randomized Design using the GLM procedure of statistical analysis software SAS® version 2013. Significant differences among treatment means were determined using Duncan Multiple Range Test (DMRT) as contained in the SAS® software.

Results and Discussion

As shown in Table 2, Feed intake of the birds at the starting phase of the experiment was significantly increased ($p<0.05$) in birds fed 1g/kg and 2g/kg MLP (1528.43 and 1421.40g) respectively and this manifested in the final body weight of the birds too as the birds on 1g/kg and 2g/kg MLP recorded the highest values (820.89 and 765.18g) for final body weight gain at the starting phase of the experiment. The increment in feed intake could be attributed to improved taste of the diet (Windisch *et al*., 2008) and low concentration of antinutritional content of the plant in the 2 inclusion levels. This observation corroborates the report of Muhammad et al. (2014). Also, the stimulatory effect of the phytogenic additives on the appetite and endogenous secretions in the digestive system of the birds which in turn improve the feed utilization (Wenk, 2002) could be related to the improved final body weight gain of the birds on 1g/kg and 2g/kg MLP at starting (820.89 and 765.18g) and finishing (2073.70 and 1990.80g) phases of the experiment. Similarity in feed intake recorded at the finishing phase corroborates the report of Amouzmehr *et al.* (2013), Bushra (2011) and Fadlalla *et al.* (2010).

Cost of feed consumed by birds on 1g/kg and 2g/kgMLP diets (₦233.70 and ₦217.76) were respectively high ($p<0.05$) at the starting phase but not significantly different at the finishing phase. Also, cost of feed per kg weight gain at finishing phase was lowest in birds on 1g/kg and 2g/kg MLP (₦364.50 and ₦353.48) when compared to other dietary treatments. This could be attributed to good feed utilization by the birds on 1g/kg and 2g/kg MLP diets.

Table 2: Growth performance and feed cost benefits of broiler chickens fed *Morinda lucida* leaf powder (MLP) at starting and finishing phases.

Parameters	Control	1g/kgMLP	2g/kgMLP	3g/kgMLP	SEM	**P-value**
Total feed intake (g)						
Starter	1226.94^{c}	1528.43^{a}	1421.40^{b}	1253.20^{c}	38.89	<0.0001
Finisher	3358.80	3644.30	3452.70	3535.60	98.87	0.821
Feed conversion ratio						
Starter	1.99	1.96	1.97	2.09	0.04	0.676
Finisher	3.03	2.91	2.82	3.56	0.11	0.065
Body weight (g)						
Starter	659.39^{b}	820.89^{a}	765.18^{a}	640.74^{b}	25.61	0.007
Finisher	1780.50^{ab}	2073.70^{a}	1990.80^{a}	1635.30^{b}	63.74	0.026
Cost of feed/kg (₦)						
Starter	152.60	152.90	153.20	153.50	-	-
Finisher	124.90	125.20	125.50	125.80	-	-
Cost of feed consumed (₦)						
Starter	187.23^{c}	233.70^{a}	217.76^{b}	192.37^{c}	5.97	<0.0001
Finisher	417.51	456.26	433.32	444.78	12.46	0.807
Cost of feed per kg live weight gain (₦/bird)						
Starter	303.42	299.91	301.65	320.70	5.89	0.636
Finisher	378.51^{a}	364.50^{b}	353.48^{b}	447.67^{a}	14.46	0.059

SEM- Standard error of mean; MLP – *Morinda lucida* leaf powder

Means on the same column having different superscript differ significantly at $P < 0.05$

Conclusion and Recommendation

It can be concluded that inclusion of MLP at 1g/kg and 2g/kg diet posed no deleterious effect but improved performance and cost benefits of broiler chickens at starting and finishing phases. The use of MLP at either 1g/kg or 2g/kg is therefore recommended for improved growth performance and feed cost effectiveness of broiler chickens.

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