PERFORMANCE OF BROILER CHICKENS FED SUPPLEMENTED LEVELS OF DRY GUAVA (*Psidium guajava*) LEAF MEAL AS A PHYTOGENIC ADDITIVE IN POULTRY PRODUCTION

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ABSTRACT
The study was designed to investigate the effects of dietary levels of Dried Guava Leaf Meal (DGLM) on growth production performance indices. 180 unsexed day-old broiler chicks with average weight of 40 g. The birds were divided and randomly allotted to four treatment groups of three replicates with each replicate containing 15 chicks in a Completely Randomized Design (CRD). The dietary treatment comprised of control (basal diet without guava leaf meal supplementation (0 g/100kg DGLM)) and those with 450g/100kg DGLM, 500 g/100kg DGLM and 550g/100kg DGLM diet. Data were collected on growth performance (body weight, feed intake and feed conversion ratio). The growth performance data collected were subjected to One-way Analyses of Variance and significant, means were separated using Duncan Multiple Range Test of SPSS version 22 software packages. The results showed that final weight gain was not significantly (p>0.05) different across the treatments. Daily feed intake was not significantly (p>0.05) affected by Dried Guava Leaf Meal. Feed conversion ratio reduced with increase in Dried Guava Leaf Meal supplementation but showed no significant differences (p>0.05). The results revealed that there was no significant (p>0.05) difference among the dietary treatments in all the parameters measured. It can be concluded that dried guava leaf meal does not have detrimental effect on the performance of broiler chicken.
Keywords: Performance, Broilers, Guava leaf meal, Supplementation, Phytogenic.

INTRODUCTION

Broiler chicken production is a fundamental aspect of the global agricultural worldwide (Singh *et al*., 2022). It contributes to the majority of meat consumption in Nigeria and other countries. However, the production of broiler chicken is constrained by scarcity of feedstuffs and high cost of conventional feedstuffs such as maize and Soybean s (Daing *et al*., 2020). The challenge of feedstuffs at economic prices in developing countries of the world has compelled animal nutritionists to intensify research into alternative feed sources and additives to reduce cost of animal production (Calvelo *et al*., 2014). One of such additives is dried guava leaf meal. Guava (*Psidium guajava*) is a common small tropical tree growing up to 35 feet in length, its cultivation is higher in the tropics with its fruit as the main product of consumption. The plant have been used for a long time for its medicinal value and also have higher applications of its leaves as phytogenics (Nwinyi *et al*., 2008). The chemical analysis reveals that guava foliage volatile oils obtained were -pinene (11.77%), 1, 8-cineol (9.22%), globular (5.88%), hexenal (5.03%), epi-bisabolol (10.85%), 1-epi-cubenol (4.56%) and terpipineol 4.35% (Ramadan *et al*., 2009). Guava leaves are rich in tannins, phenols, flavonoids, essential oils, lectins, vitamins, and fatty acids. (Geidam *et al.*, 2007). Much of the guava leaf's medical activities is attributed to flavonoids. The flavonoids have demonstrated anti-bacterial activity. The objective of this study therefore is to determine the performance of broiler chickens fed supplemental levels of dry guava (*psidium guajava*) leaf meal as a phytogenic additive in their diet.

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of University of Calabar, Animal Science Research Farm Calabar, Nigeria. Calabar is located at 4.9517^0 latitude and 8.322^0 longitude with an average elevation of 42 metres. Calabar has an average temperature of 25.8 ℃ with average rainfall of 3,306.00 mm per annum and relative humidity of 91.18% (Nigerian Meteorological Agency, 2024). Fresh tender leaves of guava were collected from different location in Calabar. Tree leaves of guava were shade-dried for 2-3 days. After drying they were milled in the farm hammer mill. For formulation and preparation of basal diets, all feed ingredients were purchased from local market of Calabar except DGLM, which was processed manually. DGLM was mixed manually with basal diet at the rate of 450 g/100kg DGLM, 500 g/100kg DGLM and 550 g/100kg DGLM, respectively to constitute experimental treatments while 0 g/100kg DGLM served as control. The ingredient composition of the experimental diets is shown in Table 1. A total of 180-day old unsexed broiler chicken from Gabty Agric Services with average weight of 40g were randomly allotted in to four (4) dietary treatments in a Completely Randomized Design (CRD) with 45 birds per treatment, with each treatment having 3 replicated and 15 birds per replicate. From day old, the experimental birds were fed *ad-libitum* in two phases; the starter diet for four weeks and finisher diet for another four weeks and managed under the deep litter system of management.

Cost analysis was carried out by the end of the experiment and the gross margin analysis was conducted to determine the profitability or otherwise of using dry guava leaf meal (DGLM). All data collected was subjected to a one-way Analysis of variance (ANOVA) in a Completely Randomized Design (CRD). Significant means were separated using Duncan's Multiple Range Test of SPSS version 22 software packages.

Table 1: Ingredients composition of starter and finisher broiler chicken diets using guava (*Psidium guajava*) leaf meal as phytogenic additives

Ingredient	Starters (kg)	Finisher (kg)
Maize(yellow)	43.54	53.16
Soybean	35.17	27.47
Wheat offal	5.00	5.00
Palm kernel cake	3.00	3.00
Blood meal	5.86	4.58
Fish meal	2.93	2.29
Bone meal	2.50	2.50
Lime stone	1.00	1.00
Salt	0.25	0.25
Vitamin/mineral premix	0.25	0.25
Lysine	0.25	0.25
Methionine	0.25	0.25
Total	100.00	100.00
Calculated Analysis:		
ME (Kcal/Kg)	3049.00	3033.82
Crude protein (%)	23.00	19.50
Crude fibre (%)	3.31	3.20
Calcium (%)	2.68	1.81
Phosphorus (%)	2.97	2.50

RESULTS AND DISCUSSION

The results of growth performance indices and economics of production of birds fed supplemental DGLM as phytogenic additive is shown in Table 2. The result showed that all parameters were not significantly ($p>0.05$) influenced by dietary treatments. The final body weight and average daily weight gain (1956.11g and 34.21g) for birds fed dietary treatment supplemented with 550g DGLM/100kg ration were numerically ($p>0.05$) higher than those fed diets supplemented with 0g DGLM, 450g DGLM and, 500 g DGLM/100kg of experimental ration. The average daily feed intake of all the treatments were also statistically similar ($p>0.05$) across the treatments. The results further showed that the FCR of 2.14, Benefit cost ratio (BCR) of 1.17, cost of feed consumed of ₦ 3704.15, feed cost (₦)/kg weight gain of ₦ 2055.28 recorded in 550g/100kg were not significantly ($p>0.05$) better than those for birds fed control, 450g and 500g of DGLM/kg of feed.

The mean final body weight and the mean body weight gain increased with corresponding increase in the level of dietary supplementation with DGLM up to 550g/100kg basal diet. This is an indication that broiler chickens could tolerate this level of DGLM in their basal diet. The body weight range of 1638.58 to 1916.11 g obtained in this study is lower than the body weight gain of 2106 to 2362 g reported by Adeyemi *et al*. (2022) who fed dietary supplementation of Guava leaf, Oxytetracycline, and Tert-Butylhydroxytoluene. The observed body weight gains met the expected broiler performance as indicated by Doughari, (2012). This result is in variance with the findings of Sadeghi *et al*. (2004) and Abang *et al*. (2023) who reported significant mean final body weight and mean body weight gain increase as the level of dietary DGLM supplementation increased. The findings however agree with that of Banerjee *et al*. (2013) who reported that there were no significant ($p > 0.05$) differences across dietary treatments in mean final body weight and mean body weight gain when broiler birds were fed diets containing guava leaf meal. The variance in the effects of these phytogenic additives could be attributed to differences in methodology, stage of harvest and the level of inclusion (Mahmoud *et al*., 2013). Feed intake was not affected by DGLM and there was no significant difference ($p>0.05$) across treatment groups. This observation corroborates the earlier reports of Banerjee *et al*. (2013). The birds fed 550g of DGLM per 100kg basal diet had better FCR ($p>0.05$) than the other groups. FCR depends on two major factors; growth rate and feed intake and both are affected by the quality of the diet (Mahmoud *et al*., 2013). The improvement in growth performance even though not significant may be due to the ability of phytochemicals in guava leaf to stimulate the activities of digestive enzymes and synthesis of bile acids, which enhance nutrient digestibility and ultimately improved body weight gain (Hashemi *et al*. 2010). The treatment group fed diet supplemented with 550 g DGLM/100 kg basal diet had

a better ($p<0.05$) feed cost ₦/weight kg gain than the other groups. This could be due to better FCR and final weight gain. It can be concluded that guava leaf meal up to 550g /100kg dietary supplementary inclusion level had no detrimental effects on feed consumption and performance.

Table 2: Growth Performance and Economics of Production of Birds Fed Supplemental DGLM as Phytogenic Additive

Parameters	Supplementation Levels of Guava Leaves Meal (g/kg)				SEM
	0g DGLM	450g DGLM	500g DGLM	550g DGLM	
Initial weight (g/b)	40.00	40.00	40.00	40.00	0.00
Final weight (g/b)	1795.61	1678.58	1815.40	1956.11	79.29
Total weight gain (g/b)	1755.61	1638.58	1775.40	1916.11	79.29
Av. daily weight (g/b)	31.35	29.26	31.70	34.21	1.41
Total feed intake	4188.82	3999.70	3901.16	3858.49	83.19
Daily feed intake	74.80	71.42	69.66	68.90	1.48
Feed conversion ratio	2.43	2.44	2.20	2.14	1.12
Benefit cost ratio	1.16	1.05	1.11	1.17	0.04
Cost of feed consumed (₦)	4021.27	3839.72	3745.12	3704.15	79.87
Cost/Kg of feed (₦)	960.00	960.00	960.00	960.00	0.00
Cost (₦)/Kg weight gain	2337.87	2345.45	2113.56	2055.28	116.04
Total variable cost (₦)	5400.00	5550.00	5700.00	5850.00	50.56
Total Revenue (₦)	6284.62	5875.03	6353.91	6846.38	277.51
Total cost of production	5455.00	5605.00	5755.00	5905.00	50.56
Gross Margin (₦)	884.62	325.03	653.91	996.38	268.69
Body weight (kg)	1.79	1.67	1.81	1.95	0.07

SEM: Standard error of mean (SEM) g/b: grams per bird, DGLM: Dried guava leaf meal

CONCLUSION

The results revealed that there was no significant ($p>0.05$) difference among the dietary treatments in all the parameters measured. It can be concluded that dried guava leaf meal does not have detrimental effect on the performance of broiler chicken.

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