

EFFECT OF SUPPLEMENTED GINGER MEAL AS PHYTOBIOTIC FEED ADDITIVE ON THE GROWTH PERFORMANCE OF FINISHED BROILER CHICKENS

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ABSTRACT

A 28-day experiment was carried out to examine the effect of supplemented ginger meal (GM) as phytobiotic additive in the diets of broiler finisher chickens in terms of feed intake, weight gain and feed conversion ratio. A total of 96(4-weekold) broiler chickens were assigned randomly to 4 dietary treatments each replicated thrice (8 birds per replicate). Four experimental diets were formulated with the control (D1) without GM (0%). Bird's group on diets D2, D3 and D4 were fed with GM supplemented at 0.1, 0.2 and 0.3% levels, respectively. The feed intake of birds on 0.2% diet was significantly ($P<0.05$) higher compared to birds on 0, 0.1 and 0.3% diets. Birds on 0.1 and 0.3% diets had similar ($P>0.05$) feed intake but significantly ($P<0.05$) lower compared to control. The weight gain of birds on 0.2% diet was significantly ($P<0.05$) higher compared to those on 0, 0.1 and 0.3% diets. The weight gain of birds on 0.1 and 0.3% diets were similar ($P>0.05$) but significantly ($P<0.05$) lower compared to control. Feed conversion ratio (FCR) of birds on 0.2% was better ($P<0.05$) compared to those on 0, 0.1 and 0.3% diets. The FCR of birds on 0.1% and 0.3% diets were similar ($P>0.05$) but significantly ($P<0.05$) lower compared to the control diet. Feed cost (₦) per kg gain increased with increased level of GM supplementation in the diets. It is concluded that the feeding of broiler finisher chickens with GM supplemented at 0.2% improves performance and can be a viable alternative to antibiotic feed additives in the diets of broiler finisher chickens.

Keywords: Antibiotic; finished broiler; ginger meal; weight gain; phytogenic additive

INTRODUCTION

The use of in-feed antibiotics in many countries has been confirmed in recent years, and this has fueled the interest for the search and use of alternative products. The focus of numerous researchers today, is therefore, on a group of natural growth promoters or non-antibiotic growth promoters used as feed additives known as “phytobiotics”, which have been known to potentially improve animal performance (Jacela *et al.*, 2010). Phytobiotics or phytogenics aside from having antimicrobial activity have been identified to provide ant-oxidative effects, enhance palatability, improve gut functions or promote growth (Murugesan *et al.*, 2015). Karangiya *et al.* (2016) observed significant improvement in both feed intake and body weight gains of broiler chickens when ginger and garlic were fed at 1% level of inclusion in the diet compared to the control at finisher phase. Tekeli *et al.* (2011) observed improved body weight gain in broiler chickens when ginger (*Z. officinale*) was fed at the rate of 120, 240, and 360 ppm. The objective of this study was to examine the effect of ginger meal fed as phytobiotic feed additive on the overall performance of broiler chickens at the finishing phase.

MATERIALS AND METHODS

Experimental site

The research was conducted at the Poultry Unit of the Teaching and Research Farm, College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna (11° 10' N, 07° 03' E with elevation of 632m above sea level). Mando has an average rainfall of 1200mm with 95% falling between April and October; and is located in the Northern Guinea Savannah Zone of Nigeria (Google maps, 2023).

Experimental birds and dietary treatments

In a four (4)-week feeding trial, the performance of broiler finisher birds was determined where ginger meal was supplemented in the diets of broiler chickens as phytobiotic feed additive during the finisher phase. There were four iso-nitrogenous (20% CP) and iso-caloric diets formulated for broiler chicken finishers as follows; Diet 1, the control (0%) was without ginger meal. Diet 2 (D2) contained ginger meal at 0.1% level. Diet 3 (D3) had ginger meal at 0.2% level while Diet 4 (D4) contained ginger meal at 0.3% level of inclusion.

Broiler finisher phase (5-9 weeks)

For a finisher phase, a total number of ninety-six (96) mixed sex broiler chickens, four weeks of age were used for the experiment. They were allotted into four treatments of three replicates each containing eight (8) birds. The diets were also randomly allocated into the broiler pens placed on concrete floor with wood shavings serving as litter materials. The ingredient (%) composition of the finisher diets is as shown in Table 1.

Table 1: Ingredient composition (%) of broiler chickens fed supplemented ginger meal at finisher phase (5-9 weeks)

	Diets			
	D ₁ (0%) Ginger	D ₂ (0.1%) Ginger	D ₃ (0.2%) Ginger	D ₄ (0.3%) Ginger
Maize	55.00	55.00	55.50	55.50
Maize offal	8.00	8.00	8.00	8.00
GNC	18.00	18.00	18.00	18.00
SBC	8.50	8.50	8.50	8.50
Fish Meal	6.00	6.00	6.00	6.00
Bone Meal	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00
Methionine	0.25	0.25	0.25	0.25
*Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Palm oil	0.75	0.75	0.75	0.75
Total	100.00	100.00	100.00	100.00
Ginger	0.00	0.10	0.20	0.30
Calculated Nutrients				
Crude Protein, %	20.29	20.30	20.31	20.30
ME.Kcal./Kg	3000.64	2987.54	2977.54	2884.14
Ether extract, %	4.48	4.48	4.48	4.48
Crude Fibre, %	4.40	4.40	4.40	4.40
Calcium, %	1.28	1.28	1.28	1.28
Available P, %	0.64	0.64	0.64	0.64
Lysine, %	1.10	1.10	1.10	1.10
Methionine + Cys, %	0.78	0.78	0.77	0.78
Feed cost ₦/Kg gain	324.00	577.90	831.13	1084.30

*Vitamin/Mineral Premix (Agridom Premix) supplied per kg of feed. Vit.A 30,000,000 i.u., Vit. D 60,000,000 i.u., Vit. E 30,000 i.u., Vit. B123,000.00mg, Vit. C 30.00g, Niacin 40,000.00mg, Pantothenic acid 12,000.00mg, Vit. B₆ 1,500mg, Vit. B₁₂ 10,000.00mg, Folic acid 1,000.00mg, Biotin 400.00mg, Chloride 3,000,000.00mg, Cobalt

The experimental birds on D1 were fed with a conventional formulated diet (without ginger), while birds on D2, D3, and D4 diets were fed with formulated diets supplemented with 0.1, 0.2, and 0.3% ginger meal, respectively. The birds were provided with feed and water *ad-libitum*. Feed quantities were weighed and given daily, while leftover feeds were collected and weighed. The initial weights of birds were taken at the commencement of the experiment and at weekly intervals. The records of feed intake (FI) and mortality were kept. Also, feed conversion ratio (FCR), average daily gain and feed cost per kg gain were calculated for the birds.

Data Evaluation

Data amassed were subjected to analysis of variance procedure (ANOVA-Single factor) using “Analyse-it” for Microsoft Excel (3.03) Standard. Significant means were separated using the Duncan Multiple Range Test (Duncan, 1995) taking $P < 0.05$ as level of significance.

RESULTS AND DISCUSSION

The effect of nutritional supplementation of ginger meal on the performance of finished broiler chickens is presented in Table 2.

Table 2: Performance of Broiler birds fed supplemented ginger meal diets at finisher phase (5-9 weeks)

Parameter	Diets				SEM
	D1	D2	D3	D4	
	(0%) Ginger	(0.1%) Ginger	(0.2%) Ginger	(0.3%) Ginger	
Average initial weight (g/bird)	700.10	700.60	700.10	700.10	24.92
Average final weight (g/bird)	1500.00 ^b	1400.00 ^c	1600.00 ^a	1420.00 ^c	45.46
Weight gain (g/bird)	799.90 ^b	699.40 ^c	900.00 ^a	719.90 ^c	26.51
Average daily gain (g/bird)	28.60 ^b	25.00 ^c	32.18 ^a	25.80 ^c	0.93
Total feed intake (g/bird)	3712.10 ^b	3481.80 ^c	4111.80 ^a	3488.80 ^c	147.74
Daily feed intake (g/bird)	132.58 ^b	124.35 ^c	146.85 ^a	124.60 ^c	5.28
Feed to gain ratio	4.64 ^b	4.97 ^c	4.56 ^a	4.88 ^c	0.10
Feed Cost (₦)/kg gain	324.00 ^d	577.90 ^c	831.13 ^b	935.80 ^a	25.61
Mortality (%)	0.00	0.00	0.00	0.00	0.00

^{abcd}Means within rows with different superscript differ significantly (P<0.05). SEM = Standard Error of Mean, D= diets, g = gram, kg = kilogram

Feed intake and weight gain (g/bird)

The FI of birds on 0.2% diet was significantly (P<0.05) higher compared to birds on control (0%), 0.1 and 0.3% diets. The FI of birds on 0.1 and 0.3% diets were similar (P>0.05) but significantly (P<0.05) lower compared to the control diet. The positive effect on feed intake or broiler chickens observed in this study could be as a result of improvement in palatability associated with ginger meal supplementation. Tekeli *et al.* (2011) reported that 240ppm of *Z. officinale* fed to birds had significant effect on feed consumption compared to birds fed the control diet. On the contrary, Onu (2010) observed that the addition of ginger meal at 0.25% in the basal diet of broiler chickens did not have any effect on feed intake. The daily weight gain of birds on 0.2% diet was significantly (P<0.05) higher compared to those on 0, 0.2 and 0.3% diets. The weight gains of birds on 0.1 and 0.3% diets were similar (P>0.05) but significantly (P<0.05) lower compared to the control diet. Onu (2010) observed significant increase in body weight gains on addition of 0.25% of ginger meal to the diet of broiler chickens while Zhang *et al.* (2009) reported non-significant difference for average daily gains in broiler chickens fed ginger meal at the rate of 5g/kg.

Feed conversion ratio (FCR)

The FCR of birds on 0.2% diet was significantly (P<0.05) the best when compared to birds on other diets. The FCR of birds on 0.1 and 0.3% diets were similar (P>0.05) but significantly (P<0.05) lower to that of birds on the control diet. The reason for better performance of broiler birds on supplemented ginger meal diets over the control (0%) has been attributed by researchers to improvement in palatability and the quick digestive effect of ginger (Khan *et al.*, 2012) as well as the effect of two enzymes (protease and lipase) that are associated with ginger (Herawati, 2010).

Feed cost (₦) per kg of broiler produced

Feed cost (₦) per kg gain increased with increased level of ginger meal in the diets as a trend. This was expected due to the high cost of fresh or dried-ginger rhizomes in the Nigerian market. Feed cost (₦) per kg gain for birds on 0.3% diet was significantly (P<0.05) the highest compared to those for birds on 0, 0.1 and 0.2% diets. There was no mortality recorded nor toxic characteristics observed among birds across the different dietary treatments throughout the finishing period. This is at variance with the report of Herawati (2010) that broilers, when fed diets containing 0.5, 1.0 and 1.5 % red ginger, exhibited edema, necrosis and inflammation in the muscles.

CONCLUSION

The results obtained in this study showed that GM supplementation at 0.2% in the diets of broiler finisher chickens resulted in significant improvement in daily weight gain, and better feed conversion compared to birds on other diets. It is concluded that ginger meal when added at 0.2% improves performance and can be a viable alternative to antibiotic feed additive in the diets of broiler finisher chickens.

RECOMMENDATION

For better performance in terms of feed conversion and weight gain without fear of any toxic effect, the supplementation of ginger meal as a phytobiotic agent at the rate of 0.2% in the diet of broiler finisher chickens is most suitable.

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