

EFFECT OF DIETARY SUPPLEMENTATION OF GINGER, GARLIC AND GINGER PLUS GARLIC ON THE GROWTH PERFORMANCE OF BROILER STARTER CHICKENS

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ABSTRACT

The study was conducted to determine the effect of dietary supplementation of ginger, garlic and their mixture on performance of broiler chicks at starter phase. 120, 7-days-old broiler chicks were randomly assigned to four diets replicated thrice with 12 chicks per replicate. Four experimental diets were formulated. The control diet (D1) contained neither ginger nor garlic, while diets D2, and D3 contained 1% ginger and 1% garlic respectively. Diet D4 contained a mixture of 1% ginger and 1% garlic. The parameters measured in a 28 days feeding experiment include: feed intake (FI), weight gain, feed conversion ratio (FCR), and feed cost (₦)/kg. FI of birds on diets D1, D2, D3 and D4 differ significantly ($P < 0.05$). Birds on garlic diet (D3) had significantly ($P < 0.05$) the highest FI compared to those on control and other diets. The weight gain (g/bird) of birds across the dietary treatments differ significantly ($P < 0.05$). Superior ($P < 0.05$) weight gain was observed with birds on ginger diet compared to control, D3 and D4 diets. FCR for bird on control, D2 and D3 diets were similar ($P > 0.05$) but significantly lower compared to D4 diet. The feed cost (₦)/kg for birds on ginger supplemented diet was significantly ($P < 0.05$) lower than that for birds on D3 and D4 diets. It is concluded from the study that supplementation of ginger at 1% in the ration of broiler starter, gave the best performance in terms of weight gain and can serve as a potential substitute for antibiotic growth promoters in the rations of broiler starters.

Key words: Broiler chickens, body weight, feed intake, garlic, ginger and starter diets,

INTRODUCTION

A variety of dietary additives for enhancing nutritional value of feed for broiler chickens to improve performance are in use today. The use of spices as additives in the diets of broiler chickens are very common. Antibiotics have been the most routinely useful feed additives. But nowadays, the use of antibiotics is not only limited, but also have been banned in many countries for reasons like; alteration of gut microbacteria and bacteria drug resistance in humans (Karangiya *et al.*, 2016). These have no doubt caused a lot of diminished interest on poultry meat in most communities, as such phyto-genic feed additives such as herbs and spices are being incorporated into the diets of swine and poultry for the improvement of growth performance (Cullen *et al.*, 2008). Ginger and Garlic have been reported as natural growth promoters and as potential alternatives to common artificial growth promoters like antibiotics (Demi *et al.*; 2003). The ability of ginger to stimulate digestive enzymes and have an impact on microbial activity in broilers was reported by Dieumou *et al.* (2019). Garlic (*Allium sativum*) as a spice has been put to use as a native medicine for decades. Its antibacterial, antifungal, antiviral antioxidant, anticancer, and vasodilator characteristics were reported by Hanieh *et al.* (2010). Different supplemental levels of ginger and garlic have been tried in the diets of birds by researchers, but most consistent results were obtained at about 1% level. The strong stimulating effect on the immune and digestive system in birds by ginger and garlic supplements in broiler chickens have been reported by Al-Shuwaili *et al.* (2015), while Karangiya *et al.*, (2016) observed superior performance of birds on garlic supplementation in comparison to birds on ginger and combination of garlic and ginger. The objectives of this experiment were to determine the effect of ginger, garlic and their mixture on the performance of broiler starter chickens

MATERIALS AND METHODS

Experimental site

The research was conducted at the Poultry Unit of Teaching and Research Farm of College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna (11° 10' N, 07° 38' E with elevation of 632m above sea level). An average rainfall of 1200mm with 95% falling between April and October. Mando is located in the Northern Guinea savannah Zone of Nigeria (Google maps, 2023).

Sources and processing of ginger and garlic into powder

The grounded ginger and garlic used in this study were procured raw from Kawo market, Kaduna. The raw ginger and garlic were then cut into smaller pieces separately with a pen knife and dried adequately in the sunlight. Furthermore, for the purpose of the experiment the dried ginger and garlic were grounded finely and passed through a sieve (1mm).

Experimental birds and dietary treatments

In a four (4)-week feeding trial, the performance of broiler starter birds was determined where ginger and garlic were fed to the birds singly and in combination during the starter phase. There were four iso-nitrogenous (23% CP) and iso-caloric diets formulated for broiler starter as follows;

Diet 1 (D1): Control (0%) diet, without ginger and garlic meal

Diet 2 (D2): Contained only ginger at 1% supplementation

Diet 3 (D3): Contained only garlic at 1% supplementation

Diet 4 (D4): Contained the mixture of ginger and garlic at 1% supplementation each.

Table 1. Ingredient composition (%) of broiler chicks fed with supplemented ginger, garlic and ginger plus garlic meal at starter phase (1-5weeks)

Ingredients (Kg)	Diets			
	D ₁ Control	D ₂ Ginger	D ₃ Garlic	D ₄ Ginger plus Garlic
Maize	49.00	49.00	49.00	49.00
Maize offal	10.00	10.00	10.00	10.00
BDG	2.00	2.00	2.00	2.00
GNC	26.00	26.00	26.00	26.00
Fish Meal	9.00	9.00	9.00	9.00
Limestone	2.00	2.00	2.00	2.00
Bone Meal	1.00	1.00	1.00	1.00
Lysine	0.25	0.25	0.25	0.25
Methionine	0.20	0.20	0.20	0.20
*Premix	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30
Ginger	-	1.00	-	1.00
Garlic	-	-	1.00	1.00
Total	100.00	101.00	101.00	102.00
Calculated Analysis				
Crude Protein, %	23.82	23.88	23.89	23.90
ME.Kcal./Kg	2928.10	2928.14	2928.14	2928.00
Ether extract, %	5.71	5.71	5.71	5.71
Crude Fibre, %	3.65	3.68	3.67	3.70
Calcium, %	2.28	2.28	2.28	2.28
Available P, %	0.54	0.54	0.54	0.54
Lysine, %	1.10	1.10	1.10	1.10
Methionine + Cys, %	0.66	0.66	0.66	0.66
Cost ₦/Kg	116.60	120.60	125.08	129.08

*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. B₁₂ 3,000.00mg, 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

Broiler Starter phase (1-5 weeks)

Seven (7)-days old 120 broiler chicks were used for the experiment. Randomly, the birds were allocated to 12 pens in groups of 12 chicks per pen. Each of the four diets group was replicated thrice

(3 times). The diets were also randomly allocated into the broiler pens placed on concrete flooring with wood shavings as litter materials. The experimental birds on D1 were fed with a conventional formulated diet (without ginger and garlic), while birds on D2, D3, and D4 diets were fed with formulated diets supplemented with 1% ginger, 1% garlic and a mixture of 1% ginger and 1% garlic respectively.

The birds were provided with feed and water *ad-libitum*. Feed quantity were weighed and given daily, while leftover feeds were collected and weighed. The birds were weighed at the commencement of the experiment and at weekly intervals. The record of feed intake (FI) and mortality were kept. While feed conversion, average daily gain and feed cost per kg gains were calculated for the experimental period.

The ingredients (%) composition of the starter diets is as shown in Table 1.

Data Analysis

Data collected 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 significance level.

Results

Table 2. Performance of Broiler birds fed supplemented ginger, garlic and ginger plus garlic diets at starter phase (1-5 weeks)

Parameter	Diets				SEM
	D1	D2	D3	D4	
Average initial weight (g/bird)	145.32	145.37	145.30	145.33	0.03
Average final weight (g/bird)	510.34 ^c	553.33 ^a	534.00 ^b	497.00 ^d	5.85
Weight gain (g/bird)	568.97 ^c	410.00 ^a	387.33 ^b	339.00 ^d	5.48
Average daily gain (g/bird)	13.81 ^c	14.64 ^a	13.83 ^b	12.10 ^d	0.20
Total feed intake (g/bird)	469.67 ^c	478.00 ^b	487.24 ^a	450.33 ^d	2.87
Daily feed intake (g/bird)	16.77 ^c	17.07 ^b	17.40 ^a	16.08 ^d	0.10
Feed to gain ratio	1.21 ^a	1.32 ^a	1.33 ^a	1.17 ^b	0.01
Feed Cost (₹)/Kg gain	116.60 ^d	120.60 ^c	125.08 ^b	129.08 ^a	1.79
Mortality (%)	0.00	0.00	0.00	0.00	0.00

^{abc}Means within rows with different superscript differ significantly ($P < 0.05$).

SEM = Standard Error of Mean, D= diets, g = gram, Kg = kilogram

The effect of dietary supplementation of ginger, garlic and ginger plus garlic on the performance of broiler starter chicks is as shown in Table 2. Feed intake (g/bird) of birds on all the diets group (D1, D2, D3, and D4) differ significantly ($P < 0.05$). The FI of birds on ginger and garlic diets were significantly ($P < 0.05$) higher than those on the control diet. The FI of birds on D3 (garlic) was significantly the highest while the FI of birds on D4 diet was least statistically. In terms of body weight gain (g/bird), the average daily gains of birds on the different diet groups differ significantly ($P < 0.05$) from each other. The daily gains of birds on ginger and garlic diets group were significantly higher than those on the control diet. The daily gains of birds on ginger diet was significantly ($P < 0.05$) superior compared to those on other diets. In terms of FCR, the results showed no differences statistically in FCR between birds on ginger, garlic and those on control diets. The FCR of birds on ginger plus garlic was the least ($P < 0.05$). s.

Discussion

The results on feed intake indicates that ginger and garlic supplementation in the diets of broiler chicks had no negative effect on feed consumption either due to smell or taste. These results are in agreement with other researchers who have reported significant positive effect of ginger and/or garlic powder on the FI of broiler chickens Herawati and Marjuki, (2011), Mohamed *et al.* (2012). Contrary, other workers have reported non-significant effect of garlic supplementation on the FI of broiler birds (Aji *et al.*; 2011). It has been observed (Karangiya *et al.*, 2016) that the improvement in body weight gain of broiler chicks fed ginger, could be attributed to the active components present in ginger which

stimulates digestive enzymes and improves the overall digestion that leads to increased body weight gain. While the improvement in body weight gains of birds groups on garlic diets has been attributed to the action of compounds like allicin and oregano sulfur with antibacterial, anti-fungal properties (Cullen *et al.*, 2005). The results are consistent with those of Karangiya *et al.* (2016) and Mohamed *et al.* (2012), who observed that the used of ginger in broiler diets had significant ($P<0.05$) positive effect on weight gain compared to the control. It is observed that the supplementation of ginger and garlic alone in the diets of birds did not exert any significant ($P>0.05$) effect on FCR as compared to control. These results are in agreement with the findings of Aji *et al.* (2011) who reported non-significant effect of ginger and garlic on FCR of bird

Conclusion

From the results obtained in this study, ginger supplementation at 1% in the diets of broiler starter resulted in significant ($P<0.05$) daily weight gain compared to the control and other diets supplementation without negative effect on feed intake or feed conversion ratio.

Recommendation

From the above conclusion, the supplementation of ginger meal at 1% in the diet of broiler starter is recommended for better performance in terms of daily weight gain.

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