EFFECT OF DIFFERENT INCLUSION LEVELS OF GINGER (*Zingiber officinale* Roscoe) MEAL ON THE PERFORMANCE OF STARTER BROILER CHICKENS

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ABSTRACT

One hundred and thirty-two (132) day old broiler chicks of Abor-acre strain were used in this study to investigate the effect of different inclusion levels of ginger meal on the performance of starter broilers. The birds were randomly divided into four treatment groups, each comprising of 33 broilers. Each group was further sub-divided into 3 replicates of 11 birds each, in a completely randomized design. Four dietary treatments were formulated. The control diet contained no ginger (0.0 % ginger diet). Diet 2 contained 0.5 % ginger; diet 3 contained 1.0 % ginger and diet 4 contained 1.5 % ginger. The experiment lasted for 30 days. Results from the experiment showed that differences in ginger levels did not affect weight gain and feed conversion ratio but feed intake of the ginger groups were similar but significantly higher ($P < 0.05$) than the control group. Cost of feed and cost/kg weight gain was higher in the ginger groups with diet 4 recording the highest values, though the differences were not significant. 0.5 % inclusion level of ginger meal in broiler starter diets could have positive effects on the birds since birds on this diet exhibited lower feed conversion ratio with minimal feed intake.

Key words: Ginger meal, starter broiler chickens, performance

Introduction

In-feed additives/growth promoters such as antibiotics have normally been used at sub-therapeutic doses to enhance growth in poultry. However, in January 1, 2006 the in-feed antibiotics were banned in European countries (Mansoub, 2010) due to their link to antimicrobial resistance among several pathogenic bacteria in animals and humans (Donogue, 2003). The ban necessitated the search for sustainable and economically viable alternative which was found in phytogenic feed additives (PFAs). PFAs called phytobiotics or botanicals are herbs or plant derived products which on addition to livestock feeds are able to enhance livestock performance trough the improvement of digestibility, nutrient absorption and elimination of pathogenic microbes resident in the animal gut (Balunas and Kinghorn, 2005; Athanasiadou *et al*., 2007). Spices such as ginger, garlic and turmeric and their essential oils have been extensively used as phytogenic feed additives and reported to posses the capacity to improve growth in broilers (Alcicek *et al*., 2003; Windish *et al*., 2007).

Ginger has for hundreds of years been consumed as a delicacy, medicine or spice. Arkan *et al*. (2012) reported that supplementing broilers ration with 0.2 % dried ginger meal increased body weight at six weeks of age. Ademola *et al*. (2009) and Onimisi *et al*. (2005) also reported that supplementation of ginger up to 2 % level in the diet of broilers increased body weight.

Materials and method

Experimental location

This research was conducted at the poultry unit of Teaching and Research Farm of Federal University of Technology, Owerri, Imo State, Nigeria. Owerri lies between latitudes $4^0$4' and $6^0$3' N and longitudes $6^0$15' and $7^0$28' E.

Experimental birds and treatment diets

A total of one hundred and thirty-two (132) day old broilers of Abor-acre strain were used in this experiment. They were weighed on arrival and grouped into four treatment diet groups, each comprising of thirty-three (33) broilers. Each group was divided into three replicates of 11 birds. Each replicate group was housed in a pen measuring 1 m x 1 m. Birds were offered experimental diets from

the first day until they were 30 days of age. Experimental diet 1 (control) contained no ginger. Experimental diets 2, 3 and 4 contained 0.5 %, 1.0 % and 1.5 % dry ginger meal, respectively. All diets were iso-proteinous and iso-caloric ranging from 23.07 – 23.09 % crude protein (CP) and 2870.93 – 2872.73 kcal/kg metabolizable energy. (ME). Table 1 shows the ingredient and calculated nutrient composition of the experimental diets.

Management of birds

The birds were managed on deep litter system and were offered feed and water *ad-libitum*. They were brooded using kerosene stoves, lanterns and electric bulbs. Necessary vaccinations and multivitamins were administered.

Source of experimental materials and processing of ginger

The broilers used in this research were procured from a reputable farm in Ibadan. The fresh ginger was bought from Relief market in Owerri while other feed ingredients were bought from a commercial feed dealer also in Owerri. The fresh ginger was washed, and water was allowed to drain. They were then sliced into small sizes of about 5 mm thickness to facilitate drying. They were sundried for 7 days and milled into fine powdery mass using a hammer mill fitted with 0.01 mm sieve. The powdery mass (ginger meal) was stored in plastic air-tight container and stored at room temperature until needed during feed formulation.

Data collection

The birds were weighed at the beginning of the experiment, weekly thereafter and on the 30th day to ascertain the weight gain. Feed intake was obtained daily by subtracting left-over feed from the feed fed the previous day. From the data collected averages were taken and recorded. Feed conversion ratio was obtained by dividing the average daily feed intake by the average daily weight gain. Cost of feed consumed per bird was calculated by multiplying the unit price of the feeds by the amount of feed consumed in kilogrammes. Cost of feed per kilogramme weight gain was calculated by dividing the cost of feed consumed per bird by kilogramme weight gain of the bird.

Experimental design and data analysis

All data collected from the experiment were subjected to analysis of variance (ANOVA) in a completely randomized design (CRD) at 5 % level of probability. Significantly different means were compared using Duncan's New Multiple Range Test as outlined by Obi (1990).

Results

The performance of the starter broilers fed different levels of ginger meal is shown in table 2. There were no significant differences in the final weight and weight gain of the birds, though values were higher in the ginger groups than the control group. The birds fed 1.0 % ginger diet had the highest weight gain followed by those on 1.5 % and 0.5 % ginger diets and then the control group. Feed intake of broilers on ginger diets were similar but significantly higher ($P < 0.05$) than the control group. Birds fed 0.5 % ginger diet had numerically better feed conversion ratio (FCR) though differences were not significant. Cost of feed consumed and cost/kg weight gain were similar though there were numerical increases with increasing inclusion level of ginger meal.

Discussion

In terms of weight gain, the results obtained in this study were similar to those of Zhang *et al* (2009) who reported that inclusion of ginger meal in broiler diets at 5g/kg did not affect daily gain of the broilers. However, Ademola *et al* (2009) and Onimisi *et al*. (2005) have reported that weight gain can be increased at 2 % level of ginger meal inclusion in broiler diets. Our result was in contrast to the findings of Dooley *et al*. (2009) who reported no differences in feed intake by broiler chickens fed ginger extract for a period of 6 weeks. The higher feed intake by birds on the ginger groups may be due to the sweet flavour and aroma of ginger. Similar to our results, Zomrawi *et al*. (2013) reported no significant differences in feed conversion ratio of broiler chickens fed ginger root powder at 1.0 %,

1.5 % and 2.0 % levels respectively. Mohammed *et al*. (2012) noted significant differences in body weight gain, feed intake and feed conversion ratio when broiler chickens were fed diets containing 0.1 % and 0.2 % ginger meal.

Conclusion

0.5 % inclusion level of ginger meal could have positive effects in starter broilers since it exhibited lower feed conversion ratio with minimal feed intake.

Table 1: Ingredient and calculated nutrient composition of experimental broiler starter diets

	Ginger levels (%)			
Ingredients (%)	**0.0**	**0.5**	**1.0**	**1.5**
Maize	51.00	50.50	50.00	49.50
Ginger	0.00	0.50	1.00	1.50
Palm kernel cake	12.00	12.00	12.00	12.00
Soybean meal	22.00	22.00	22.00	22.00
Bone meal	3.00	3.00	3.00	3.00
Blood meal	3.00	3.00	3.00	3.00
Fish meal	5.00	5.00	5.00	5.00
Wheat offal	3.00	3.00	3.00	3.00
Vitamin/mineral premix*	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated values (%)				
Crude protein	23.09	23.08	23.08	23.07
Calcium	1.33	1.33	1.33	1.33
Phosphorus	1.02	1.02	1.02	1.02
Crude fibre	4.56	4.61	4.67	4.73
Metabolizable energy (kcal/kg)	2872.73	2872.73	2871.53	2870.93

Table 2: Performance of starter broilers fed different levels of ginger meal

Parameters	**Ginger levels**				
	0.0 %	**0.5 %**	**1.0 %**	**1.5 %**	**SEM**
Av. initial live weight (g)	35.44	35.54	36.96	33.57	1.62
Av. final live weight (g)	659.81	762.96	787.72	753.89	41.58
Av. total weight gain (g)	624.38	727.42	750.76	720.32	41.79
Av. daily weight gain (g)	20.80	24.25	25.03	24.01	1.09
Total feed intake (g/bird)	1189.80	1361.10	1463.70	1403.10	--
Feed intake (g/day)	39.66[b]	45.37[a]	48.79[a]	46.77[a]	0.16
Feed conversion ratio	1.91	1.87	1.95	1.95	--
Cost of feed taken/bird	201.31	265.24	322.82	479.63	--
Cost of feed/kg gain (N)	322.42	364.63	429.99	479.63	23.58

[a, b] Means within a row with different superscripts are significantly different ($P < 0.05$).

Av. = average

SEM = Standard Error of Mean

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