EVALUATION OF GINGER WASTE MEAL IN THE DIET OF BROILER STARTER CHICKENS

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Abstract

This study was designed to examine the growth performance of broiler starter chicks fed ginger waste meal (GWM) as a replacement for maize in a four-week feeding trial. A total of three hundred and seventy five (375) one-day-old Abor-Acre chicks were assigned to five treatment groups using a completely randomized design. Each treatment group contained 75 chicks and was replicated three times with twenty five chicks per replicate. The GWM was incorporated in the diets at 7.5%, 15.0%, 22.5%, and 30.0% as a replacement for the maize used in the control diet. At the end of the feeding trial, growth parameters including initial and final body weight, weight gain, feed intake, feed/gain ratio and mortality were measured. The results revealed a significant difference ($p < 0.05$) in the growth parameters measured. Birds on 7.5% and 15.0% GWM had the highest final body weight, daily weight gain and feed to gain ratio, which was similar to that of 0%, 15.0% and 22.5% GWM, while those fed 30% GWM in place of maize had the lowest final body weight, daily weight gain and feed to gain ratio. The average feed consumed increased linearly as the inclusion level of GWM increased from 7.5% to 30% GWM. Thus, the optimal inclusion level of GWM in broiler diets as a replacement for maize should not exceed 15.0%. It was therefore concluded that inclusion of GWM in the diet of broiler chicks is beneficial.

Keywords:
Performance; Ginger Waste Meal; Inclusion levels, Replication; Broiler chicks

Introduction

Livestock agriculture is very important in any economy of the world; poultry contributes about 46% of the livestock economy. As viable as poultry industry is in livestock economy, it has its major roadblock which is high cost of production due to high cost of feed. Feed cost contributes about 67% in poultry production Akure, *et al.,* this high cost of feed is caused by high cost of conventional feed ingredients such as maize, soybean and groundnut which are in high demand by man, therefore, there is a need to look for alternative feed ingredients for poultry industry in order to secure its future. Ginger waste from ginger is one of such alternative Ingredients identified. However there is scanty information on use of ginger waste meal as a supplement in broiler diets.

The ginger waste meal is the residues left after super critical fluid extraction to produce ginger oil, ginger oleoresin and ginger total extract. The by-product here is referred to as ginger waste meal (Onimisi *et al.*, 2006). That ginger waste meal is obtained from the extraction of oleoresin using ethanol (Omage *et al.,* 2007). Spent ginger obtained after the extraction of oleoresin constitute more than 90% of the material and is rich in carbohydrate (Konar *et al.*, 2013) and could therefore be a cheap and locally available substitute for maize in livestock diets (Omage *et al*., 2007). This study was, therefore, carried out to evaluate the influence of ginger waste meal on performance of broilers starter, and therefore look at the possibility of partially substituting ginger waste meal for maize as a potential feed ingredient to lower the demand for maize and other grains while also meeting their nutritional requirements. This study will further provide a fair knowledge for monogastric nutritionists, farmers and the feed industries at large on how to economically substitute maize and other grains with ginger waste meal in broiler starter diets, thus reducing the cost of producing the feed and overall cost of production of broiler chickens.

Materials and methods

The experiment was conducted at the poultry section, Department of Livestock, Ministry of Agriculture, Mariri, in Kumbotso Local Government Area of Kano State, Nigeria. Ginger waste meal (GWM) was procured from Neighborhood, Kano, Kano State. The GWM was sun-dried to reduce the moisture content and then milled before being homogenized with other feed-stuffs. The GWM was included in the experimental diets at graded level of 0, 7.5. 15.0, 22.5, and 30%, these five levels represented treatment 1,2,3,4, and 5 respectively. A total of three hundred and seventy five (375) one-day-old Abor-Acre chicks were assigned to five treatment groups using a completely randomized design. Each treatment group contained 75 chicks and was replicated three times with twenty five chicks per replicate. A known weight of formulated feed was given daily while water was given *ad libitum.* The management of the broiler chickens was carried out according to the standard procedures for cleaning, brooding vaccination and medication. The feeds and the birds were weighed weekly. The performance of the birds in terms of daily feeding, initial and final body weight, weight gain, feed intake and feed to gain ratio were measured and recorded. The mortality of bird was also recorded and calculated. The experiment lasted for four weeks. All data were recorded and analyzed using analysis of variance (ANOVA) (7). Means were separated by Duncan Multiple Range Test. The starter diet was formulated to be iso-nitrogeneous and iso-caloric and to meet standard requirement as recommended by NRC, 1994). The composition of experimental diet is shown in Table 1

Table 1: Composition of Broiler starter diets containing Ginger waste meal (GWM)

Ingredients	T1 0%	T2 7.5%	T3 15%	T4 22.5%	T5 30%
Maize	48.00	53.80	51.95	46.00	42.25
Ginger Waste Meal	0.00	7.50	15.00	22.50	30.00
Fixed Ingredients	0.00	7.50	15.00	22.50	30.0
Total	100	100	100	100	100
Calculated Analysis					
ME Kcals/kg	3130	3085	3064	3020	3125
Crude Protein (%)	23.00	23.00	23.00	23.00	23.00
Crude fibre (%)	3.35	4.28	4.46	5.45	5.85.
Ether Extract (%)	9.95	10.32	10.45	10.50	10.85
Ash(%)	6.40	7.45	8.00	8.42	9.00
Calcium (%)	1.35	1.45	1.47	1.48	1.49
Av.Phosphorus (%)	0.78	0.79	0.70	0.74	0.74
Lysine (%)	1.50	1.62	1.64	1.70	1.72
Methionine (%)	0.67	0.69	0.69	0.69	0.68
Methio. + Cyst. (%)	0.75	0.78	0.78	0.78	0.75

The proximate composition and mineral composition of the ginger waste meal (GWM) is shown in Table 2 and the performance of day old chicks fed with GWM for four weeks is presented in table 3.

Table 2: Proximate and mineral composition of Ginger waste meal

Nutrient	Composition
Dry matter(%)	92.80
Crude protein(%)	2.00
Crude Fibre(%)	6.86
Ether Extract(%)	2.83
Ash(%)	8.74
N.F.E(%)	80.85
Calcium(g/kg)	4.01
Potassium(g/kg)	26.73
Sodium(g/kg)	0.38
Phosphorous (g/kg)	2.74

Table 3: Performance of day old chicks fed with GWM for four weeks

Parameters	Treatments						
	T_1 0%	T_2 7.5%	T_3 15%	T_4 22.5%	T_5 30%	SEM	LOS
Initial weight (g/b)	65.00	65.00	65.00	65.00	65.00	0.00	NS
Final weight (g/b)	578.20^a	590.45^a	588.60^a	495.15^b	480.85^b	7.83	*
Weight gain (g/b)	513.20^a	525.45^a	523.60^a	430.15^c	415.85^d	7.13	*
Feed intake (g/b)	1195.17^b	1300.28^a	1422.82^a	1450.78^a	1380.10^b	13.45	*
Feed /Gain Ratio	2.33^a	2.47^a	2.52^a	3.37^b	3.28^b	0.06	*
Mortality	00	00	00	00	00	00	NS

a,b,c = Means within the same row with different superscripts differ significantly ($P<0.05$)
SEM = standard error of means *= significant difference NS =Not significant

Results and discussion

In Table 2 it shows that GWM contains 92.80% Dry matter and 2,00% Crude Protein; 6.86% Crude Fibre; 2.83% Crude Fat (ether extract), 8.74% Ash and 80.85% Nitrogen-free extract (NFE). The NFE which represents the soluble carbohydrate portion of the meal was relatively high. This makes it a potential livestock feedstuff especially as an energy source.

Performance of birds

The result of the performance of day old chicks fed with GWM for four weeks are shown in table 3. There were significant differences ($p<0.05$) between treatments with respect to final weight, feed intake, weight gain, feed/gain ratio and mortality at four weeks. Feed consumption increased significantly ($p<0.05$) with the inclusion of GWM and with the highest level up to 22.5% after which a linear decrease occurred at 30% inclusion level of GWM, having the lowest total feed intake among the treatments having GWM. The observed increase trend in feed intake as GWM increased could be because of the increase in bulkiness of feed as a result of high fibre, with increasing level of GWM,

since birds tend to consume more feed when the feed is bulky in order to receive similar levels of nutrients to meet their required needs. This result is in agreement with the findings of Fadugba (1989) and Onimisi *et al.* (2005) who reported that bulky feeds which are high in fibre are rather low in nutrient concentration per unit volume. A unit weight of the bulkier feed contributes less digestible nutrients and also makes other nutrients less available. However, reduction in feed consumption occurs when feed becomes excessively bulky. This is consistent with the results of Stanley and Ishiaki (1982) and Onimisi *et al.* (2005) who explained that the weight of excessive bulky feed consumed by birds are reduced thereby causing a physical limitation on the intake of digestible nutrients. Highest weight gain and highest final weight were recorded for the birds fed 15.0% GWM at the end of the four week feeding trial. However, the birds on 0% and 10%GWM recorded similar weight gain and final weight gain with the birds on 15%GWM. Therefore, growth rate is significantly ($p<0.05$) similar for birds on 0%, 7.5% and 15.0% GWM. There was significant reduction in the weight gain of birds on 22.5% to 30% GWM. The inclusion of GWM in the diets of broiler chicks increased feed consumption significantly ($p<0.05$) but with non-significant ($p>0.05$) differences in weight gain. This is in accord with reports of Osuji (1982) and Alawa and Umunna (1993) who reported that the inclusion of most agro-industrial by-products in livestock rations has often resulted in increased feed intake as a compensation for the reduced nutrient concentration of such diets and most often with non-corresponding increase in weight gain. Linear increase occurred in feed /gain ratio with increasing level of GWM in diet levels beyond 15.0% significantly depressed the ability of birds to convert feed materials into weight gain. The feed conversion efficiency of birds reduced with higher level of GWM in the diet. The bulkiness of feed with increasing level of GWM reduced the quality of feed. This observation is common to most agro- industrial by- products used in Livestock feeds (Fadugba, 1989).

Conclusion

From the results of the trials, it is concluded that up to 22.5% of GWM may be included in the diet of broiler starter chicken without any significant negative effect on growth performance

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