GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER FINISHERS FED GINGER WASTE MEAL AS AN ENERGY SOURCE

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ABSTRACT

A 4-week feeding trial was conducted with four-week-old unsexed Abor-Acres chickens (n=375) to examine the growth performance and carcass traits of the chickens fed graded dietary levels of ginger waste meal (GWM) at 0, 7.5, 15.0, 22.5, and 30.0% replacement for maize, representing T1, T2, T3, T4 and T5, respectively. The chickens were allotted to 5 treatments with 5 replicates each of 15 birds in a completely randomized design. Clean water was provided ad libitum. At the end of the four-week feeding trial, some growth parameters (Final weight, daily weight gain and feed to gain ratio) and carcass traits were calculated. The results showed that dietary levels of inclusion of GWM had significant (P<0.05) effect on the growth parameters and carcass traits measured. Final weight and daily weight gain increased as GWM increased in the diet, while average daily feed consumed and the feed to gain ratio also increased. The dressing percentage, carcass, thigh, breast, wing and back weights were higher for the birds fed 0, 7.5%, 15.0%, and 22.5% GWM based diets than those on 30%GWM. It is concluded that 22.5% of the maize in broiler chicken diets can be substituted by dried GWM with no loss of performance as measured by growth rate, feed conversion and carcass conformation.

Keywords: Ginger waste, Broiler Chickens, Body weight, Carcass traits, Feed intake

INTRODUCTION

Nigeria is deficient in animal protein security with the per capita consumption put at 9.3g/day as against the 35g/day recommended by the FAO to be the minimum requirement for the growth and development of the body (Esobhawan *et al.,* 2008). This calls for attention in the area of production of fast growing animals with short generation interval like pigs, rabbits and poultry. Poultry in particular is one of the fastest channels of attaining appreciable improvement in the nutritional standard of the populace because of its short generation interval and quick turnover rate. In addition, poultry is also free from social and religious taboos, Broilers especially have great potentials for providing the protein needs of Nigerians due to excellent feed conversion. The major challenge facing broiler production is high cost of conventional feed ingredients such as maize which serve as energy source because they are in high demand by man. Energy has remained the most abundant nutrient to supply in a balance diet, containing between 45-60% of finished feed for monogastric animals and the bulk of it is supplied by cereal grains (Machin, 1992). Broiler chicken is usually raised for meat and the meat is known to be a source of protein, however, the meat is not readily available on Nigerian tables, this is so because of its high price. The high cost may be attributed to its high cost of production due to high cost of feed. successful production of these birds requires adequate feeding which is estimated to stand at about 70 -80% of the total cost of production (Akure *et al.,* 2020) .

There is a need to look for alternative feed ingredients for poultry industry in order, to reduce the cost of feed, increase the profit margin for farmer make it available for consumption and to secure its future. Ginger waste from ginger is one of such alternative Ingredients identified. However, there is scanty information on the 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.,* 2005). Omage *et al*. (2007) stated that ginger waste meal is obtained from the extraction of oleoresin using ethanol. Spent ginger obtained after the extraction of oleoresin constitutes more than 90% of the material and is rich in carbohydrate and therefore could 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 and carcass characteristics of broilers finisher, 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 finisher 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. Kano State is located in the North Western Nigeria. Kano State borders Katsina State to the North-West and Jigawa State to the North-East. Kano State features Savanna vegetation with a semi-arid climate. It occupies an area approximately 20,131km^2. The area lies between latitude 11^{o}55'49"N and 11^{o}59'43"N and longitude 8^{o}31'18"E and 8^{o}36'19"E at an altitude of 460m above sea level. It witnesses an average precipitation of about 690mm per year, the bulk of which falls from June to September. The state is typically hot throughout the year, though noticeably cool from December to February. The annual temperature ranges between19.06^{o}C to 33.19^{o}C and humidity of 52.81 %. (KNARDA 2021). The GWM was sun-dried to reduce the moisture content and then milled before being homogenized with other feed-stuffs. GWM. The GWM was included in the experimental diets at graded level of 0, 7.5. 15.0, 22.5, and 30%. The finisher diet was formulated to be iso-nitrogenous 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. Gross composition of experimental finisher broiler diet (4-8weeks)

Ingredients	**Levels of maize replacement with ginger waste meal (GWM)**				
	0	7.5	15	22.5	30
Maize	55.65	51.20	45.00	40.00	34.66
Ginger waste meal	0.00	7.50	15.00	22.50	30.00
Groundnut cake	24.25	21.20	19.90	17.40	15.24
Soya bean meal	8.00	8.00	8.00	8.00	8.00
Maize offal	5.00	5.00	5.00	5.00	5.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Common salt	0.30	0.30	0.30	0.30	0.30
Vit. Premix	0.30	0.30	0.30	0.30	0.30
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**	**100**
Calculated Analysis					
Met. Energy (ME) (kcal/kg)	2883	2892	2898	2890	2882
Crude Protein (%)	20.00	20.00	20.00	20.00	20.00
Ether Extract (%)	5.60	6.36	6.38	6.39	6.41
Crude Fibre (%)	3.52	4.35	5.20	6.04	6.88
Calcium (%)	1.24	1.25	1.27	1.28	1.29
Avail. P (%)	0.60	0.63	0.63	0.63	0.64
Lysine (%)	1.15	1.19	1.24	1.28	1.29
Methionine (%)	0.46	0.46	0.46	0.46	0.46
Meth + Cyst (%)	0.93	0.92	0.92	0.91	0.90

Biomix premix supplied per kg of diet: Vit. A, 10,000IU; Vit.D_3, 2000 IU; Vit E, 23 mg; Vit. K, 2mg; Vit.B_1, 1.8mg; Vit. B_2, 5.5mg; Niacin, 27.5mg; Pantothenic acid, 7.5mg; Vit. B_{12}, 0.015mg: Folic acid, 0.75mg; Biotin, 0.06mg; Choline chloride, 300mg; Cobalt, 0.2mg; Copper, 3mg; Iodine, 1 mg; Iron, 20 mg;

Manganese, 40 mg; Selenium, 0.2 mg; Zinc, 30mg; Antioxidant, 1.25mg. ME=Metabolizable Energy

Experimental Birds

A total of 375 4-week-old Abor Acres chicks (mixed sexes) were used for the experiment.The birds were weighed at the beginning of the experiment and randomly assigned to 5 treatment groups of 75 chicks each, in a completely randomized design (CRD). Each treatment group was further replicated 5 times with 15 birds each and placed in brooding pens. The birds were housed in deep litter pens and were reared in open-sided pens which were closed and well illuminated with 200Watts bulb and heated during the brooding period. The temperature was monitored during this period. Each replicate was in a 3m x 3m pen within the same house. Tray feeders were used to dispense the feed for the chicks for the first 7 days and Cone drinkers were used to provide water for the chicks at the starter phase, from the 8th day the chicks were given feed with the cone feeders of appropriate size and specialized bowl drinkers for broilers were used from the 15th day to provide water for the chicks. water was provided *ad-libitum*. The management of the birds was carried out according to the standard procedures for brooding, vaccination and medication. Routine vaccinations against New Castle and Gumboro diseases were given and drugs were given as appropriate. The birds and feeds were weighed weekly. The performance characteristics of the chicks were measured in terms of total weight gain, daily weight gain, total feed intake, daily feed intake, and feed to gain ratio.

At the end of the experiment, one bird per pen (5 per treatment) was selected with each bird reflecting the average pen weight. The birds were deprived of feed overnight but given water *ad libitum*. Birds were weighed and slaughtered by ventral neck cut. They were bled thoroughly, weighed and defeathered by dipping in hot water (scalding) at 65^0C temperature to soften the feathers for easy removal. The defeathered birds were labeled and eviscerated. Hot carcass weight was taken and expressed as dressing percentage. Also, the weights of prime cuts such as thigh, breast, wing and back were taken and expressed as percentages of dressed weight. All data obtained from the trial were subjected to analysis of variance (ANOVA) using procedure of SAS (2002), significant levels of differences among treatment means were determined using the Duncan's multiple range test.

RESULTS AND DISCUSSION

Table 2 shows the result of the carcass characteristics of broiler finisher birds fed GWM based diets. There were significant (P<0.05) differences between the treatment means for all measurements. The results of the control, 7.5, 15.0 and 22.5% GWM diets were similar and gave the best result for the carcass weight, dressing percentage when compared with birds on 30% GWM. Birds on the control 7.5, 15.0 and 22.5% GWM diets also gave the best result for the cut parts such as thigh, breast, back and wing weights. This result could infer that GWM was not deleterious to the birds. The results of the carcass weight, and cut parts such as thigh, breast, wing, and back weights of the control, 7.5, 15.0 and 22.5% GWM diets being higher when compared with those on 30.00% could be an indication that there was an efficient utilization of feed by the birds on these diets and efficient conversion of feeds to meat. This led to better carcass development and meat yield on these four diets. The reduction in carcass weight at 30% inclusion level of ginger waste meal (GWM) could be due to low feed intake. Fetuga, (1975) indicated that carcass quality was closely related to the intake level of nutrients especially protein and energy.

Table 2. Carcass characteristics of broiler finisher fed varying levels of ginger waste meal as replacement for dietary maize (4 – 8 weeks)

Parameters	Levels of maize replacement with ginger waste meal (%)					SEM	P
	0	7.5	15	22.5	30		
Live weight (g)	2775[ab]	2792[a]	2809[a]	2830[a]	2650.[b]	117.60	*
Dressed weight (g)	2625[a]	2620[a]	2632[ab]	2636[b]	2520[b]	185.40	*
Carcass weight (g)	2199[a]	2220[a]	2240[a]	2260[a]	2010[b]	180.60	*
Dressing %	79.24[a]	79.51[a]	79.74[a]	79.86[a]	75.85[b]	1.29	*
Thigh (%DW)	26.20[a]	26.40[a]	26.50[a]	26.70[a]	24.79[b]	0.84	*
Breast (%DW)	23.64[a]	23.20[a]	23.30[a]	23.50[a]	20.50[a]	1.11	*
Back (%DW)	21.18[a]	21.18[a]	21.12[a]	20.10[a]	17.11[b]	0.10	*
Wing (%DW)	11.09[a]	11.19[a]	11.22[a]	11.16[a]	9.11[b].	0.22	*

[abc] *Means in the same row with different superscripts differ significantly (P<0.05) SEM=Standard error of mean, NS= Not significant*

Conclusions

- Ginger waste meal (GWM) is highly beneficial and enhanced the carcass quality of finisher broilers.
- Treatment 4 had a better feed conversion ratio, average daily weight gain and lower cost of feed per kg gain. Therefore, it is concluded that GWM in broiler chicken feed can replace dietary maize as an energy source at 22.5% level of inclusion in the diet of broiler finishers for optimum performance.

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