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THE NUTRITIVE VALUE OF DRIED PITO MASH IN THE DIETS OF BROILER CHICKENS

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ABSTRACT

A feeding trial was conducted for 8 weeks using 120 one-day-old Cobb broiler chickens to study the optimum level of sun-dried pito mash (DPM) that should be substituted for maize in broiler diets. The 1-day-old broiler chickens were randomly allotted in groups of 30 birds to each of the four dietary treatments. One hundred, 150 and 200 g kg^{-1} levels of DPM were included in a nutritionally balanced diet. The control diet did not contain DPM. Feed and water were supplied *ad libitum*. Feed consumption, body weight gains and feed conversion efficiency (FCE) of the control birds were not significantly ($P > 0.05$) different from that of broiler chickens fed 100 or 150 g kg^{-1} levels of DPM but they were significantly ($P < 0.05$) different from that of birds fed 200 g kg^{-1} level of DPM. The carcass quality was significantly ($P<0.05$) improved due to a significant ($P<0.05$) reduction of abdominal fat in birds fed diets at all levels of DPM inclusion. Dietary treatment had no impact on carcass dressing percentage. It seems that up to150 g kg^{-1} sun-dried pito mash could be included in the diets of broiler chickens to increase productivity.

KEY WORDS: Dried pito mash, broiler chickens, growth performance, carcass quality

INTRODUCTION

The incidence of protein malnutrition is quite high in most developing countries including Ghana. The per capital meat consumption of the average Ghanaian is low (Okai, 1997). Protein malnutrition is a very serious problem in the rural areas of Ghana where poverty level is very high and majority of the people cannot make ends meet. There is therefore the need to increase livestock and poultry production so as to supply animal protein for the growing population to prevent protein deficiency diseases. Poultry production provides a means by which rapid transformation in animal protein consumption can be achieved in Ghana. This has necessitated the increasing number of both large and small-scale poultry farms in many parts of Ghana. However, one of the major obstacles to poultry production in Ghana is the high cost of feed, especially, maize and fish meal. Feed cost is the largest component of total production costs of poultry production. Feed cost constitute about 60-65 percent of the total poultry production cost in Ghana (Koney, 1993). Expensive high carbohydrate feed resource such as maize is always used in poultry diets (Kesse, 1988). According to Church (1991), energy is the most important item in the diet of animals, and all feeding standards and ration formulations. Poultry birds are simple-stomached animals and as such they compete directly with humans for food, especially maize and fish. The great competition between humans and poultry birds for maize usually results in acute shortage and high cost of the energy yielding feed ingredient. This leads to high cost of maize and a consequent high cost of chicken and eggs to meet the pocket of the ordinary poor Ghanaian. This problem can be partly solved by making maximum use of cheaply and commonly available local feed materials, by-products and waste feeds with high nutritive value (Holness, 1991). Dried pito mash is a by-product of millet and sorghum (guinea corn) that can be fed to poultry birds so as to reduce the high cost of production.

Millet and guinea corn are widely grown in the savanna regions (Northern, Upper East and Upper West regions), parts of Brong Ahafo and Ashanti regions of Ghana as a component of the traditional crop farming system. Local brewers use millet and guinea corn to brew a local beer called pito and the residue/by-products called pito mash are thrown away. Pito mash is commonly available in many parts of Ghana and it is cheaper than maize. This makes pito mash attractive as a potential feed ingredient for poultry that may serve as a partial replacement for maize. Despite the beneficial effects of sun-dried pito mash in poultry rations, there is no published data on the optimum level of sun-dried pito mash that should partially replace maize in broiler diets to enhance their performance

This work was undertaken to investigate the optimum level of sun-dried pito mash that should be substituted for maize for broiler production to increase productivity.

MATERIALS AND METHODS

The experiment was conducted at the animal farm of University of Education, Winneba, Mampong campus (latitude 07° 4'N and longitude 01° 24'W), Ghana. The dried pito mash (DPM) that was used in formulating the diets for the broilers was bought from local pito brewers in Mampong town. One hundred and twenty (120) one-day-old unsexed Cobb commercial broiler chickens were selected at random from a population of two hundred and fifty (250) one-day-old chicks. They were initially weighed in groups to obtain the mean weight for the birds. They were then individually weighed and allotted in groups of 30 birds to four experimental groups (0, 100, 150 and 200 g kg^{-1} DPM) such that the group of birds were equalized for sex and weight. The trial was conducted using the completely randomized design. Each dietary treatment was replicated three times and each replicate had 10 birds. Representative samples of DPM were subjected to proximate analysis at the laboratory. The composition of experimental diets and the calculated analysis are presented in Table 1. The experimental house was divided into 12 compartments using wire mesh as partitions. Each group of 10 birds was housed in a compartment measuring 3.4 × 1.16 × 2.20 m. Feed and water were supplied *ad libitum*. The trial lasted 8 weeks.

The feed intake and live weight gain were measured and feed conversion efficiency (FCE) calculated. On the final day of the trial, 4 broilers were selected randomly from each treatment replicate and slaughtered for carcass analysis.

The analysis of variance (ANOVA) was used in data analysis and significant differences among treatment means

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were estimated using Tukey post-hoc test. All statistical analyses were conducted using Minitab for Windows (version 14), Minitab Inc., State College, PA, USA; Ryan *et al.*, 1985).

Table 1: Composition of experimental diets, g kg^{-1} DM

Composition	0	100	150	200
Ingredients				
Dried pito mash	0	100	150	200
Maize meal	550	515	500	490
Wheat bran	130	120	110	90
Groundnut cake	85	60	50	50
Fish meal	110	95	90	80
Soya bean	95	80	70	60
Oyster shell	10	10	10	10
Palm oil	10	10	10	10
Vitamin premix	5	5	5	5
Iodated salt	5	5	5	5
Total	1000	1000	1000	1000
Calculated analysis				
Crude protein	210.35	210.55	210.02	200.24
Crude fibre	30.35	30.64	30.99	40.21
Ether extract	40.00	40.28	40.40	40.60
ME (MJ kg^{-1})	12.31	11.78	11.39	11.15

RESULTS AND DISCUSSION

The results of proximate analysis of DPM used for this study are as shown in Table 2 below.

Table 2: Proximate analysis of dried pito mash

Sample	Percentage composition
Crude protein	29.78
Crude fibre	9.87
Ether extract	5.02
Ash	13.11
Dry matter	98.40
Gross energy (Kcal/kg)	1154

The nutrient status of the DPM used in this trial may be comparable with DPM from other sources or it may be slightly different because millet and guinea corn and their varieties may either differ or look alike in their biochemical composition due to factors such as water supply, soil composition, climatic factors, manure, season and variety.

The effects of DPM on broiler performance are summarized in Table 3. Feed consumption, body weight gains and FCE of broiler chickens fed DPM at 100 or 150 g kg^{-1} diet significantly ($P<0.05$) improved over those fed 200 g kg^{-1} DPM but they were not significantly ($P>0.05$) different from the control birds (Table 3). However, the control birds were significantly ($P<0.05$) different from the birds fed 200 g kg^{-1} DPM in terms of feed consumption, body weight gains and FCE, respectively. This indicates that the ability of the broiler chickens to convert feed into muscle was significantly ($P<0.05$) improved by the addition of DPM in their diet up to 150 g kg^{-1}.

The improvement in feed consumption, body weight gains and feed utilization efficiency of the broiler chickens fed the 100 or 150 g kg^{-1} DPM was observed by the end of the third week and it continued until the eighth week. This was probably due to the fact that these diets were palatable so the birds became used to them during the early stages of the trial. Feed intake is the prime determinant of rate of weight gains, body composition and of carcass quality meat (Whittemore, 1993).

Table 3: Effect of dried pito mash on the performance of broiler chickens

	Dietary treatments, g DPM kg^{-1} diet				
Parameter	0	100	150	200	SEM
Initial body weight, kg	0.42	0.42	0.42	0.42	-
Final body weight, kg	2.23	2.15	2.04	1.81	3.55
Body weight gain, kg	1.81^a	1.73^a	1.62^a	1.39^b	4.76
Total feed intake, kg	5.13^a	5.24^a	5.22^a	4.76^b	9.21
FCE, kg feed/kg BWG	2.83^a	3.03^a	3.22^a	3.43^b	1.53
Mortality	-	-	-	-	-
Dressing percentage	76.43^a	74.87^a	73.53^a	73.34^a	1.97
Abdominal fat, %LBW	3.01^a	2.01^b	1.98^b	1.94^b	0.85
Liver weight, %LBW	2.24^a	2.19^a	2.21^a	2.49^b	0.94
Gizzard weight, %LBW	2.51^a	2.58^a	2.42^a	3.26^b	0.61

a,b,c,d different at $P<0.05$

On the other hand, the depression in feed consumption, body weight gains and feed utilization efficiency of the broiler chickens fed 200 g kg^{-1} DPM was observed at the end of the fourth week. This could be due to the high content of crude fibre in that diet which might have led to reduction of dietary energy. According to McDonald *et al.* (2002), millet contains a high content of indigestible fibre owing to the presence of hulls which are not removed by ordinary harvesting methods and can therefore end up in DPM. It could also be due to reduction of appetite of broiler chickens fed 200 g kg^{-1} DPM as a result of the bitter taste in the sorghum variety used in the study. This agrees with a report made by McDonald *et al.* (2002) that the seeds of some sorghum varieties contain tannins which reduce protein digestibility and also make the seeds bitter. Maize is very low in fibre, high in oils and also has high metabolizable energy values (McDonald *et al.*, 2002). It therefore stands to reason that a diet high in maize such as the control diet will be more palatable to broiler chickens than DPM with high fibre and low oil contents.

There were no significant ($P>0.05$) dietary treatment effects on gizzard and liver weights when they were expressed as percentage of the live body weight (%LBW) of broiler chickens fed 100 or 150 g kg^{-1}DPM The gizzard and liver weights of these birds were not significantly ($P<0.05$) different from the control birds but they were significantly ($P<0.05$) different from birds fed 200 g kg^{-1} DPM (Table 3). In the process of detoxifying high levels of tannin, the liver can become enlarged. High levels of fibre can cause gizzards to enlarge as it performs its churning function on fibrous materials. These could cause the differences in the weight of the organs among the treatments.

There were no deaths or health related problems recorded during the study This indicates that DPM can be incorporated in the diet of broiler chickens up to 200 g kg^{-1} without any adverse effects on the survival of the birds if good sanitation and strict vaccination practices are adopted

The carcass quality was significantly ($P<0.05$) improved due to a significant ($P<0.05$) reduction of abdominal fat in birds fed DPM Abdominal fat content of the carcass decreased with increased levels of DPM in the test diets The abdominal fat content of the control birds was significantly ($P<0.05$) higher than that of birds at all levels of DPM inclusion This indicates that the inclusion of DPM in broiler diets can help to reduce abdominal fat content and improve the carcass quality of broiler chickens In that case DPM may be a good remedy for fatty broiler chickens and enhance their acceptability to consumers who cherish lean meat

Dietary treatment had no impact on carcass dressing percentage The carcass dressing percentage of the control birds was not significantly ($P>0.05$) different from that of birds at all levels of DPM inclusion This shows that DPM up to 200 g kg^{-1} had no effect on the carcass dressing percentage and that DPM can be a very good ingredient in broiler diets

In summary the results of this study show that DPM may be incorporated into broiler diets up to 150 g kg^{-1} (15 %) It may be possible to include higher levels of DPM in broiler diets if the seeds from the millet variety used to brew pito to produce DPM are not bitter In that case DPM may be a good remedy for fatty broiler chickens

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