THE EFFECTIVENESS OF REPLACING MAIZE WITH PALM KERNEL CAKE IN BROILERS' STARTER DIET

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ABSTRACT

This study was conducted to examine the effectiveness of using palm kernel cake in place of maize in broilers' starter diet. One hundred and eighty day old hubbard strain were used for this experiment. The birds were reared in deep litter floor pens. A total of 12 pens, with an allowance for one feeder and one drinker per pen was used. The floor of the pen was covered with wood shavings. Each group was placed in a pen with an area of 5.00m^2. The average weight per bird at the start of the experiment was 500grams above. Antibiotics, coccidiostat and vaccinations were administered periodically as required. The experiment lasted for 0 - 6 weeks. Data obtained were subjected to Analysis of Variance (ANOVA) and significant means were separated using Duncan's Multiple Range Test at 5% level of significance. The experiment lasted for 6 weeks. The results indicated that weight gain, final body weight gain, feed consumption and feed to gain ratios were not significantly affected by dietary treatment. The metabolisable energy (ME) intake was significantly affected by dietary treatments. Protein intake was not significantly affected by dietary treatment. It increased with increases in PKC level of diet. There was no mortality during this period. As a result of high cost of maize, PKC could be used to replace at least 50% of the required amount of maize in broiler starter diets.

Keywords: *Palm kernel cake, standard diet, feed consumption, hubbard strain, protein intake, maize*

INTRODUCTION

Maize and groundnut cake continue to be the most important plant protein sources in the diets of poultry in Nigeria. The high cost of these two major ingredients is the prime stimulant for the continuing search for alternative feedstuff to reduce cost of feed and animal production (Adeyemi, Sobayo, Oke and Adebajo, 1998). Palm Kernel Cake (PKC) is a by-product after palm oil extraction from the fruit *(Elaeis guinensis)* and gives rise to the palm nut, which is cracked to produce palm kernel. This product is further crushed and its oil extracted by solvent or expeller method to produce a waste caked - Palm Kernel Cake (PKC).

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The PKC does not form food for man or have other industrial uses for now. It is easily available and nutritionists have found it to be suitable for cattle feed (Mustapha, Christensen, Kinnon and Huel, 1987). Palm Kernel Cake supplies both protein and energy. Its crude protein content of 18% classified it as a protein source of medium grade (Chin, 2001). It however has high fibre content and it is reported to have a low metabolizable energy value for poultry (James and Wheeler, 1949). Palm oil cake/meal is one of such alternative feed resource that can be used in poultry feeds. Palm kernel cake is relatively cheap, easily available and virtually has no competition between man and farm animals. This study was therefore designed to examine the effectiveness of replacing maize with palm kernel cake in broiler chickens.

MATERIALS AND METHODS

The experiment was conducted at the Delta State Polytechnic, Ozoro, Poultry Research Centre. It is located within the polytechnic which is on latitude $5^{o}30^{l}$ and $5^{o}45^{l}$N of the equator and longitude $5^{o}40^{l}$ and 6^{o}E of the Greenwich Meridian. The area has an annual rainfall of between 2500 - 3000mm and means temperature at the centre was 27.4^{o}c with range of 25^{o}c to 30^{o}c all through the period of the study. One hundred and eighty hubbard strains of day-old were used for this experiment. The birds were reared in deep litter floor pens. A total of 12 pens, with an allowance for one feeder and one drinker per pen was used. The floor of the pen was covered with wood shavings. Each group was placed in a pen with an area of $5.00m^2$. The average weight per bird at the start of the experiment was 500grams above. Antibiotics, coccidiostat and vaccinations were administered periodically as required. The experiment lasted for 0 - 6 weeks.

At the commencement of the experiment, the birds were weighed and randomly allotted to 12 similar groups (on equal weight basis) of 15 birds each. Three of such pens were placed on each treatment. Each group constituted a replicate. Feed and water were supplied ad libitum. Four experimental diets were formulated for starter broiler. The percentage composition of the diet is shown on table 1. Diet 1 served as control and did not contain PKC while the other three diets were formulated such that in diet 2, 25% of the maize was replaced with PKC in diet 3, 50% of the maize was replaced with PKC, in diet 4, 75% of the maize was replaced with PKC.

The birds were weighed and feed intake was recorded on weekly basis. Also, mortality was recorded on a daily basis. Data obtained were subjected to Analysis of Variance (ANOVA) and significant means were separated using Duncan's Multiple Range Test (Steel and Torrie, 1980) at 5% level of significance.

RESULTS AND DISCUSSION

Results of the experiment with broiler starters are shown on table 3. The weight gain, final body weight, feed consumption and feed to gain ratio were not significantly affected by dietary treatments. Feed cost per live weight gain decreased

significantly when PKC was used in the diets and the highest gain in the control diet. Protein intake per bird was not significantly affected by dietary treatment. It was however lowest in the control diet. Metabolisable Energy (ME) intake was not significantly affected by dietary treatment. It was lowest in the control diet. There were no significant difference in the Metabolisable energy intake between diets 2, 3 and 4. There was no mortality during the period.

The results with starter broilers indicated that partial replacement of maize with PKC in the diets resulted in a reduction in weight gain. This may be attributed to the fact that the energy level of the diet was too low for the birds to meet their body requirement. Feed cost per kg live weight gain decreased with increasing levels of PKC in the diet. This observation is not surprising since the maize used was about 5 times more expensive than the PKC. The dietary treatments had no effect on mortality. This is due to the fact that the diets were relatively balanced in their nutritional content, that is, the diets had no adverse effects on the health of the birds.

Although not significant, there was a general increase in feed intake as the level of PKC increased. This was probably an attempt by the birds to consume enough energy for optimum performance. These findings are in consonance with the postulate that within certain limits, poultry generally eat to meet their energy requirements if fed ad libitum on non-isocaloric diets (Sugandi, Bird and Atmadilaga, 1975; Olomu and Offiong, 1983). Giles, Morrison and Wilson (1981) also reported similar findings in pigs. Most poultry adjusted feed intake in order to provide a fixed metabolizable energy consumption. Thus, ME intake is more likely to be constant than feed intake. The increase in feed intake in the present study may also have been due to increase in dietary fibre as the level of PKC increased (Thompson and Weber, 1981). Babatunde (1975) had earlier shown that feed intake and fibre content were directly related. The marked difference between the prices of maize and PKC must have resulted in the significant difference in the feed cost per kg diets recorded in this experiment. This also took place despite the increased feed intake on the PKC diets. Another reason for the higher feed intake in the PKC diets may be because protein intake by the broilers increased as PKC level in the diets increased.

CONCLUSION

From the results of this experiment carried out in this study, it can be concluded that with replacement of maize with PKC, depression in body weight occurred in broiler starters. Therefore, a process of bleaching and deodorizing PKC should be worked out in order to reduce possible discrimination against PKC based diets by farmers in view of the peculiar colour and odour; and due to the high cost of maize, PKC could also be used to replace at least 50% of the required amount of maize in broiler starter diets while 25% could be used for broiler finisher diets (Kperegbeyi and Akpobasa, 2007).

Table 1: Percentage composition of starter diets fed broiler chicks from 1 - 6 weeks of age

	Diets			
Ingredients	***1***	***2***	***3***	***4***
Maize	65.00	35.00	17.00	0.00
Palm kernel cake	0.00	30.00	48.00	65.00
Soyabean meal	30.40	30.40	30.40	30.40
Bone meal	2.75	2.75	2.75	2.75
Oyster shell	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35
Premix1	0.50	0.50	0.50	0.50
Total	100	100	100	100
% Crude protein	22.2	26.0	28.0	29.6
ME/Kcal/kg	2977	2674	2522	2371
Cost/kg (N2)	31.70	24.54	20.90	17.30

Source: Experimentation, 2009

1 Supplied per kg diet: Vit A 8000iu, Vit D3, 1600iu, Vit E, 3iu; Vit K, 2mg; Vit C, 10mg; Vit B1, 1mg Vit B2, 3mg; calcium panthothenate; 4.5mg; Vit B3, 9mg; Vit B6, 1mg; Vit B12; 0.008mg; folic acid, 0.5mg; manganese, 70mg; zinc, 50mg; iron, 20mg; copper, 3mg; iodine, 1mg; cobalt 0.2mg; selenium, 0.1mg; antioxidant, 0.1mg; choline chloride, 0.2mg, Antimould, 15mg; Growth promoter, 0.20mg; carrier and 2.5mg; methionine, 2.2mg; Lysine; 2.25mg.

2 Based on prices at the time of studies = N1,500 per bag

Table 2: Calculated nutrient level of the diets

	Diets			
Nutrients	***1***	***2***	***3***	***4***
Crude protein %	22.2	26.0	28.0	29.6
ME/Kcal/kg	2977	2674	2522	2371
Ether extract %	3.05	4.09	4.50	5.20
Crude fibre %	2.71	7.30	9.61	11.93
Calcium %	1.40	1.40	1.46	1.50
Phosphorus %	0.85	0.90	0.95	1.00
Lysine %	1.42	1.52	1.63	1.68
Methionine + Cysteine %	0.65	0.80	0.88	0.97

Source: Experimentation, 2009

Table 3: Effects of different levels of PKC on the performance of broiler chicks (1 - 6 weeks)

	Treatments				
Parameters	***1***	***2***	***3***	***4***	***SEM***
Final body weight, g/bird	530.62	580.75	545.50	600.08	43.50
Weight gain per bird (g)	430.59	580.70	545.49	500.08	43.50
Feed consumption per bird (g)	1222.11b	1594.38a	1630.70a	1515.20a	168.21
Feed gain ratio	2.99	2.93	2.97	3.08	0.38
Feed cost per kg gain, N	94.78a	71.90b	62.35b	53.40b	9.50
Energy consumed, kcal/bird	3636.98	4261.90a	4118.38a	3791.14b	16.82
Protein consumed, g/bird	274.34b	417.70a	458.36a	453.81a	175.50
Mortality	0.00	0.00	0.00	0.00	0.00

a, b means row values with the same superscript or no superscript are not significantly different (P>0.05)
SEM = Standard error of means

Source: Experimentation, 2009

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