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Effects of Feeding Varying Levels of Unpeeled Cocoyam Meal on the Performance of Growing Quails (*Coturnix coturnix japonica*)

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Abstract
A feeding trial of 4 weeks duration was conducted to determine the effect of replacing maize with unpeeled cocoyam of CP; 8.90% and ME; 3110.52kcal/kg on the performance and carcass values of growing Japanese quails. Two hundred three–week old quails of mixed sexes were randomly allocated to five diets in a completely randomized design. Five isonitrogenous (25% CP) diets incorporated 0, 8.31, 16.61, 24.92 and 33.13% of unpeeled cocoyam at the expense of maize. The diets, however, varied in energy levels from 2,706.92 (Diet A) to 2,599.71kcal/kg ME (Diet E). Diets B (2,680.04), C (2,653.05) and D (2,626.25) were lower than diet A. Each diet was replicated three times. Feed intake (11.11, 10.91, 10.37, 13.29 and 15.69g/bird/day), weight gain (2.59, 2.74, 2.17, 2.56, 2.75g/bird/day) and feed conversion ratio (5.26, 4.03, 12.53, 5.39 and 5.64) did not differ significantly from the control. Therefore, unpeeled cocoyam meal could completely replace maize in diets for Japanese quail chicks without adverse effect on performance.

Key word: Cocoyam meal, weight gain, Japanese quails,*Coturnixcoturnix japonica*

Introduction

The maize grain with over 80% digestibility has been the major choice of the energy **source of** feed material for poultry and other non-ruminants. This feed material accounts for between 45 and 55% of virtually every poultry diet. This high inclusion rate considering the cost of maize today results in high cost of poultry feed and subsequently the high cost of products like eggs and meat, (Fafiolu *et al*., 2004).Cocoyam belongs to the genus *Xanthosoma* and the genus *Colocasia.* Those that belong to the genus Colocasia are called, 'Taro' while those belonging to Xanthosoma are called, 'Tannine' (Manner and Taylor, 2010).Taro cocoyam is less consumed by man as compared to grains. Cocoyam has better nutritional qualities than other roots and tuber crops such as cassava and yam with higher protein, vitamins and minerals.

Japanese quails are little-known birds that are small-sized and early maturing (Robbins, 1981). This early maturing nature enables them to start laying as early as from the 5th week of life (Martins, 1987). It is recommended that persons prone to high blood pressure and related diseases could consume the meat and eggs with less risk. Recommended levels of some nutrients (CP, 25; ME, 2,600kcal/kg) when maintained in the feed is useful in achieving optimal performance in growing Japanese quails, (Haruna *et al*., 1997; Edache *et al*., 2005).

There is paucity of information regarding taro cocoyam and its nutritional value in quail diet hence the need for this study.

Materials and Methods

three-week old Japanese quail birds of mixed sexes were obtained from the National Veterinary Research Institute poultry farm and used in this study. They were uniform in size and body conformation and housed in deep litter house partitioned into 15 units with wire mesh to allow for adequate ventilation. There were 16 birds per unit although ten units had an extra bird each. Each diet was randomly allocated three units of cages in a completely randomized design. All birds from each unit were weighed at the beginning and weighed weekly for four weeks. The experimental diets were designated A, B, C, D and E. Diet A contained no unpeeled cocoyam meal. Feed and water were given *ad libitum* for six weeks.

Unpeeled cocoyam was collected from some local markets in Plateau State. They were dried and crushed into meals and incorporated into the diets free from weevils and mould. They were analyzed for proximate chemical contents as described by AOAC (2000).Five isonitrogenous (25%CP) diets were formulated. Diet A with no unpeeled cocoyam was the control. In the other diets, B, C, D and E, 25, 50, 75 and 100% respectively of maize was replaced by unpeeled cocoyam meal and contained metabolizable energy (ME) levels; 2,706.92, 2,680.04, 2,653.05, 2,626.25 and 2,599.71 kcal/kg respectively (see Table 1).

The mean weekly body weights and feed intake were recorded throughout the experimental period. From the mean body weight and feed intake, feed conversion ratio was calculated. Feed cost/kg diet was calculated from prevailing local market price of feed materials. Data collection was subjected to analysis of variance; ANOVA (Steel and Torrie, 1980).

Results and Discussion

Proximate analysis of sundried unpeeled cocoyam showed that it contained; moisture, 4.23%; crude protein, 8.90%; crude fibre, 5.13%; ether extract, 2.69%; total ash, 3.17% and N.F.E, 81.02%. These values contrast with those recorded for sundried cocoyam as reported by Adejoro *et al.* (2013) and may be dueto varietal and soil nutrient differences. However, crude protein, crude fibre and NFE levels (7.87, 4.75, 80.83%) reported by Mohammed *et al* (2009) are close to values for the cocoyam in this study. Levels of phytate (0.50), oxalate (0.61), hydrogen cyanide (0.27), saponins (4.02), haemagglutinins (0.06) and tannins (1.16mg/100g) in the cocoyam used in this report vary appreciably from levels reported by Adejoro *et al.* (2013). Varietal factors and geographical location have regulating effects on the content of these toxic chemicals.

Table 1: Ingredient and calculated composition of the diets

Ingredients	A	B	C	D	E
Maize	33.22	24.89	16.55	8.23	-
Unpeeled cocoyam	-	8.31	16.61	24.92	33.13
Ground nut cake	39.08	39.10	39.14	39.15	39.17
Palm kernel cake	20.00	20.00	20.00	20.00	20.00
Rice offal	2.00	2.00	2.00	2.00	2.00
Fish meal	1.50	1.50	1.50	1.50	1.50
Bone meal	2.00	2.00	2.00	2.00	2.00
Lime stone	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated composition					
C.P. (%)	25.00	25.00	25.00	25.00	25.00
M.E. (kcal/kg)	2706.01	2680.04	2653.05	2626.05	2599.71
Ca. (%)	1.63	1.57	1.53	1.56	1.59
P. (%)	0.65	0.51	0.53	0.53	0.54
C.F. (%)	5.25	5.53	5.73	6.04	6.30

Data on feed intake, weight gain and feed conversion ratio are presented in Table 2. Feed intake, weight gain and feed conversion ratio on the cocoyam diets were similar ($p>0.05$) to the control diet. The report by Olajide (2012) of lack of significant effect of the cocoyam diets on feed intake agrees with the result of the present study. Mohammed *et al* (2009) also reported a significant reduction in weight gain with increasing levels of cocoyam in the diets for broilers. However, the report of decreasing weight gain and increasing FCR in the study reported by Olajide (2012) was not observed in this study and may be as result different animal species. Therefore unpeeled cocoyam could completely replace maize in the diet of growing quails since there was no adverse effect on performance.

Table 2. Effects of varying cocoyam meal levels on parameters measured

Parameters	A	B	C	D	E	SEM
Feed intake (g/b/d)	11.11	10.91	10.37	13.29	15.69	2.02NS
Weight gain (g/b/d)	2.59	2.74	2.17	2.56	2.75	0.47NS
Feed/gain ratio	4.32	4.36	4.61	5.05	6.23	1.66NS
Initial weight (g)	29.89	22.22	23.33	22.22	25.56	
Final weight (g)	110.00	100.83	74.17	103.33	90.00	

Conclusion

Cocoyam is not as heavily used as maize in human nutrition but has a great potential for use in poultry diets. All efforts to replace maize in diets for poultry should be exhausted to reduce the cost of poultry products. Comparison of the mean values of parameters (feed intake, weight gain and feed/gain ratio) showed that the mean values of these parameters were similar. However, studies on carcass values could further confirm the use of unpeeled cocoyam in quail nutrition and should be encouraged as this could bring out further details of how much of this feed material can be utilized.

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