NUTRITIONAL EVALUATION OF GRADED LEVELS OF CASSAVA PEEL MEAL FOR GROWING JAPANESE QUAIL (*Coturnix coturnix japonica*)

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ABSTRACT
A feeding trial of 6 weeks duration was conducted to determine the effect of replacing maize with cassava peel meal of CP; 2.93% and ME; 3042.70kcal/kg on the performance of growing Japanese quails. One hundred and fifty two (152), a week old quails of mixed sexes were randomly allocated to five diets in a completely randomized design. The five isonitrogenous (25% CP) diets incorporated 0, 8.29, 16.58, 24.87and 28.37% of cassava peel meal at the expense of maize. The diets, however, varied in energy levels from 2,706.45 (Diet A) to 2,558.10kcal/kg M (Diet E). Diets B (2,662.92), C (2,619.80) and D (2,576.42) were lower than for diet A. Each diet was replicated three times. Feed intake (16.75, 16.32, 16.74, 16.69 and 16.91g/bird/day), weight gain (3.39, 3.42, 3.44, 3.44 and 3.55g/bird/day), feed conversion ratio (4.94, 4.77, 4.87, 4.85 and 4.78) did not differ significantly from the control. However, feed cost/kg gain was significantly higher ($p<0.05$) on diet A (370) than on diets D (320.00), and E (313.33) respectively. Other differences were not significant. Feed cost per kg diet decreased from 74.53(diet A) to 65.10 (diet E) and has a cost saving of 12.65% over the control diet. It is concluded that cassava peel meal could replace 100% of maize in growing quail diet without negative effect on performance.

Key words: Cassava peel, Productive performance, Japanese quail.

INTRODUCTION
Japanese quail birds are small-sized, early maturing, hardy and prolific (Robbins, 1981). They come to egg production between the 5th and 6th week of life but adult plumage is not attained until the 12th week of age (Martins, 1987). The meat and eggs are low in body fat and cholesterol (Schwartz and Allen, 1981) which is of public health significance. Persons prone to high blood pressure and related diseases could consume these products with less risk. Between 22% and 25% crude protein diet has been recommended for acceptable performance for growing Japanese quail (Haruna *et al.*, 1997; Edache *et al.*, 2005). According to Fafiolu *et al.* (2004), the major problem of the poultry industries is the escalating price of feed materials. Cassava belongs to the family *Euphorbiaceae*. It was introduced from its native region of tropical America by Portuguese to the Congo basin around 1558 (IITA, 2009). It is a staple food in Nigeria with many uses. IITA (2009) reported that it contains a high level of carbohydrate, calcium, vitamin B and C and several minerals. Nigeria is the World's largest producer with a production capacity of 40 million metric tones (Okoli, 2008). According to Calpe (1991) cassava utilization in animal feed accounts for only 2% of cassava utilization in Africa. Cassava peel can replace maize in the diet of broiler finisher chicken without adverse effect on performance (Abubakar and Ohiaege, 2011). The objective of this study is to determine the effect of replacing maize with cassava peel meal on the performance of growing Japanese quails.

MATERIALS AND METHODS
Birds and management: A total of 150 two-week old Japanese quail birds of mixed sexes obtained from the poultry farm of the National Veterinary Research Institute were used for this study. They were uniform in size and body weight and were housed in deep litter house partitioned into 15 units with wire mesh to allow for adequate ventilation. There were 10 birds per unit. Each treatment or 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 six weeks. The experimental diets were A, B, C, D and E. Diet A contained no cassava peel. Feed and water were given *ad libitum* for six weeks. Cassava peels were collected from several processing points in Mangu. Mangu LGA in Plateau State. They were sun-dried and crushed into meals and incorporated into the diets free from mould and weevils. They were

analyzed for proximate chemical contents, (AOAC, 2000).

Experimental diets: Five isonitrogenous (25%CP) diets containing graded levels (0, (control), 8.29, 16.58, 24.87 and 28.37%) of cassava peel meal at the expense of maize were used in the study. The diets were designated A, B, C, D and E respectively and contained metabolizable energy (ME) levels; 2706.45, 2662.92, 2619.80, 2576.42 and 2558.10 kcal/kg respectively.

Data Collection: 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 gain and 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) and where significant differences occurred, means were separated by Duncan's multiple range test (Duncan's, 1955).

RESULTS AND DISCUSSION

Proximate analysis of cassava peel meal showed that it contained; moisture, 8.90%; crude protein, 2.93%; crude fibre, 4.20%; ether extract, 0.91%; total ash, 7.50%; dry matter, 92.94% and N.F.E, 84.90% and HCN, 17mg/100g. Data on feed intake, weight gain and feed conversion ratio are presented in Table 2. Feed intake and weight gain on the cassava peel diets were similar to the control diet. This is contrary to the report of Abubakar and Ohiaege (2011) where the broilers in their study had significantly higher feed intake and weight gain on the 50% cassava peel diet than on other levels and the control. Feed conversion ratio did not differ between the cassava peel meal diets and the control in this study. Abubakar and Ohiaege (2011) reported significant reduction in feed conversion ratio as cassava peel meal increased in the diet. However, the non significant effect of the diet on feed intake, weight gain and feed conversion ratio in this study agrees with the report of Tiemoko (1985) and Edache *et al.* (2007) and may probably be due to the ability of Japanese quail to adjust feed intake acquired in the wild. Feed cost /kg gain was significantly better on diets D (75%) and E (100%) than on the control which agreed with the findings of Salami and Odunsi (2003) when they fed laying birds with processed cassava peel meal. Abubakar and Ohiaege (2011) reported significantly better feed cost/kg gain in broilers fed the 50% cassava peel meal diet. Feed cost/kg feed decreased as the levels of cassava peel meal increased which is similar to the report of Edache *et al.* (2007) and have a cost saving of 12.65% over the control diet.

Conclusion

Cassava peels are present at several processing points of our towns and settlements and many times constitute a waste disposal burden. The escalating cost of poultry feed could effectively be alleviated by use of cheaper resources like this. Comparison of the mean values of parameters (feed intake, weight gain and feed/gain ratio and feed cost/kg gain) showed that the mean values of the parameters were similar (p□0.05). Therefore, maize can completely be replaced by cassava peel meal for profitable performance in growing Japanese quail.

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Table 1: Effects of various cassava peel meal levels on parameters measured

Parameters	A	B	C	D	E	SEM
Feed intake (g/b/d)	16.75	16.32	16.74	16.69	16.91	0.53N.S
Weight gain (g/b/d)	3.39	3.42	3.44	3.44	3.55	0.15N.S
Feed/gain ratio	4.94	4.77	4.87	4.85	4.78	0.28N.S
Feed cost/kg gain	370[a]	343.33[ab]	336.67[ab]	320.00[b]	313.33[b]	20.49*
Initial weight (g/bird)	16.43b	14.29ab	13.81a	13.81a	14.76ab	1.25*
Final weight (g/bird)	131.93[ab]	134.20[ab]	129.41[a]	138.13[b]	129.85[ab]	4.14*

a,b. Means with different superscripts within a row differ significantly (P<0.05)

Table 2: Composition of experimental diets (%)

Ingredients	A	B	C	D	E
Maize	33.16	23.45	13.79	4.10	-
Cassava p. meal	-	8.29	16.58	24.87	28.37
Groundnut cake	39.14	40.56	41.93	43.33	43.93
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
Limestone	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
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
Calculated composition					
CP (%)	24.99	25.00	25.00	25.00	25.00
ME (Kcal/kg)	2706.45	2662.92	2619.80	2576.42	2558.10
Ca (%)	1.48	1.49	1.49	1.50	1.50
P (%)	0.50	0.50	0.50	0.51	0.51
C.F. (%)	5.26	5.49	5.74	5.93	6.03
Cost/kg(N)	74.53	71.79	69.02	66.26	65.10