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Growth Response and Nutrient Digestibility of Japanese Quails (*Coturnix coturnix japonica*) Fed Sun-Dried and Honey-Flavored Cassava Peel Meal Diets

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Abstract

A six-weeks feeding trial was conducted to determine the effect of feeding varying levels of sun-dried and honey-flavored cassava peel meal, as a replacement of maize, on the growth performance of Japanese quails (*Coturnix coturnix japonica*) using 200 two-weeks-old chicks. The wet cassava peels were collected fresh, cleaned and sun-dried for seven days, after which they were coarsely milled and flavoured with honey. The birds were randomly assigned to four dietary treatments with 45 birds per treatment, each replicated thrice designated T₁, T₂, T₃ and T₄ containing 0, 50, 75 and 100% of sun-dried and honey-flavoured cassava peel meal (HSCPM) as replacement for dietary maize respectively. The parameters measured were initial body weight, final body weight, average feed intake, average weight gained, and feed conversion ratio. At the end of the 5th week, a nutrient digestibility trial was carried out. Results show that there were no significant ($p>0.05$) differences among the treatment means for initial body weight, average weight gain and feed conversion ratio. Significant ($p<0.05$) differences were however recorded for average feed intake and final body weight. There were significant ($p<0.05$) differences in the nutrient digestibility of the birds across the treatment means. Hence, it was concluded that HSCPM can be used to replace up to 75 % maize in the diet of growing Japanese quails with no detrimental effect on growth performance and nutrient digestibility.

Keywords: Honey-flavored, cassava peel meal, growth response, nutrient digestibility, Japanese quails,

Introduction

The animal protein intake level of humans in most developing countries including Nigeria is very low due to the high cost of protein (Abeke *et al.*, 2003). There has been call for substantial increase in the intake of proteins of animal origin in the developing countries (FAO, 1985) as they are richer in the essential amino acids. This low level of animal protein intake has generated concerns as it affects both the physical and mental development of man. In Nigeria, the domestic fowl is the major protein source providing both chicken meat and eggs. In order to widen the scope of meat and egg supply and alleviate the problem of pressure on egg and meat supply from chicken, other under-utilized species are now under focus. Efforts are being directed towards boosting the livestock industry through the introduction of other livestock species which are prolific, have short generation interval and rapid growth (Owen and Amakiri, 2010). Some species having these qualities include Japanese quail, duck, guinea fowl and ostrich (Edache *et al.*, 2007). According to Odunsi *et al.* (2007), Japanese quail are prolific, have short generation interval and rapid growth rate. They are also suitable for diabetic and hypertensive patients because of its low cholesterol level (Agwunobi and Ina-Ibor, 2007). Faniyi (2002) identified feed as constituting up to 70-80 % of total cost of poultry production of which maize constitute the major cost. Many energy supplying feed ingredients have been investigated as possible replacement for maize in the diet of poultry.

One of such alternatives is cassava and its derivatives. A good derivative is cassava peel, a by-product of cassava production, which is found abundantly in Nigeria. It is a cheaper and unconventional alternative feed resource for livestock. Omoikhoje *et al.* (2008) have reported on the extensive use of cassava peel meal as a cheaper substitute for maize in the diet of monogastric animals.

The objective of the study is to determine the growth response and nutrient digestibility of Japanese quails fed sun-dried and honey-flavoured cassava peel meal diets.

Materials and Methods

This study was carried out at the Poultry Unit of the Department of Animal Production Teaching and Research Farm, Federal University of Technology, Minna, Niger State, Nigeria. Minna lies between latitude 9° 28' and 9° 37' North and on longitude 6° 23' and 6° 33' East. The research was carried out in 6 weeks. Fresh cassava peels were obtained from cassava processing plants within Minna metropolis were cleaned up and spread on a clear polythene sheet to sun-dry for 7 days. The peels were then coarsely milled with an attrition machine and flavoured with honey at 6 % inclusion level to form the honey-flavoured cassava peel meal (HSCPM). Honey inclusion at 6% was the amount in percentage of honey that was used to flavour the cassava peel. HSCPM with others ingredients were used to prepare the experimental diets with HSCPM replacing maize at 0, 50, 75 and 100% respectively (Table 1). Two hundred (200) two-weeks-old Japanese quails sourced from National Veterinary Research Institute Vom, Plateau State, Nigeria, were used for the experiment which were randomly allotted into four treatments

with 45 birds per treatment each replicated thrice (15 birds per replicate) in a completely randomized design. The cages were equipped with feeders and drinkers. Lighting and heat were provided using 100 watt bulbs.

Table 1: Composition of experimental diets fed to growing Japanese quails (%)

	T ₁	T ₂	T ₃	T ₄
Ingredients (%)				
Maize	44.40	21.23	10.39	0.00
HSCPM	0.00	21.23	31.16	40.67
Groundnut	38.90	40.84	41.75	42.63
Maize offal	10.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50
Limestone	1.50	1.50	1.50	1.50
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
*Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis				
ME(Kcal/Kg)	2664.71	2396.71	2271.35	2151.47
Crude protein	24.00	24.00	24.00	23.15
Crude fibre	3.76	5.23	5.91	6.57
Lysine	0.98	0.95	0.94	0.93
Methionine	0.41	0.37	0.35	0.33
Calcium	1.62	1.62	1.62	1.62
Phosphorus	0.82	0.77	0.74	0.72

*Premix supplied per 0.25kg: vit. A (7,500.00iu), vit. D (500,000iu), vit. E (1,000iu), vit. B₁ (375mg), vit B₂ (125mg), vit. B₃ (500mg), vit. B₆ (150mg), vit. B₁₂ (2.5mg), vit. K (15mg), vit. C (10mg) and folic acid (150mg), Ca (12.5mg), Cu (8.0mg), Fe (32mg), I (0.8mg), Se (100mg), Mg (0.25mg), Chlorine (250mg), panthotenic acid (14.4mg). HSCPM=Sun-dried Cassava Peel Meal; T1=100% maize, 0% HSCPM; T2=50% maize, 50% HSCPM; T3=75% maize, 25% HSCPM; T4=100% HSCPM, 0% maize.

Routine management operations were carried out. Data was collected on average feed intake, average weight gained and feed conversion ratio. At the end of the 5th week of the experiment, five birds were randomly selected from each replicate and moved into metabolism cages for nutrient digestibility studies. They were adjusted in the cages for three days, followed by faecal collection for four days using the total collection method. The experimental diets and the collected faecal samples were analyzed for their proximate composition using the procedures of AOAC (1990) to determine the apparent nutrient digestibility of the experimental diets by the growing quails. Data collected were subjected to analysis of variance using SPSS 17.0 version.

Results and discussion

The results of growth performance and nutrient digestibility are presented in Table 2. The final body weight and the daily feed intake were significantly ($p < 0.05$) affected by the inclusion levels of HSCPM in the diets of the birds. The increased feed intake observed in the birds fed HSCPM might be as a result of the high fibre content and low energy value of the cassava peel meal which is in agreement with the findings of Salami and Odunsi (2003) who reported that increase in crude fibre decreases the metabolizable energy and leads to increase in the feed intake. It can also be attributed to the honey inclusion in their diets which improved the nutritive value, palatability, growth rate and feed efficiency (Busserolles *et al.*, 2002). Quails fed 75% HSCPM had significantly ($p < 0.05$) better digestibility which is in disagreement with earlier findings of Onyimonyi and Ugwu (2007) who reported that birds could tolerate up to 50% cassava peel as replacement for maize beyond which decrease in weight and poor digestibility sets in. The tolerance level might be due to flavouring of the cassava peel meal with honey which tends to improve the nutritive value, palatability and feed efficiency of the diets. It can therefore be concluded that HSCPM can be used to replace up to 75 % maize in the diet of growing Japanese quails with no detrimental effect on growth performance and nutrient digestibility.

Table 2: Growth performance and nutrient digestibility of Japanese quails fed dietary levels of sun-dried and honey-flavoured cassava peel meal

Parameters	T ₁	T ₂	T ₃	T ₄	SEM	LS
Initial body weight (g/b)	4.44	4.54	4.29	4.29	0.05	NS
Final body weight (g/b)	13.65 ^a	13.81 ^a	12.22 ^b	12.54 ^b	0.21	*
Daily weight gain (g/b)	3.07	3.07	2.64	2.75	0.42	NS
Daily feed intake (g/b)	13.86 ^c	18.80 ^a	17.98 ^b	18.08 ^b	0.16	*
Feed conversion ratio	0.61	0.94	1.20	1.32	0.20	NS
Nutrient digestibility coefficient (%)						
Dry matter	76.43 ^a	69.13 ^b	77.45 ^a	70.73 ^b	0.94	*
Crude protein	74.03 ^{ab}	69.78 ^c	77.53 ^a	73.09 ^{bc}	0.84	*
Crude fibre	83.84 ^c	68.46 ^b	83.72 ^a	63.46 ^c	1.88	*
Ether extract	84.14 ^c	85.71 ^{bc}	91.15 ^a	86.67 ^b	0.59	*
Ash	54.17 ^c	64.73 ^b	73.31 ^a	70.66 ^{ab}	1.80	*
Nitrogen free extract	64.37 ^b	65.26 ^b	72.90 ^a	66.26 ^b	0.94	*

^{abc}Means in the same row with different superscripts were significantly (P<0.05) different. SEM= standard error of means; LS= Level of significance; *= significantly different (P<0.05); g/b= gram per bird, HSCPM= Honey-flavoured sun-dried cassava peel meal; T₁=100% maize, 0% HSCPM; T₂=50% maize, 50% HSCPM; T₃=25% maize, 75% HSCPM; T₄=0% maize, 100% HSCPM.

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