RESPONSE OF JAPANESE QUAILS (*COTURNIX COTURNIX JAPONICA*) FED DIETS CONTAINING VARYING LEVELS OF SWEET POTATO PEEL (*IPOMOEA BATATAS)* MEAL

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Abstract

The response of Japanese quails chicks (*Coturnix coturnix japonica*) fed diets containing varying levels of Sweet potato peel (*ipomoea batatas*) meal as dietary energy was studied. Three hundred unsexed 2 weeks old Japanese quails (mean weight 32.00g) were fed the different diets for a period of 28 days during which data were collected. The birds were randomly assigned to four dietary treatments each (0, 10, 20, 30% sweet potato peel meal) consisting of 75 grower quails per treatment with three replicates of 25 birds in a completely randomized designed (CRD). Water and feed were supplied ad libitum. Result showed that inclusion of sweet potato peel meal in diets of grower quails significantly improved ($P<0.05$) their final live weights, weight gain, cost per gain and age at 1st egg across dietary treatments. Feed intake decreased significantly ($P < 0.05$) as the levels of sweet potato increased in diets. Quail birds fed 10% sweet potato peel meal performed significantly ($P < 0.05$) better in feed conversion ratio. It was concluded that sweet potato peel inclusion at 10% enhanced growth performance of Japanese quails up to 6 weeks of age compared to other dietary treatments.

Keywords: Dietary treatments; Japanese quails; Performances; Sweet Potato Peel; Varying levels.

INTRODUCTION

The Nigerian poultry industry is faced with a lot of problems that have resulted to a gross shortage of meat to meet the population challenge in the country and there is acute shortage of animal protein in the diet of an average Nigerian (FAO, 2006). This is due to the high cost of conventional protein and energy concentrates, increasing competition between man, industries and livestock for the available grains, price fluctuations and unavailability of the feed ingredients for the formulation of animal feeds (Duru and Dafwang, 2010). Profit maximization cannot be attained unless the birds are fed diets at lowest costs. There is need to search for non-conventional feed resources that are cost-effective, non-toxic and readily available and alternative sources of energy concentrate. Sweet potato peel can be a good alternative source of energy in poultry ration. Japanese quails (*Coturnix coturnix japonica*) are beginning to make useful contribution to meat supply in Nigeria where there is shortage of animal protein. They have unique characteristic of fast growth, early sexual maturity, short generation interval that make them suitable for diversified animal agriculture (Oluyemi and Roberts, 2007). They are fairly resistant to disease and required little demand for vaccination (Jadhav and Saddiqui, 2010). This study was designed to evaluate the effect of varying dietary sweet potato peel levels on growth performance of Japanese quails and compared cost benefit effect of experimental diets.

MATERIALS AND METHODS

The study was conducted at the Quail Unit, Teaching and Research Farm, Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria. Zaria is located within the Northern Guinea Savanna Zone on latitude 11^0 11' 06" N and longitude 7^0 38' 55' E, at an altitude of 706m above sea level. A total of three hundred (300) quail birds were purchased from Maizuma farm at Galma New Jos Road, Along Dakace Zaria, Kaduna State. Sweet Potato Peel was sourced from Local Sweet potato fryers within Samaru and Samaru market in Zaria, Kaduna State (during dry season). The sweet potato Peel was washed

and sun-dried on concrete floor (under hygienic condition), after which they were winnowed to get rid of any foreign materials. Sample of the winnowed sweet potato peel were oven dried, milled and used for chemical analysis. The other ingredients were sourced from Rebson Feed Mill, Samaru Zaria, Kaduna State. A total of three hundred (300) 2 weeks old quail birds were used for the study. On arrival, the quails were weighed and randomly assigned into four groups of 75 birds each. Each of the groups was subdivided into 3 replicates of 25 birds per replicate in a completely randomized design (CRD). Common diet was given for a day and all necessary routine management practices were adhered to throughout the study period. Four Experimental diets were formulated for the trial. The quail birds were given their respective diets and water *ad-libitum* throughout the trial period. The birds were weighed at the beginning of the trial and weekly thereafter. Performance parameters were monitored. Feed intake and body weight gain were taken weekly. These were used to calculate average or daily feed intake and weight gain. Feed conversion ratio was calculated on the basis of unit of feed consumed to unit of body weight gain. Samples of the Sweet Potato peel were taken to the Animal Science Biochemical Laboratory for proximate analysis using the methods described by A.O.A.C. (2005). Metabolizable energy (ME) was computed using the method described by Pauzenga, (1985). Data generated were statistically analyzed using the General Linear Model Procedure of Statistical Analysis System (SAS, 2002). Significant means were separated using Dunnett's Test in the SAS package.

Table 1: Proximate Composition of Sweet Potato Peel Meal and Experimental Diets Containing Varying Levels of Sweet Potato Peel Meal for Grower Japanese Quails (2 – 6 weeks)

		Inclusion levels of Sweet Potato Peel (%)			
Parameters (%)	Sppm	0	10	20	30
Dry matter	92.86	93.50	93.07	92.75	93.45
Crude protein	3.88	21.44	25.31	23.75	25.19
Ash	11.38	8.74	9.24	8.08	9.02
Crude fibre	7.70	6.33	6.19	6.08	6.80
Ether Extract	5.10	4.48	4.56	4.84	4.75
Nitrogen free Extract	70.99	59.01	54.70	57.25	54.25
ME (Kcal/ Kg)	3073.07				

Spm=Sweet potato meal. ME=metabolisable energy. ME (Kcal/Kg) = (35.0x%CP)+(81.8xEE)+(35.5xNFE),Pauzenga, 1985

RESULT AND DISCUSSION

The result of proximate composition of sweet potato peel meal and experimental diets is shown in table 1. The effect of diets containing varying levels of sweet potato peel meal on the growth performance of grower Japanese quails is presented in Table 2. The final weight (141.33g) and weight gain (109.33g) were significantly ($P < 0.05$) higher in birds fed 10% sweet potato peel based diets. The feed intake was significantly ($P < 0.05$) higher in birds fed 10% sweet potato peel based diets (128.33g).The feed conversion ratio (1.00g) was significantly ($P < 0.05$) higher in birds fed 10% sweet potato peel based diets. The average age at first egg (AAFL) was significantly ($P < 0.05$) higher in birds fed 10% sweet potato peel based diets (39.67g). The weight of first egg was significantly ($P < 0.05$) higher in birds fed 10% sweet potato peel diets. Feed cost per kg gain (10.50) was significantly ($P < 0.05$) better in birds fed 30% sweet potato peel based diets. The cost of daily feed intake (₦ 8.82) and cost of total feed intake (₦ 247.08) were significantly better in birds fed 30% sweet potato peel based diets. The proximate composition of the sweet potato peel meal was similar to values reported by Agbai *et al*, 2017 that sweet potato meal contained 92.95% DM, 5.25%CP and 76.85% NFE and also similar to values reported by Afolayan (2010) that sweet potato meal contained 92.76% DM, 5.36%CP and 81.78% NFE. Birds on 10% sweet potato meal performed better on the basis of feed intake, weight gain, feed conversion ratio and dressing percentage compared to the control

diet and other treatments. This may be due to the increased level of digestibility of the diets. Yoshida and Morimoto (1958) and Ravindran (1995) reported the carbohydrate fraction in sweet potato to be about 90% digestible in grower birds. The result showed significant difference between the weight gained and the level of dietary Sweet potato. The 10% sweet potato diets appeared to be the most efficiently utilized compared to the other diets. The 30% diets were the most poorly utilized. The increase in the inclusion levels of sweet potato resulted in decline in feed intake and growth. This agreed with the report of Maphosa *et al.* (2003) who reported that a significant decline in weight gain was noticed with increase in the inclusion of sweet potato during the starter and finisher phases. The significantly reduced weights of birds on diets containing 30% sweet potato meal could be as a result of increased fibre in the sweet potato meal which also increases the fibre content and anti-nutrients factor (Oladunjoye and Ojebiyi, 2012). Bach, (2001) reported that the main physiochemical characteristics of dietary fibre with nutritional significance was hydration properties, which influence solubility, water holding capacity (WHC), and swelling capacity.

Table 2: Effect of Varying Levels of Sweet Potato Meal on Growth Performance of Grower Japanese Quails (2 – 6 weeks)

	Inclusion levels of sweet potato (%)				
Parameters	0	10	20	30	SEM
Initial weight (g/b)	32.00	32.00	32.00	32.00	0.00
Final weight (g/b)	141.28^{a}	141.33^{a}	132.70^{b}	132.32^{c}	0.11
WG (g/b)	109.28^{a}	109.33^{a}	100.70^{b}	100.32^{c}	0.10
Total Feed intake (g/b)	128.37^{ab}	128.33^{b}	155.62^{a}	119.77^{c}	10.30
DFI (g/b/d)	4.59^{ab}	4.58^{b}	5.56^{a}	4.28^{c}	0.37
FCR	1.18	1.00^{a}	1.55^{c}	1.19^{ab}	0.10
AAFL (d)	36.67	39.67^{a}	35.50^{c}	39.33^{ab}	0.77
AWFE (g)	8.87	9.78^{a}	8.49^{bc}	9.72^{a}	0.19
Cost/kg WG (₦ /kg)	31.42^{b}	12.87^{b}	15.13^{c}	10.50^{a}	2.32
Cost of feed (₦ /kg)	26.63^{d}	24.64^{c}	22.63^{b}	20.63^{a}	0.00

^{abcd} Means with different superscript on the same row are significantly different (P < 0.05) SEM: Standard Error of Means. WG: weight gain. DFI: daily feed intake. FCR: feed conversion ratio. AAFL: average age at first lay. AWFE: Average weight of first egg. (g/b): gram/bird. (g/b/d): gram/bird/day.

Birds on 10% sweet potato inclusion in their diets had better feed conversion ratio compared to those on 0% sweet potato inclusion in their diets. This agreed with the observation of Gerpacio *et al.* (1978) who reported that the performance of birds fed diets containing sweet potato especially at the higher levels was less satisfactory compared to corn. The significant difference in feed conversion ratio observed across the dietary treatments is in agreement with the observation of Afolayan *et al.* (2012) who reported that birds fed diets containing 10% to 20% sweet potato meal performed better than those on 30 and 40% inclusion levels. The significant difference among dietary treatments may be as a result of the presence of anti-nutritional factors which affected nutrient utilization. Elkin *et al.* (1995) reported that the growth of poultry birds has been known to reduce due to the presence of anti-nutritional factors in the diet which reduced the utilization of energy, protein and specific amino acids. No mortality was observed across the treatments. This is in agreement with earlier reports that though sweet potato may contain unidentified growth inhibitors, the level in sweet potato definitely posed no danger of death to birds. Many researchers (Tewe, 1994; Ravindran and Sivakanesan, 1996) have attested to the claim that sweet potato in broiler chickens diets does not result in mortality. Observation by Maphosa *et al* (2003) however differed and the authors attributed the high mortality recorded in their experiment to sweet potato inclusion in the diets. The difference in the present result and that of Maphosa *et al* (2003) may be due to the difference in the type of sweet potato cultivars used. Diets containing 10 and 30% sweet potato peel meal reduced cost of production

by 59.04% (₦18.55) and 20.92% (₦66.58%) respectively. Increase in inclusion of sweet potato peel meal, decreases cost of feed.

CONCLUSION AND RECOMMENDATION

It was concluded that Sweet potato peel meal inclusion at 10% enhanced growth performance of quails at least cost of production compared to those on the control diets.

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