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The Performance of Japanese Quail (*Coturnix coturnix*) Birds on Graded Levels of Sweet Potato (*Ipomoea batatas*)

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ABSTRACT

An experiment was conducted to determine the performance of Japanese quail on graded levels of sweet potato (0%, 11%, 22% and 33%) in treatment 1 (T_1), treatment 2 (T_2), treatment 3 (T_3) and treatment 4 (T_4), respectively. Ninety six quail birds were allotted to the four treatments (T_1, T_2, T_3 and T_4) in a Completely Randomized Design. The experiment lasted 8 weeks. Results showed that feed intake and egg weight were significantly ($P<0.05$) affected by the treatments. Feed intake was highest in T_3 (39.42 $\pm$1.24g), followed by T_2 (36.36$\pm$1.24g) and T_1 (35.88$\pm$1.24g) and the least was in T_4 (32.14$\pm$1.24g). Egg weight was highest and same in T_4 (12.58$\pm$0.693g), T_2 (12.54$\pm$ 0.693g) and T_1 (11.83$\pm$ 0.693g) with the least in T_3 (9.46$\pm$0.693g). There was depression in egg production in T_3, therefore T_2 is recommended for farmers.

INTRODUCTION

Poultry production has been on the decline due to constraints like high cost of feed and drugs, low quality day old chicks, disease etc (Musa et al., 2008). This has resulted to low animal protein intake in developing countries like Nigeria. To bridge this gap, animal nutritionists are on the search for cheaper non – conventional feedstuff for the production of poultry, quail inclusive. Quails are cheap sources of animal protein (Babangida and Ubosi, 2006) and they are early maturers (Tuleun et al., 2013). The crude protein requirement of Japanese quail for egg production has been reported to be 20% (Edache et al., 2012 and Akpan et al., 2008) with a range of 16 – 30% (Attia et al., 2012 and Shayan et al., 2013).

Sweet potato (*Ipomoea batatas*) has been reported to support the growth of Japanese quail (Edache et al., 2009). Sweet potato meal can be included up to 25% in the diets of laying hens without adverse effect (Okereke et al., 2009).

This study was therefore aimed at evaluating the effects of graded levels of sweet potato meal on the performance of Japanese quail birds.

MATERIALS AND METHODS

Location of Study

This experiment was carried out in the University of Port Harcourt Research and Demonstration Farm, Choba, Obio/Akpor Local Government Area of Rivers State in the South-South zone of Nigeria. It falls within the humid rain forest zone of West Africa with long duration of rainfall (March - November) and a very short dry season precipitation occurs during September with an average of 367 mm of rain in 182 rain days with a temperature range of 25 - 28^{0}C and a very high relative humidity (above 80% rainfall (March-November) and a very short dry season precipitation occurs during September with an average of 367 mm of rain in 182 rain days with a temperature range of 25 - 28^{0}C and a very high relative humidity (above 80%).

Experimental diet

Sweet potato tubers were purchased from markets in Choba, sorted, peeled, chopped into slices and sundried for 7days. They were then milled and bagged for feed formulation. Other ingredients are bought from the market and in the feed formulation as shown in Table 1.

Table 1: The experimental diets

Ingredients(%)	Treatments			
	T_1(0%)	T_2(11%)	T_3(22%)	T_4(33%)
Maize	45.3	33.97	22.65	11.33
Sweet potato	0.0	11.33	22.65	33.97
PKC	10	10	10	10
SBM	25	25	25	25
FM	4	4	4	4
WB	9	9	9	9
Palm oil	3	3	3	3
Bone meal	3	3	3	3
D – L methionine	0.03	0.03	0.03	0.03
Lysine	0.02	0.02	0.02	0.02
Salt	0.4	0.4	0.4	0.4
	100	100	100	100

Where PKC = palm kernel cake, SBM = soyabean meal, FM = fish meal, WB = Wheat bran

Experimental birds and their management

Ninety six female Japanese quail birds were randomly allotted to 4 dietary treatments. There were 8 birds per replicate, 3 replicates per treatment which is 24 birds per treatment in a Completely Randomized Design. The dried sweet potato meal was included at 0%, 11%, 22% and 33% in T_1, T_2, T_3 and T_4 respectively. The treatment diets were formulated to meet the 20% crude protein requirement of the laying quail birds.

Data collection

Daily feed allowance was weighed before giving to the birds and left over feed collected and weighed. The feed consumed by the birds for the day was obtained by difference between the weight of feed served and the weight of the left – over. Daily feed consumption per bird was obtained by dividing the total feed consumed by the total number of birds on each replicate. Birds were weighed in group per replicate at the beginning of the experiment and subsequently weighed at weekly

interval. The average weight was obtained by dividing the total weights of the birds by the number of birds weighed per replicate.

Analytical procedure

The experiment was a Completely Randomized Design experiment. Data were analyzed using analysis of variance (ANOVA) (Steel and Torrie, 1980). Where ANOVA detected significant treatment effects, means were separated using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The nutrient composition of the experimental diets is summarized in Table 2.

The crude protein of the experimental diets fall within the range of 20.63 – 20.84%. This crude protein agrees with the 16 – 30% crude protein requirement of Japanese quail for egg production reported by Attia et al. (2012) and Shayan et al. (2013).

The performance of quail birds on graded level of sweet potato is shown in Table 3. Feed intake and egg weight were significantly ($P<0.05$) affected by the treatment diets. Feed intake tended to increase as the level of inclusion of sweet potato increases in the treatment diets and started declining after treatment 3. The highest feed intake was in T3 (39.42g), followed by T2 (36.36g) and T1 (35.88g) and the least in T4 (32.14g). The observed differences in feed intake are similar to those reported by Olubamiwa et al. (1999), Edache et al. (2005) and Edache et al. (2009). This positive attribute in feed intake recorded by the birds on 33% sweet potato inclusion could be ascribed to the high digestibility, palatability and solubility of sweet potato (Tewe et al., 2001). Egg weight was highest in T_4 (12.583 ± 0.693g) but same with T_2 (12.542 ± 0.693g) and T_1 (11.833 ± 0.693g) but declined in T_3 (9.458 ± 0.693g). This result agrees with the result of Akpan et al. (2008) for laying hens. They reported that more than 15% sweet potato depressed egg production. The result of this study showed that after 11% sweet potato inclusion, at 22% sweet potato inclusion, egg production of laying Japanese quail depressed.

Table 2: Nutrient composition of the experimental diets

Ingredients	Treatments			
	T_1(0%)	T_2 (11%)	T_3 (22%)	T_4 (33%)
CP (%) calculated	20.84	20.63	20.67	20.66
ME (Kcal/kg)	2831.91	2868.78	2894.75	2891.49
Oil (%) (calculated)	6.18	5.35	4.44	3.09
CF (%) (calculated)	5.05	4.92	4.49	4.25
Lysine (%) (calculated)	1.09	1.09	1.12	1.15
Methionine (%) (calculated)	0.41	0.40	0.41	0.41
Calcium (%)(calculated)	1.45	1.45	1.50	1.54
Phosphorus (%)(calculated)	1.0	1.0	1.0	1.0

Where CP = crude protein, ME = metabolizable energy, CF = crude fibre

Table 3: The effects of graded levels of sweet potato (*Ipomoea batatas)* on the performance of quail birds

Parameters	Treatments			
	T_1(0%)	T_2(11%)	T_3(22%)	T_4(33%)
Initial bodyweight (g)	108.70 ±0.02	110.40±0.02	107.5±0.02	105±0.02
Final bodyweight (g)	128.69± 0.15	132.25±0.15	126.85±0.15	125.28±0.15
Feed intake (g)	35.88 ± 1.24^{b}	36.36 ± 1.24^{b}	39.42 ± 1.24^{a}	32.14 ± 1.24^{c}
Weight gain (g)	19.99±26.35	21.85±26.35	19.35±26.35	19.68±26.35
Feed conversion ratio	1.80	1.66	2.04	1.63
Egg weight (g)	11.83 ± 0.693^{a}	12.54 ± 0.693^{a}	9.46 ± 0.693^{b}	12.58 ± 0.693^{a}

^{abc}Means on the same row with different superscript differ significantly ($P<0.05$).

CONCLUSION AND RECOMMENDATION

Sweet potato is available in several local and commercial markets. The escalating cost of poultry feed could be effectively alleviated by the use of cheaper and available ingredients like sweet potato. From the result of this study, it can be recommended that the best inclusion level of sweet potato is 11%. This will help farmers to produce at a lesser cost with increased profit margin.

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