Performance and carcass values of Japanese quails (*Coturnix coturnix japonica*) fed processed sweet potato (*Ipomea batatas*) meal diets,

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Abstract

A six-week feeding trial was carried out to investigate the effect of processing of sweet potato tuber on growth parameters and carcass values of Japanese quails. Five isonitrogenous (25%CP) diets were compounded. The control diet (A) had zero sweet potato tuber meal. The other four diets (B, C, D and E) contained sweet potato tuber meal processed in different ways (unpeeled, peeled, unpeeled and cooked and peeled and cooked) replacing maize at 15.60% of the diet. 300 day-old Japanese quail birds (of mixed sexes) were randomly assigned the diets in a completely randomized design. Feed and water were provided *ad libitum*. Each diet was allocated to 60 quail chicks which were further divided into three replicates of 20 birds each. None of the indices measured (feed intake, water intake, weight gain, feed conversion ratio, feed cost/gain, protein intake, energy efficiency ratio and protein efficiency ratio) differed significantly ($p > 0.05$) from the control. Energy intake was, however, higher ($p < 0.05$) on the control than on the sweet potato diets. Carcass values measured showed that bled weight and plucked weight were significantly ($p < 0.05$) heavier on the peeled and cooked sweet potato than on the unpeeled. Dressed weight and dressing % were better ($p < 0.05$) on the peeled and cooked than on the rest of the diets. Wing % was worse ($p < 0.05$) on the peeled and cooked sweet potato than on the rest of the diets while drumstick % was worse ($p < 0.05$) on peeled and cooked than on the control only. Results show that processed sweet potato can replace maize at 15.60% of the diet of quail chicks without adverse effect on performance or on carcass values and has a cost saving of 1.5% over the control diet

Keywords: Feed intake, water intake, dry matter digestibility

Introduction

Japanese quails are small-bodied birds, weighing about 180 grams at maturity. The quail belongs to the class Aves, order Galiformes, family Phasianide and kingdom Animalia (Thear, 1998; Mizutani, 2003). Quails are prolific (Robbins, 1981) and hardy birds (ANON, 1991). They have low body fat and cholesterol but high in body protein content (Garwood and Diehl,

1987). This fast growing nature makes it a panacea for increasing animal protein availability to growing human population. It is therefore important to establish an alternative energy source that can adequately support the performance of this bird.

Agwunobi (1999) reported that sweet potato meal can be a substitute for maize in the diets of broiler starter and finisher at 27

and 30% respectively and that higher level resulted in wet droppings. Gerpacio *et al.* (1978) replaced 100% of the maize with sweet potato in diets for broiler chicks. The result of their work showed that not more than 75% of maize should be replaced by sweet potato meal.

Ayuk and Essien, (2009) reported a consistent drop in weight gain as the quantities of sweet potato increased in the diet for broilers. The drop in weight gain of broilers may be due to the increasing dustiness of the feed with increasing content of sweet potato. However, the birds were not predisposed to anaemia or any health threat (Ayuk and Essien, 2009). However, as observed by Apata and Babalola (2012), data on use of sweet potato for non-ruminant animals are limited. Cooking did not significantly affect the utilization of energy (Oyenuga and Fetuga, 1975), but increased the digestibility of the nutrients (Oyenuga and Fetuga, 1975, Canope *et al.*, 1977).

Sweet potato is cheaper, easier to cultivate than maize and also has less pressure of competition for human use. However, scanty report on the use of sweet potato in quail diet is available in literature. This study seeks to establish information on the use of this feed resource in quail nutrition. The objective of this study is to investigate the effect of feeding sweet potato tuber processed in various ways on the growth performance and carcass values of Japanese quails.

Materials and methods

Source and processing methods of sweet potato tuber

The white-flesh sweet potato tuber used in this study was purchased from Jos and from a border market between Plateau and Kaduna States. The sweet

potato tubers were cleaned of dirt and subjected to various processing methods as follows:

1) Unpeeled sweet potato tubers were, sliced (3mm) and sun-dried for seven days during the harmattan to about 10% moisture.

2) Peeled sweet potato tubers were sliced (3mm) and sun-dried for seven days during the harmattan.

3) Unpeeled sweet potato tubers were sliced (3mm), cooked (20 minutes) and sun-dried for seven days during the harmattan.

4) Peeled sweet potato tubers were sliced (3mm), cooked (20 minutes) and sun-dried for seven days during the harmattan.

The cooking was done by pouring the sliced sweet potato tuber into boiling water and left boiling for 20 minutes.

The variously processed sweet potato tubers were milled using a hammermill fitted with an 8 mm sieve for incorporation into experimental diets. The diets were analyzed for proximate chemical components by procedures outlined by AOAC (2000).

Diets

Five isonitrogenous (25.13% CP) diets were formulated. The first diet contains 0% of sweet potato and tagged A (control). In each of the other four diets, 47.80% of maize (i.e 15.60% of the diet) was replaced by sundried sweet potato tuber meal that have been produced as described earlier; viz, unpeeled and raw (B), peeled and raw (C), unpeeled and cooked (D) and peeled and cooked (E). The ingredients and calculated nutrient composition of the diets are presented in Table 1.

Table 1: Percent ingredient composition of experimental diets for quail chicks (0- 6wks)

Ingredients	A	B	C	D	E
Maize	32.65	15.60	15.60	15.60	15.60
Sweet potato meal	0	15.60	15.60	15.60	15.60
Ground nut cake	36.65	38.10	38.10	38.10	38.10
Wheat offal	10.00	10.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Palm kernel cake	15.00	15.00	15.00	15.00	15.00
Bone meal	1.50	1.50	1.50	1.50	1.50
Limestone	1.50	1.50	1.50	1.50	1.50
*Vitamin Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated composition					
C.P (%)	25.13	25.13	25.13	25.13	25.13
M.E (kcal/kg)	2658.58	2450.88	2450.88	2450.88	2450.88
Ca (%)	1.33	1.33	1.33	1.33	1.33
P (%)	0.48	0.48	0.48	0.48	0.48
C.F (%)	5.14	5.79	5.79	5.79	5.79
Cost/kg diet (N)	74.04	72.92	72.92	72.92	72.92

*10 Nutrient premix supplied the following per 100kg of diet: Vitamin A, 1,200,000 I.U.; Vitamin D₃ 250,000 I.U.; Vitamin E, 3,000 I.U.; Vitamin K, 200mg; Thiamin, (B₁) 225mg; Riboflavin, (B₂) 900mg; Pyridoxine (B₆) 450mg; Niacin, 4000mg; Vitamin B₁₂, 2mg; Pantothenic acid, 1,500mg; Folic acid, 150mg; Biotin, 8mg; Choline chloride, 30,000mg; Anti oxidant, 12,500mg; Manganese, 8,000mg; Zinc, 3,000mg; Iron, 2,000mg; Copper, 500mg; Iodine, 100mg; Selenium, 20mg; Cobalt, 50mg. Key: C.P, crude protein; M.E, metabolizable energy; Ca, calcium; P, phosphorus; C.F, crude fibre.

Experimental birds: Three hundred unsexed day-old quail chicks were purchased from the Poultry Department of the National Veterinary Research Institute, Vom. They were healthy, uniform in weight and size.

Housing and experimental procedure

The birds were housed on deep litter in a standard poultry brooding house. The house was partitioned using wire mesh to allow for adequate ventilation. A floor space of 75 cm² per bird as recommended (Musa *et al.*, 2008) was used. The birds were randomly allotted to five (5) dietary treatment groups at sixty (60) chicks each in a completely randomized design. The treatments

were replicated thrice with twenty (20) chicks each. Each replicate group of chicks was weighed at the start of the feeding trial and thereafter weighed weekly to monitor the growth response over time. Cool drinking water and experimental diets were provided *ad libitum* for the study period of six weeks.

Data collection

Feed intake, water intake, body weight gain, energy intake and protein intake were measured in the course of the study. From the feed intake and weight gain, feed conversion ratio was calculated. Feed cost/gain and feed cost/kg feed were calculated using the prevailing market

prices around Jos. From the weight gain, energy intake and protein intake, energy efficiency ratio and protein efficiency ratio were determined..

$$FCR = \frac{\text{Feed intake (g)}}{\text{Weight gain (g)}}$$

Protein efficiency ratio (PER):

This was determined as a ratio of gain in body weight to the protein consumed.

$$PER = \frac{\text{Gain in body weight (g)}}{\text{Protein consumed (g)}}$$

Energy efficiency ratio (EER): This was determined as ratio of gain in body weight to the energy consumed.

$$EER = \frac{\text{Gain in body weight (g)}}{\text{Energy consumed (kcal/g)}}$$

Data collected were subjected to one-way analysis of variance as described by Steel and Torrie (1980) and where significant differences ($P < 0.05$) were observed, means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Carcass evaluation

At the end of the 6 weeks feeding trial,

four birds per replicate comprising two males and two females of live weight as close as possible to the mean of the treatment were randomly selected. The birds were starved overnight; weighed and slaughtered, plucked and dressed. Dressing percentage, prime cuts (drum stick, breast, back, wings and thigh) and visceral organs (heart, gizzard, liver, and intestines) expressed as a percentage of live weight was determined according to the procedure outlined by Oluyemi and Roberts (2002).

Results and Discussion

The result of analysis of processed sweet potato (Table 2) showed that the value for dry matter ranged from 94.37 in unpeeled sweet potato meal to 95.50% in peeled sweet potato meal. Crude protein varied from the lowest (5.45) in peeled and cooked sweet potato meal to the highest (6.08%) in peeled sweet potato meal. Figures for ether extract behaved differently with peeled sweet potato meal having the lowest (4.68%) while peeled and

Table 2: Effect of method of processing on proximate composition of sweet potato tuber meal (%)

Parameters	Method of Processing Sweet potato Tuber				SEM
	UP	P	UPC	PC	
Dry matter	94.37	94.42	95.48	95.50	±0.55N.S
Crude protein	5.72	6.08	5.61	5.45	±0.43N.S
Ether extract	5.26	4.68	5.90	6.43	±1.29NS
Ash	5.42	5.08	5.33	4.99	±0.35NS
Crude fibre	5.93	5.13	6.12	6.43	±0.94NS
Nitrogen free extract	72.04	73.45	72.52	72.20	±1.07NS

UP Unpeeled; P Peeled; UPC Unpeeled cooked; PC Peeled cooked. N.S, not significant ($p > 0.05$). SEM, standard error of mean

Table 2: Nutrient composition (%) of quail chick diets used in the experiment.

Parameters	A	B	C	D	E	SEM
Dry matter	93.78	92.69	93.78	92.14	91.74	±4.61NS
Crude protein	24.99	25.03	25.05	25.04	25.01	±0.04NS
Ash	9.10	8.41	8.82	9.56	7.97	±1.08NS
Fat	9.66	9.22	9.36	9.62	9.84	±0.43NS
Moisture	6.22	7.31	6.22	7.86	8.26	±1.63NS
Crude fibre	4.81	6.12	4.09	7.52	5.22	±2.31NS
Nitrogen free extract	64.93	56.94	58.33	54.04	55.68	±7.80NS

Key: A = Control (no sweet potato tuber meal), B = Diet with 15.60% unpeeled sundried sweet potato tuber meal, C = Diet with 15.60% peeled sundried sweet potato tuber meal, D = Diet with 15.60% unpeeled cooked sundried sweet potato tuber meal, E = Diet with 15.60% peeled cooked sundried sweet potato tuber meal, SEM: standard error of mean, N.S. not significant (P > 0.05).

cooked had the highest (6.43%) value. Peeled and cooked sweet potato meal has the lowest (4.99%) value for ash with the highest value by unpeeled

sweet potato meal (5.42%). Crude fibre value ranged from 5.13 in peeled sweet potato meal to 6.12% in unpeeled sweet

Table 3: Percent ingredient composition of experimental diets for quail chicks (0- 6wks)

Ingredients	A	B	C	D	E
Maize	32.65	15.60	15.60	15.60	15.60
Sweet potato meal	0	15.60	15.60	15.60	15.60
Ground nut cake	36.65	38.10	38.10	38.10	38.10
Wheat offal	10.00	10.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Palm kernel cake	15.00	15.00	15.00	15.00	15.00
Bone meal	1.50	1.50	1.50	1.50	1.50
Limestone	1.50	1.50	1.50	1.50	1.50
*Vitamin Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated composition					
C.P (%)	25.13	25.13	25.13	25.13	25.13
M.E (kcal/kg)	2658.58	2450.88	2450.88	2450.88	2450.88
Ca (%)	1.33	1.33	1.33	1.33	1.33
P (%)	0.48	0.48	0.48	0.48	0.48
C.F (%)	5.14	5.79	5.79	5.79	5.79
Cost/kg diet (N)	74.04	72.92	72.92	72.92	72.92

*Ed Nutrient premix supplied the following per 100kg of diet: Vitamin A, 1,200,000 I.U.; Vitamin D₃ 250,000 I.U.; Vitamin E, 3,000 I.U.; Vitamin K, 200mg; Thiamin, (B₁) 225mg; Riboflavin, (B₂) 600mg; Pyridoxine (B₆) 450mg; Niacin, 4000mg; Vitamin B₁₂ 2mg; Pantothenic acid, 1,500mg; Folic acid, 150mg; Biotin, 8mg; Choline chloride, 30,000mg; Anti oxidant, 12,500mg; Manganese, 8,000mg; Zinc, 5,000mg; Iron, 2,000mg; Copper, 500mg; Iodine, 100mg; Selenium, 20mg; Cobalt, 50mg. Key: C.P, crude protein; M.E, metabolizable energy; Ca, calcium; P, phosphorus; C.F, crude fibre.

potato meal. Value for nitrogen free extract ranged from 72.04 in unpeeled (UP) to 73.45% in peeled (P) sweet potato meal. However, the differences were not significant ($p>0.05$).

Processing methods for sweet potato tuber had no significant effect on feed intake (Table 3). According to Maphosa *et al.* (2003), feed intake was significantly depressed by increasing content of sweet potato meal for broiler chickens which disagrees with the result of this study. Results similar to what was obtained in this study were obtained by Orunmuyi *et al.* (2006) for rabbits fed sweet potato meal up to 40% of the diet. The levels of sweet potato by these authors were; however, lower than

the level of inclusion in the present study. However, Afolayan *et al.* (2011) reported that feed intake of broilers decreased significantly as the level of sweet potato meal increased in the diets. This was not found in this study and may probably be due to differences in species. Japanese quails are known to be hardy (Annon, 1991) and more tolerant of nutrient changes (such as energy and crude fibre levels) than chickens.

Mean daily water intake increased numerically from control; 28.93ml/bird/day (diet A) to 34.26ml/bird/day (diet B), but reduced again to 29.74ml/bird/day (diet E) but the differences were not significant. Watery feces had been reported for

Table 3: Effects of sweet potato tuber meal diets processed in various ways on Performance of quail birds.

Parameters	A	B	C	D	E	SEM
Initial weight (g)	7.71	8.00	7.62	7.82	7.73	± 0.43 NS
Final weight (g)	150.11	148.95	145.35	163.44	154.72	± 10.95 NS
Feed intake (g/bird/day)	14.96	14.31	14.13	14.69	14.71	± 0.50 NS
Water intake (ml/bird/day)	28.93	34.26	30.93	33.21	29.74	± 2.93 NS
Weight gain (g/bird/day)	3.39	3.36	3.22	3.71	3.50	± 0.26 NS
Feed/gain ratio	5.05	4.82	4.88	4.78	4.28	± 0.71 NS
Energy intake (kcal/g/bird)	39.32 ^a	34.64 ^b	32.26 ^b	35.59 ^{ab}	35.64 ^{ab}	± 2.32 *
Protein intake (g/bird)	3.74	3.58	3.53	3.67	3.68	± 0.12 NS
Energy efficiency ratio (EER)	0.17	0.18	0.18	0.20	0.19	± 0.02 NS
Protein efficiency ratio (PER)	1.76	1.70	1.71	1.90	1.84	± 0.13 NS
Mortality (%)	12.50	12.38	11.78	13.36	12.50	± 7.14 NS

a, b, means separated by distinct letters within rows are significantly different at 5% level ($p \leq 0.05$). SEM = standard error of mean, N.S = not significant, A, control (no sweet potato tuber meal) B, Diet with 15.60% unpeeled sundried sweet potato tuber meal, C, Diet with 15.60% peeled sundried sweet potato tuber meal, D, Diet with 15.60% unpeeled cooked sundried sweet potato tuber meal, E, Diet with 15.60% peeled cooked sundried sweet potato tuber meal. * = significant ($p \leq 0.05$)

broilers on sweet potato meals above 30% of the diet (Agwunobi, 1999). This was not observed in this study. The daily water consumption (28.93-34.26ml/bird) recorded in this study was much similar to the 33.07ml/bird reported by Rajput (2006) but lower than the range of 38.93-44.28ml/bird reported by Tuleun *et al.* (2009). The higher range of water intake reported by Tuleun *et al.* (2009) may be due to the higher ambient temperature (25 - 37° C, Makurdi) where their studies were carried out. The similarity between the water intake reported by Rajput (2006) and the current study may be as a result of the closeness of the ambient temperature (12° C) of Pakistan and that of Vom (13.9° C) in Plateau State, Nigeria. In the current study, the water to feed ratio was approximately 2.39, which is quite close to the 2.03 reported by Rajput (2006).

The non- significant effect of the diets on weight gain is contrary to the depressive effect of sweet potato meal on weight gain of broilers reported by Maphosa *et al.* (2003), Afolayan *et al.* (2012) and Gonzalez (2002) with pigs. However, the finding agrees with the report of Dominguez (1990) who worked on pigs and Orunmuyi *et al.* (2006) for rabbits fed sweet potato meal. Manfredini *et al.* (1990) also reported that replacing maize with not more than 50% sweet potato chips gave acceptable performance for pigs.

Feed conversion ratio of quails fed the various diets was not significantly different. This lack of significant difference agrees with the report of

Dominguez (1990) who fed cooked sweet potato chips to pigs in place of maize and the report of Orunmuyi *et al.* (2006) who fed rabbits with sundried sweet potato meal and observed no effect on feed conversion. Afolayan *et al.* (2012), reported that broiler chicks on sweet potato meal diets had significantly better feed conversion which was contrary to the observations in this study. The similarity of feed conversion between the test diets and the control in this study was also a deviation from earlier reports (Maphosa *et al.*, 2003, Ayuk; 2004) and may be due to the ability of Japanese quail to adjust feed intake across different dietary energy levels as has been indicated by Weber and Reid (1967).

Feed cost/gain decreased linearly from the control to the last test diet but the differences were not significant. This may be due to the lower cost of sweet potato as compared to maize. The results are in consonance with the report of Muhammad *et al.* (2012), Afolayan *et al.* (2012) for broilers and Orunmuyi *et al.* (2006) for rabbits fed sweet potato meal.

Protein intake on daily basis decreased inconsistently between diet A and diet E with the lowest daily intake of 3.53g/bird; diet C but the differences were not significant. The range of protein intake of 1.96-1.80g reported by Tuleun *et al.* (2009) for growing Japanese quail is lower than the 3.74-3.53g reported in the present study. The higher protein intake in the present study as compared to the level reported by Tuleun *et al.* (2009) may be due to the

higher ambient temperature (25 - 37°C) where their work was carried out. Feed intake for birds usually increases with decreased ambient temperature or colder weather (13.9–28.6°C) which is prevalent at the location of the present study. However, the non-significant effect of the diets on protein intake in the present study has been reported before (Tuleun *et al.*, 2009).

Energy intake by birds was significantly higher on diet A (39.32 kcal/g/bird) than on diets B (34.64kcal/g/bird) and C (32.26kcal/g/bird) only. The daily metabolizable energy (M.E) intake in this study is lower than what was reported for Japanese quail in the work of Farrell *et al.* (1982). They reported that daily metabolizable energy intake for quail was 57, 48 and 52 kcal/kg body weight at 12, 19 and 26 days of age respectively which is much higher than reported in the present work. This is probably because of the differences in the climate where the works were carried out and the age of birds used in their study. Energy intake in birds is known to be highly affected by environmental temperature.

Protein efficiency ratio (PER) and energy efficiency ratio (EER) of birds on the various diets did not vary significantly. Similar results have been reported for Japanese quail fed raw *Vicia peregrina* seeds at the expense of soya bean meal (Karaman *et al.*, 2009). The range of PER in their work (0.752-0.816) was lower than that (1.70-1.90) reported in the present study. However, PER (1.05 -1.23) for growing quail reported by Tuleun *et al.* (2009)

compared favourably with figures in the present study. The range of EER in their work (46.45-50.68) was higher than the range (0.17-0.19) observed in the current study. Figures obtained in this study are close to the range for PER (1.20-1.29) reported by Erener *et al.* (2002) but EER reported in the present work (0.17-0.19) was much lower than the EER (64.81-69.92) reported by Erener *et al.* (2002). The variation between values (PER, EER) in this work and that of Erener *et al.* (2002) may be related to the initial body weight used. Whereas the range of initial body weight in this work was from 7.62 - 8.00g, in the report of Erener *et al.* (2002), it was 27g. It is possible that the PER and EER values were not significantly decreased because the protein content of the diet was constant. Lowering the crude protein content of the diet was reported to have decreased both PER and EER in broilers fed diets with various energy and constant energy to protein ratio (Hosseini-Vashan *et al.*, 2010).

The effect of processed sweet potatoes meal diets on carcass characteristics of Japanese Quail is presented in Table 4. The values for bled weight and plucked weight in this study were significantly higher on the diet containing peeled and cooked sweet potato than on the unpeeled sweet potato. This is probably because the development of body parts leading to higher body weight was enhanced by cooking of the sweet potato. Canope *et al.* (1977) had reported that cooking increased the digestibility of sweet potato. Values for

Table 4: Carcass values of Japanese quails fed processed sweet potato meal diets

Parameters	A	B	C	D	E	SEM
Live weight (g)	143.33	153.33	150.00	143.33	150.00	± 5.92 NS ³
Bled weight (g)	122.17 ^{ab}	128.00 ^{ab}	114.33 ^b	131.67 ^a	134.50 ^a	$\pm 8.62^*$
Plucked weight (g)	122.17 ^{ab}	128.00 ^{ab}	114.33 ^b	131.67 ^a	134.50 ^a	$\pm 8.62^*$
Dressed weight (g)	91.67 ^b	92.67 ^b	92.00 ^b	92.17 ^b	114.33 ^a	$\pm 6.51^*$
Dressing %	61.65 ^b	59.99 ^b	62.00 ^a	64.35 ^b	76.50 ^a	$\pm 4.67^*$
Prime cuts and organ weights expressed as % of live weight; %						
Breast	23.30	21.73	23.38	23.33	20.92	± 1.75 NS
Wing	6.58 ^a	6.04 ^a	6.31 ^a	6.33 ^a	5.53 ^b	$\pm 0.35^*$
Thigh	8.72	7.93	8.44	8.79	8.18	± 0.69 NS
Back	13.20	12.68	13.09	13.21	12.78	± 1.25 NS
Drumstick	6.51 ^a	5.89 ^{ab}	5.74 ^b	6.28 ^{ab}	5.67 ^b	$\pm 0.33^*$
Heart	0.78	0.78	0.86	0.84	0.80	± 0.11 NS
Intestine	3.90	4.10	3.06	4.05	4.19	± 0.88 NS
Gizzard	3.14	2.59	2.73	2.04	2.42	± 0.49 NS
Liver/gall bladder	2.67	2.83	2.74	2.65	2.81	± 0.83 NS

a, b, means in the same row with different superscripts differ significantly ($P < 0.05$). SEM = standard error of mean, NS = not significant, A: control (no sweet potato tuber meal) B: Diet with 15.00% unpeeled sundried sweet potato tuber meal, C: Diet with 15.00% peeled sundried sweet potato tuber meal, D: Diet with 15.00% unpeeled cooked sundried sweet potato tuber meal, E: Diet with 15.00% peeled, cooked sundried sweet potato tuber meal.

dressed weight and dressing percentage were significantly better on diet containing peeled and cooked sweet potato than on the control and other processed methods. This tends to suggest that cooking increased the utilization of sweet potato by birds (Dominguez, 1990). However, this trend was not sustained because wing and drumstick expressed as a percentage of live weight were

significantly poorer on the diet containing peeled and cooked sweet potato than on the other diets. However, values for live weight of quail birds reported in this study are close to values (136.60-143.06g) reported by Yisa *et al.* (2013) for Japanese quails. Furthermore, values for dressing percentage (58.89-61.92), breast (21.19-23.51), back (16.48-17.80) and wings (5.57-6.65) as percentage of live

weight reported by Yisa *et al.* (2013) are close to values reported in the present work.

Conclusion

Sweet potato is well suited to our climate and does well particularly in the savannah regions. It requires less farm input and less labour when compared to cereals. Parameters measured to determine the effect of substituting maize with variously processed sweet potato at 15.60% of the diet for quail chicks showed that energy intake was significantly higher on the control than on diets containing uncooked sweet potato. Values for feed intake, weight gain, water intake, feed conversion ratio, feed cost/gain on the sweet potato diets did not vary significantly from the control diet. Results for protein intake, energy intake, PER and EER were similar. Carcass values for birds on diets containing peeled cooked sweet potato were generally better than on the control and diets containing the raw sweet potato. Therefore, for growing Japanese quails, diet containing peeled and cooked sweet potato could effectively substitute for maize at 15.60% of the diet without adverse effect on performance.

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