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Carcass and Organ Characteristics of Growing Japanese Quails (Coturnix Coturnix Japonica) Fed Boiled Sun-Dried Taro Cocoyam (Colocasia Esculenta) as Replacement for Maize

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ABSTRACT

The high cost of maize a major energy source in the diets of poultry calls for the investigation of other sources which could reduce feed cost. One of such is taro cocoyam. One hundred Japanese quails were used to examine the effect of graded replacement levels of maize with boiled sun-dried taro cocoyam on carcass and organ characteristics. Birds were randomly assigned to five dietary treatments. Each treatment had two replicates of ten birds per replicate in a randomized complete block design. In the five diets maize was replaced with boiled sun-dried taro cocoyam at 0%, 25%, 50%, 75% and 100% respectively. At the end of the seventh week six quails per treatment were randomly selected, starved for twelve hours, weighed and slaughtered for carcass and organ evaluation. Carcass measures, cuts, organs and relative intestine weights were significantly influenced (P<0.05) by dietary treatments. Carcass weight, dressed weights, and feather weight were significantly lowest (P<0.05 at 75% and 100% taro cocoyam inclusion levels.

Also, the shank weight, breast weight were significantly reduced (P<0.05) as the level of taro cocoyam in the diets increased above 25%. Similarly, there were significant reductions (P<0.05) in organ weights as level of cocoyam increased in the diets. However, intestine and relative intestinal weights increased with increase in cocoyam levels in the diets. Result tends to suggest that beyond 25% carcass and organ characteristics reduced compared to control.

INTRODUCTION

Least cost consideration and availability are two important drivers of recent feed research efforts. Feed cost comprises of about 65% to 70% of the production cost in poultry enterprise; but feed resource are limited (Ikani et al, 2008). Maize has been playing a key role as a source of energy in poultry diets (Udedibe and Asoluka, 2008). The grains are useful as food to man and animals as well as raw material for industries, hence there in stiff completion between man and livestock (Okon etal, 2007). Its demand outstrips its supply (Udedibe and Asoluka, 2008) thereby contributing to the increased cost of poultry feeds. To make production economically efficient, the feed cost has to be lowered down (Ikani et al, 2008). Given the attendant high cost of maize and other conventional energy resource for alternative to conventional ones becomes necessary. Taro cocoyam is an unconventional energy feedstuff, which is less expensive, and its demand for human consumption is less (Agwunobi et al, 2002). Cocoyam has high potential as a replacement for maize (Abdulrashid et al, 2007). As much as 50% diet any taw cocoyam has replaced all the maize in the diets for boilers (Abdularshid et al, 2007). However, the presence of oxalates, proteinase inhibitors, phytates, tannis and acrid factors in taro cocoyam (Cooke et al. 1982) could be limitation to its use (Okon et al, 2007). The effect of these anti nutritional factors can be reduced by processing (Tang and Sakai, 1983, Agwunobi and Ina-Ibor, 2007). The increasing demand to animal protein has encouraged greater interest in the production of fast growing animals with shot generation interval (Obinne and Okorie, 2008). Japanese quails are hardy and prolific (Robbins, 1981). Quail meat is lean and the egg is low in cholesterol (Garwood and Diehl, 1987; Schwartz and Allen, 1981) and this makes it desirable to people. With coronary health concerns. This study therefore investigated the effects of feeding graded levels of boiled sun-dried cocoyam as a replacement for maize on the carcass and organ characteristics of Japanese quail (Coturnix coturnix japonica) birds.

MATERIALS AND METHODS

The experiment was conducted at the poultry unit of the Teaching and Research Farm, University of Calabar, Nigeria. One Hundred Japanese quails (Corturnix Corturnix japonica) obtained at about three weeks old were randomly assigned to five dietary treatments. The five diets had 0% (control), 25%, 50%, 75% and 100% boiled sun-dried taro cocoyam (Colocasia esculenta) cormel meal as replacement for maize. Processing of raw cocoyam was as previously described (Okon et al, 2007). The animals were replicated twice with ten births per replicate and raised on deep litter until slaughter at 10 weeks of age. Six quails per treatment were randomly selected, starved for twelve hours, and weighted before slaughter. The births were killed by severing the carotid arteries (Adams et al 1986). The quails were bled, weighed and immersed in hot water for about two minutes before de-feathering. The de-feathered carcass was weighed. It was then eviscerated and weighed to obtain dressed carcass weights (breast, back, drumstick, shank head and wings) the organs; heart, lungs, liver, gizzard and intestines were also weighed. Relative carcass and organ weights were calculated using the methods of A.O.A.C (1995)

STATISTICAL ANALYSIS

The feeding trial was based on the randomized complete block design (RCBD) and data on carcass, cuts organ weights, relative carcass and organ weights collected were subject to analysis of variance and least significant difference was used to separate means that differs significantly (steel and Torrie, 1980)

Table 1
The composition of the diets for boiled sun-dried taro cocoyam tuber meal. Percentage replacement of maize in diet

Ingredient	0%	25%	50%	75%	100%
Maize (%)	56.77	42.58	28.39	14.19	0.00
Cocoyam (%)	0.00	14.19	28.39	42:58	56.77

Roasted Soyabean Meal (%)	20.12	20.12	20.12	20.12	20.12
Fish meal (%)	7.36	7.36	7.36	7.36	7.36
Wheat Offals (%)	10.00	10.00	10.00	10.00	10.00
Bone Meal (%)	5.00	5.00	5.00	5.00	5.00
Salt (%)	0.25	0.25	0.25	0.25	0.25
Vit.Min. Premix (%)	0.5	0.5	0.5	0.5	0.5
Calculated Analysis:	100	100	100	100	100
Crude Protein (%)	20.61	20.19	19.75	19.33	18.91
M.E. (Kcal/ kg)	2810.22	2788.37	2766.84	2744.65	2722.79
Analysed nutrient M.E. (Kcal/kg)	2808.93	27629.24	2757.94	2739.58	2718.97
Crude Protein (%)	20.58	20.12	18.38	17.94	17.50

RESULTS AND DISCUSSION

Carcass cuts are presented in Table 2. Live weight of quails fed 0% (Control) was significantly (P<0.05) higher than those of 75% and 100% but was not different (P>0.05) from those of 25% and 50% levels of cocoyam inclusion. Carcass weight and dressed weight of quails fed the control diet were significantly (P.0.05) higher than quails fed the other diets. This agrees with the observation of Oyewole etal, (2012) who reported that starting pullets' chicks on control diet (maize-based) were heavier weight than those on 24 hours fermented sweet orange fruit peel meal based diet group. Quails fed 50% cocoyam had larger heads than others. Mean feather weight of quails fed 0%, 25% and 50% were similar but were significantly (P<0.05) higher than those fed 75% and 100% levels. The shank and breast weights of quails fed 0% and 25% were also significantly higher than those of other diets (50%, 705% and 100%). While the back weight of births fed) 0% and 25% were higher than 75% and 100%, they were similar to those on 50% diet. It was observed that quails on 0% cocoyam diet had highest drumstick weight followed by those on 25% while others had similar lower weights. Although, the neck weights of births on 50% cocoyam was least while the wing weight was highest compared to other treatments. The diets did not significantly higher values than those fed 0 and 25% in terms of relative wing and shank weights. The organ weights (table 4) were observed to be significantly (p<0.05) reduced with increasing levels of cocoyam in the diets except for weight of intestine with appeared to increase as level of cocoyam increased in the diet. The diets did not significantly (p<0.05) effect organ weights (table 4). However, relative weight of the intestine of birds on 75% and 100% levels of cocoyam were significantly (p<0.05) higher than those 25% and 50% include. Result indicated that the control (0%) and 25% diets supported superior Breast, back, shank, drumstick (Table 3) and lungs (Table 4) weight than the other diets. The significantly reductions (0<0.5) in the carcass cuts as taro cocoyam in the diets increased may have been caused by intrinsic factors in the cocoyam which may have influenced intake. Reduction in body weight, carcass yield and organ weight may be attributed to depressed feed intake that led to low availability of nutrients needed for tissue, organ and body development (Ani and Okorie, 2008). The depressed intake may be because of anti-nutrients in cocoyam (acrid factor) which cause irritation and burning of the throat (Sakai, 1979), thereby lowering palatability and intake (Okon et al, 2007). Anti-nutritional factors such as trypsin inhibitors and tannins can cause decrease in voluntary feed intake, digestibility of protein and impair the absorption of nutrients in the ingesta thereby resulting in depressed weight gain (McNab, 1975; Esminger et al, 1996). Anti-nutrients interfares with nutrient utilization by forming complexes with the substrate at the site of digestion (Abeke et al, 2008). Although processing reduces effects of anti-nutritional factors (Tang and Sakai, 1983; Agwunobi and Ina-Ibor, 2007) the method of processing is important (Abeke et al, 2008). However, the effect exerted is a function of the amount of the ingredient included in the feed and the capability of the animal fed to degrade the anti-nutritional factor. There is always a residual amount of some anti-nutrients no matter the processing method adopted (Abeke et al, 2008). Therefore, at higher levels of inclusion, the possibility of influence of anti-nutritional factor becomes more likely. It is probable that the significantly (P<0.05) higher intestine weights for quails on 75% and 100% level of cocoyam inclusion may have been a result of the presence of oxalic acid. Oxalic acid has been implicated as cause of corrosive gastro on consumption of large doses (kersely, 1985). It is also likely that digestibility may have been compromised thereby reducing rate of passage and digesta retained may have accounted for heaver intestinal weights at higher cocoyam inclusion (75% and 100%).

TABLE 2: Effect of graded levels of boiled sun-dried cocoyam on mean carcass yield (g) of quails at ten weeks of age.

Parameter	0%	25%	50%	75%	100%
Live weight (g)	177.50+4.10[2]	170.00+5.70[b]	166.41+6.67ab	158.l0+3.84ab	151.19+4.86[c]
Carcass weight (g)	145.93+4.06[a]	140.41+5.69[b]	l37.69+35b	125.86+5.30c	123.17+5.29[c]
Dressed weight (g)	115.93+1.30[a]	l10.15+3.19[b]	l06.38+3.88b	102.55+5.37c	100.66+3.05[2]
Head weight (g)	7.50+0.23[a]	7.40+O.22[a]	7.07+0.24b	7.42+O.24a	7.39+0.25a
Feather weight (g)	3.7 9+0.23[a]	3.70+0.23[a]	3.94+0.30a	3.25+0.46b	3 .23 +0.49b
Back weight (g)	25.00+0.82[a]	24.56+0.69[a]	23.18+1.15[ab]	20.47+1.02b	20.46+1.02b
Shank weight (g)	l.27+0.04[a]	1.25+0.05[ab]	1.2l+0.03b	1.23+0.46b	1 .22+0.03b
Drumstick weight(g)	12.03+0.l7[a]	11.04+0.34[a]	l0.44+0.27[c]	10.35+0.37c	10.31+0.38c
Neck weight (g)	6.23+2.54[a]	6.20+0.73[a]	5.45m.34[b]	6.12+0.46a	6.11+0.47a
Wings weight (g)	4.81+0.13[b]	4.65+0.17[b]	5 .24+0.14[a]	4.63+0.22b	4.6l+0.22b
Breast weight (g)	36.08+0.62[a]	34.08+1.30[ab]	32.47+l.76c	32.53+0.87[c]	32.54+0.88c

Different superscripts (a, b and c) within row indicate significant differences at specified levels.

TABLE 3

Effect graded levels of boiled sun-dried taw cocoyam on relative causes weights (g) of quails at ten weeks of age.

Parameter	0%	25%	50%	75%	100%
Carcass weight	82.21+2.288	82.60+3 .345	83.l4+3 .901	79.6l+3.353	81 .47+3.502
Dressed weight	65.31+0.735	64.73+l .876	63 .94+2.33l	64.86+3.396	66.59+2.023
Feather weight	2.l3+0.13l	2.12+0.l33	2.37+0.l77	2.06+0.288	2.14+0.303

Breast weight	20.33+0.352	20.05+0.767	19.51+1.060	20.42+0.602	21.52+O.582
Back weight	l4.09+0.462	14.45+0.406	l3.93+0.687	l2.95+0.646	13.54+0.675
Drumstick weight	6.78+0.073	6.50+0.202	6.27+0. 164	6.22+0.578	6.82+0.607
Wings Weight	2.71+0.073[b]	2.73+0.102[b]	3.15+0.086[b]	2.93+143[ab]	3.05+0.143[a]
Head weight	4.29+0.l33	4.36+0.130	4.25+0.147	4.36+0.292	4.89+0. l66
Neck weight	3.5 l+O.418	3.65+O.428	3.28+0.203	3.87+0.292	3.94+0.334
Shank Weight	0.72+0.024[b]	0.74+0.027[b]	073+0.024[b]	0.78+0.018[a]	0.81+0.021[a]

Different superscripts (a and b) within row indicate significant (P<0.05) differences at specified levels.

TABLE 4
Effect graded levels of boiled sun-dried taw cocoyam on organ characteristics (g) of Japanese quails at ten weeks of age.

Organ	0%	25%	50%	75%	100%
Liver	3.1l+0.58[a]	3 .06+0.46[a]	2.93+o.46[ab]	2.s5+0.28[ab]	2.61+0.29[b]
Liver as % of body weight	1.751+0.32	l.797+0.27	1.760+O.27	l.800+0.177	1.726+0. 19
Lungs	1.50+0.0.10[a]	1.43+0.03[b]	1.42+0.03[bc]	1.40+0.04[bc]	1.39+0.04[c]
Lungs as % of body weight	0.845+6.80	0.8424-0.02	0.85 l+0.02	0.887+0.220	0.92 l+0.02
Heart	1.34+0. 13[a]	1.24+o.09[b]	1.22+0.09[b]	1.20-0.11b	1.16+0.11[b]
Heart as % of body weight	0.755+0.07	0.727+0.05	0.733H).52	0.758+0.07	0.767+0.07
Gizzard	5.59+084[a]	5.33+0.069	5.19+0.46[ab]	4.92+0.60[b]	4.87+0.62[b]
Gizzard as % of body weight	3.144+0.47	3.137+0.40	3.1l6+0.20	3.112+O.38	3 .222+0.4 1
Intestine (Intact)	5.87+0.75[b]	5.65+0.82[b]	5.46+0.90[b]	6.79+0.42$_a$	7.33+0.53$_a$
Intestine (Intact) as % of body	3.304+0.42[b]	3.326+0.48[b]	3.28l+0.54l[b]	4.297-+0.27[a]	4.847+0.35[a]

Different superscripts (a and b) within row indicate significant (P<0.05) at specified levels.

CONCLUSION

The results obtained in this study suggest that it is relatively save to replace between 25-50% maize with boiled sun-dried taro cocoyam in the diets of finishing Japanese quails (Coturnix coturnix japonica) without deleterious effects on carcass and organ characteristic. However, further research into ways of improving inclusion levels would be interesting.

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