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Growth Performance of Growing Japanese quails (*Coturnix coturnix japonica*) Fed 48 Hours Fermented Taro Cocoyam (*Colocasia esculenta var esculenta*). As a Replacement for Maize

*** Abang, F. B ** Ayuk A. A *** Okon, B. I**

*** Department of Animal Production, College of Animal Science University of Agriculture Makurdi-Makurdi.**

****, *** Department of Animal Science, Faculty of Agriculture, Forestry and wildlife Res. Mgt, University of Calabar-Calabar**

ABSTRACT

Three hundred and seventy five two weeks old unsexed Japanese quails (Coturnix coturnix japonica) of uniform weight were randomly grouped into five (5) dietary treatments with seventy five (75) quails per treatment. Each treatment was replicated thrice with twenty five (25) quails per replicate. The five diets had 0% (control), 25%, 50%, 75% and 100% (1-V respectively) 48 hours fermented taro cocoyam meal (Colocasia esculenta var. esculenta) as a replacement for maize. The quails were fed the experimental diets over a period of four (4) weeks(28days).Feed intake was measured daily and the quails were weighed once weekly. Quails fed 0% and 25% levels of fermented taro cocoyam diets had significantly (P>0.05) heavier body weights than quails fed75% and 100% levels of fermented taro cocoyam diets .Feed intake was significantly(p >0.05) highest in quails fed 75% and100% levels of fermented cocoyam. In terms of weight gain, feed efficiency, feed conversion ratio, and protein efficiency ratio, there were no significant (p<0.05) differences across the treatments. Result indicate that, with iso nitrogenous diets of 24% crude protein, fermented cocoyam could replace maize favourably up to 100% levels in growing Japanese quails' diets at 5% level of significance without depressive growth.

Keywords : Japanese quails , fermented taro cocoyam, maize and growth parameters

Introduction:

Nigeria's population of over 160 million is severely at risk now than ever before, given the high level of food insecurity and deprivation. Without abundant accessible, assorted, safe, wholesome and affordable supply of food, the Nigerian nation may forfeit her life of hope and dignity(Igene,2001).In the near future, it is predicted that there will be a greatly increased and continuing demand for protein foods for human consumption in most developing countries. The demand is brought about not only by the increased human population and growing income, but also by changing lifestyles, food preference and urbanization. Products from animals sources provide over 33% of the protein consumed in human diets globally and 16% of energy (Martin, 2001). This has necessitated the need to use animals with short generation interval as well as fast growth rate. Quails meat is renowned for its high quality protein of high biological value, low caloric value that makes it an ideal meat for hypertensive prone individuals. Quail meat is cheap and so, it's affordable by all rural populace.

The price of finished feed in our part of the world continues to rise, thereby removing the margin of profit accruing to animal producers. The increased demand for cereals, soybean and other feeds for direct human consumption indicated that animal industries must adjust to this by making charges in their feeding management and production programmes. Thus, the bid to overcome the burden of feed ingredient base and reduce the cost of feed of livestock and livestock products has been the burden of numerous researchers in this part of the world (Bamgbose, et al; 2000)

Attention has been shifted lately towards the use of non-conventional feed stuff that are available throughout the season, less in demand and cheaper than cereal grains. Taro cocoyam (Colocasia esculenta var. esculenta) is one such less well known source of energy which is not in great demand for human food (Okon, et al., 2007; Agwunobi, et al., 2002). Taro cocoyam has been used to replace all the maize in diets for broilers (Abdulrashid, et al., 2006) and quails (Okon, et al., 2007). Although some anti-nutritional factors like oxalates, phytates , saponnins, tannins and acridity factors could be found in taro cocoyam (Cooke, et al., 1982) processing reduce their effect in feed (Agwunobi, and Ina-Ibor, 2007)

The aim of the research is to determine the effect of 48 hours fermented taro cocoyam meal on the growth performance of growing quails.

Materials and Methods

The study was carried out in cross River University of Technology Calabar, Calabar, Nigeria.

Three hunderd and seventy five (2weeks old) unsexed Japanese quails (Coturnix coturnix japonica) of uniform weight were randomly grouped into five (5) dietary treatments with seventy five (75) quails per treatment. Each treatment was replicated thrice with twenty five (25) quails per replicate and the experimental design was RCBD. The five diet had 0% (control), 25% 50% 75% and 100% 48 hours fermented taro cocoyam meal (Cococasia esculenta var. esculenta) as replacement for maize.

Unpeeled taro cocoyam corms were bought from Bendeghe village, Etung, Cross River, Nigeria. Corms were peeled and then chopped into sizable chips of about 14gms each. These chips were put into a big black plastic put-like container with a tight lid and fermented in water at room temperature (28^{o}C -29^{0}C) for 48 hours. Sun-drying lasted for a week (7days) and this reduced moisture content to less than 10%. The 48 hours fermented taro cocoyam corms and other ingredients were milled separately and used to formulate the experimental diets (Table1).

All the experimental quail were fed at 8.00am with same quantity of feed daily for 4 weeks. Fresh water was supplied ad libitum and daily records of feed intake were kept. The quails were weighed once weekly. The experimental diet was analyzed according to the procedure of A.O.A.C. (2000). Data obtained were subject to analysis of variance using the randomized complete block design as described by Steel and Torrie (1980). The least significant means method was used to separate means that differed significantly (Steel and Torrie, 1980).

Table1: Composition of diet with 48 hours fermented taro cocoyam meal (*Colocasia esculenta* var. *esculenta*) for growing Japanese quails (*Coturnix coturnix japonica*). Levels of inclusion

Ingredients	0%	25%	50%	75%	100%
Maize	50.00	37.50	25.00	12.50	0.00
Cocoyam	0.00	37.50	25.00	37.50	50.00
Soybean	8.00	8.00	8.00	8.00	8.00
Fish meal	9.70	9.40	8.70	8.00	8.70
Wheat offal's	6.25	6.25	6.25	6.25	6.25
Palm Oil	0.30	0.60	0.80	1.00	1.30
Salt	0.25	0.25	0.25	0.25	0.25
Vit/min. premix	0.50	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00

Calculated Nutrients:

Crude protein %	23.10	22.89	22.85	22.78	22.58
M.E (Kcal/kg)	2754.80	2746.13	2740.89	2690.65	2687.19
Analyzed nutrient					
Crude protein (%)	24 .12	23.80	23.78	23.59	23.56
M.E(kcal/kg)	2745.4	2735.2	2725.8	2650.00	2630.00

Results and Discussion

The determined proximate composition of crude protein in the experimental diets ranged from 23.56.56 to 24.12 (Table 2) .The crude proteins decreased as cocoyam meal content in the diets increased (i-v). Cocoyam has a low crude protein content of about 5 to 8.75, which could reduce the total dietary crude protein content.

It was observed that, quails in this study recorded heavier body weights than those recorded by Okon, et al., 2007 at week 6 (six), probably because of the increased crude protein in quails' diet (Table 3) . This result was in agreement with whyte, et al., 2000 who suggested that a dietary protein level of 18% to 24% was adequate for good performance and quails fed 24% protein will record better optimal performance. However, heaviest body weights were recorded with quails fed control diet and 25% level of cocoyam in quail's diet.

Okon, et al., 2007 observed that, mean weekly weight gain of quails fed boiled taro cocoyam was significantly ($p<0.05$) influenced by dietary treatments. This was in contrast with the result recorded in this study. In this experiment, fermented cocoyam did not significantly ($p>0.05$) influence the weight gain of quails. It is therefore possible that, the difference in crude protein used by Okon et al., 2007 (17.50-20.58%) and that of this experiment (24%) would have been responsible for these differences order than energy. Growing quails are able to keep body growth at constant rate over a wide range of dietary energy levels (Olubamiwa et al., 1999)

Quails fed 75% and 100% fermented taro cocoyam consumed significantly ($P<0.05$) more feed than quails fed other diets probably due to the decrease in energy across the treatments.Birds eat to meet up their energy demands so feed intake will likely increase with a lower energy value (Olubamiwa, et al., 1999). Rakpotober and Ijiwo, (2006) reported that lower protein contents of the diets affect utilization (below 20%). This must have explained why Okon, et al., 2007 observed depressed intake as protein content decrease. On the whole the better consumption rate in this study could also be associated with the processing method(fermentation), as acridity factors which are found mostly on peels were peeled-off before fermentation. This acridity factors causes irritation and burning of the throat thereby lowering palatability and intake (Sakai, 1979)

There were no significant ($P>0.05$) differences in feed conversion ratios, feed efficiency and protein efficiency ratio in all the diet. The non significant effect of dietary intake on feed efficiency has been reported (Okon, et al, 2007; Rakptober and Ijiwo, 2006;Edache,et al .2005,Olubamiwa,et al.,1999, Bawa et al 2011)The values in the present study are however, lower compare to 4.66 to 5.71 reported by Olubamiwa et al (1999), 5.16 to 7.00 by Edache, et al (2005), 7.60 to 7.70 by Rakpotober and Ijiwo (2006) and 8.81 to 9.64 by Okon, et al (2007). The better feed efficiency in this study is attributed to the processing method and increased crude protein in the diet (Olubamiwa, et al., 1999; Okon, et al., 2007). A better feed efficiency in this study is attributed to the processing method and increased crude protein in the diets (Bawa et al.,2011; Okon, et al .,2007).A better conversion ratio and protein efficiency was also recorded in this study when compared to those recorded by Okon, et al., 2007.

Table 2:- chemical analysis of growers feed (%).

Treatments levels	CP%	CF%	EE%	Ash%	NFE%	Moisture%	Energy% ME/kcal/kg
0%	24.12	4.00	6.50	10.00	53.38	6.60	2745.4
25%	23.80	5.00	6.00	11.76	53.44	6.60	2735.2
50%	23.78	5.75	5.00	12.00	52.72	7.40	2725.8
75%	23.59	6.25	4.25	15.77	50.64	7.60	2650.00
100%	23.56	6.75	4.00	15.56	50.63	7.60	2630.00

Table 3: summarized table of performance characteristics of growing Japanese quails.

Parameters	0%	25%	50%	75%	100%
Mean weekly feed consumption	86.24 ± 4.10^{d}	89.50 ± 2.40^{c}	$93.68\ 2.88^{b}$	$97.34\ 3.03^{a}$	97.58 ± 3.03^{a}
Mean weekly body weight	102.85 ± 20.15^{a}	104.14 ± 20.18^{a}	96.85 ± 8.85^{b}	91.59 ± 17.53^{bc}	86.93 ± 17.96^{c}
Mean terminal body weight	155.13 ± 2.89^{a}	153.02 ± 0.58^{a}	143.09 ± 1.16^{b}	135.96 ± 1.53^{c}	130.53 ± 1.60^{d}
Mean weekly body weight gain	26.78± 5.23	26.31 ±6.52	23.77 ±7.43	22.67 ±7.73	20.63 ±5.53
Feed efficiency	3.68 ±1.76	4.26 ±1.26	5.74 ±2.04	6.51 ±2.18	6.40± 2.15
Feed conversion ratio	0.31± 0.06	0.30 ±0.07	0.25 ±0.08	0.23 ±0.15	0.21± 0.06
Protein efficiency ratio	0.17± 0.03	0.17 ±0.04	0.15 ±0.05	0.14 ±0.04	0.13± 0.04

Different superscripts (abc and d) within the same row indicates significant ($P<0.05$) differences.

CONCLUSION

The results from this study suggest that fermentation could be used to improve the nutritive value of taro cocoyam. It was observed that, even though quails fed 0% and 25% levels of fermented taro cocoyam diets performed better, quails fed other diets equally met the required body weight of growing quails at six weeks (100gms and above) (Harunna, et al., 1995). Quails fed 50% 75% and 100% levels has terminal body weights of 143.09gms, 135.69gms and 130.5gms respectively.

Conclusively, it was observed that 48 hours fermented taro cocoyam replaced maize up to 100% without any growth depression.

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