Original Research Article

Growth response of quails *(Coturnixcoturnix japonica*) to varying levels of cassava *(Manihotesculenta)*tuber meal as a replacement for maize*(Zea mays)*

Odo B.I.* and Nnadi A.E

Department Of Animal/ Fisheries Science and Management,

Faculty of Agriculture and Natural ResourcesManagement,

Enugu State University of Science and Technology

P.M.B. 01660, Enugu, Nigeria

ABSTRACT

The study was conducted to determine the growth response of quails *(Coturnixcoturnix japonica)* to varying levels of cassava tuber meal as a replacement for maize. Thirty two (32) Japanese quails were randomly allotted to four dietary treatments. In each of the four diets, sun-dried cassava tuber meal was used to replace maize at 0,25,50, and 75% levels. The quails were fed one of four experimental diets over a period of 42 days (6 weeks). Result showed that there was no significant difference (P>0.05) in feed intake between quails fed 0% (T_1) and 25% (T_2)and those fed 50% (T_3) and 75% (T_4) levels of inclusion of cassava tuber meal as a replacement for maize. However, MWFI was significantly (P<0.05)higher in(T_3) 152.2±2.07) than T_2(131.94±11.24)group. No significant difference in weight gain (P>0.05) was observed between T_1 and T_3 groups just as there was no significant difference in weight gain between T_2 and T_4 groups. MWWG was significantlyhigher (P<0.05) in T_3 (125.60±10.96) than T_2 (111.41±10.31) groups. MWFCR was highest in T_4 (1.58±0.23) with 75% inclusion level of cassava tuber meal and lowest in T_1 (1.18±0.10) with 0%

inclusion level of cassava tuber meal. It implies therefore that sun-dried cassava tuber meal can favorably replace maize at 50% level of inclusion in quail diet.

Key words: Quail, cassava tuber meal, maize, growth performance

INTRODUCTION

Maize (*Zea mays*) forms the base of most livestock feeds, and it is particularly relished by poultry, rabbits and pigs (Durunna*et al*., 2000). The grains are very useful as food to man and animals as well as raw materials for industries. Hence, there is stiff competition between man and livestock for this feed resource. This competition has resulted in scarcity of the feed ingredient in Nigeria. Also, it has increased the cost of feeding animals beyond the reach of the average Nigerian farmers (Aringeniwa*et al*.,2000;Chinkwuju and Osuagwu,2000).

The high cost of cereals and uncertainty about their sustainable supply as energy source for livestock led to the search for alternative but cheaper feed resources (Agiang*et al.*2004). Cassava (*Manihotesculenta*) is a woody shrub of the *Euphorbiaceae* (Spurge family) native to South America. It is extensively cultivated as an annual crop in tropical and subtropical regions of the world for its edible starchy root, a major source osssfcarbohydrate.

The quest and effort to substitute maize in poultry feed with other less costly energy sources was inculcated significantly to reduce the cost of production in poultry (Bamgbose*et al*., 2004). Cassava tuber, a primary source of carbohydrate, cancompletely replace maize as an energy source

in feeds of pigs and birds. As a matter of fact, its use for this purpose is presently limited to research centre and small scale pig producers. For adoption by large scale commercial producers, appropriate technology needs to be developed to reduce the high moisture and hydrocyanic acid (HCN) contents of the tubers (Tewe*et al*.,1976).

The protein intake level of humans in most developing countries including Nigeria are very low due to the high cost of the product (Abeke*et al*.2003). There has been call for substantial increase in the intake of proteins of animal origin in the developing countries (F.A.O.,1985).This may have gradually triggered off interest in quail farming as an important poultry business in Nigeria unlike in the past when all emphasis have been on domestic fowl production.Ijaiya**et al**. (2009) stated that quails have been reared for egg and meat production in Nigeria, mainly by small and medium scale breeders.The species has both nutritional and economic benefits since it is fast growing and resistant to many diseases (Oluyemi and Roberts, 2000; Abatcha**et al.,**2009).It possesses distinct characteristic which includes early reproductive maturity, fast growth rate, early attainment of market weight as well as laying age, short generation interval, high rate of egg production, short incubation period of only 17days and much lower feed and space requirement than the domestic fowl (Muhammad, 2006).

Quail meat is renowned for its low caloric value in addition to having high quality protein of high biological value (Haruna*et al*. 1997). These qualities especially the low fat content is likely to divert the attention of people

especially the hypertension-prone individuals to quail meat consumption hence the justification of the study.

MATERIALS AND METHODS

Experimental site

The study was carried out at the Teaching and Research farm of Enugu State University science and Technology, Enugu, Nigeria. The site is situated at latitude $06^0 4^1$Nand Longitude 08^0 65^1 E South West. It is located at equatorial rain forest vegetation zone of southeastern Nigeria. It has an annual rainfall that ranges from 1700 – 1800mm and a mean temperature of 39^0C.

Experimental birds

Thirty-two (32) unsexedJapanese quails *(Coturnixcoturnix japonica)* of twenty one days of age were randomly grouped into four dietary treatments of 8 quails per treatment. Each treatment was further replicated twice with 4 birds per replicate. The four diets had 0, 25,50 and 75% levels of sun-dried cassava tuber meal as a replacement for maize. The nutrient composition of cassava tuber meal is as shown in Table 1.

Table 1: Proximate Composition of cassava tuber meal (CTM) and Cassava peel meal (CPM) % on dry matter basis.

Nutrients (%)	CTM	CPM
Dry matter	28.50	27.94
Crude protein	2.58	5.29
Ether extract	0.45	1.18
Crude fiber	0.43	20.97
N.F.E	94.12	66.13
Total Ash	2.41	5.93

Source:Oyenuga and Opeke, 1957

Experimentaldiets

Cassava tubers sourced from Agbani market in Nkanu Local Government Area of Enugu State, Nigeria were peeled, washed and chopped into chips of 1mm, and sun-dried. Sun-drying which lasted for ten days was aimed at reducing the moisture content. The dried cassava and other ingredients were milled separately and used to compound the experimental diets shown in Table 2.

Table 2. Composition of the experimental diets.

Ingredients%Treatments	T_1(0%)	T_2(25%)	T_3(50%)	T_4(75%)
Maize	50.00	37,05	25.00	12.50
Cassava	0.00	12.50	25.00	37.50
Soya bean cake	26.89	26.89	26.89	26.89
Fish meal	7.36	7.36	7.36	7.36
Wheat offal	10.00	10.00	10.00	10.00
Bone meal	4.80	4.80	4.80	4.80
Salt	0.25	0.25	0.25	0.25
Premix	0.50	0.50	0.50	0.50
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00
Calculated analysis:				
Crude protein%	21.18	20.37	19.55	18.73
M.E. (Kcal Kg^{-1})	2527	2509	2491	2473

Experimental procedure

Thirty two(32) quails sourced from Songhai farm, Amukpe, Sapele local Government Area of Delta State, Nigeria were housed and managed intensively in battery cage. Each cage was assigned to each of the four dietary treatments consisting of 0, 25, 50 and 75% levels of cassava tuber

meal respectively.The diets and clean water were offered respectively *ad libitum* throughout the experimental period.

Data Collection and analysis

Data were collected on daily feed intake as well as on weekly body weight. Feed conversion ratio was computed as feed intake divided by weight gain. Data collected were subjected to analysis of variance according to Steel and Torrie (1980). Least significant difference method was used to separate means that differed statistically ($P<0.05$).

RESULTS AND DISCUSSION

Results of performance characteristics of quails fed varying levels of cassava tuber meal as a replacement for maize are as summarized in Table 3. There was no significant difference ($P>0.05$) in feed intake between quails fed 0% and 25% just as there was no significant difference in feed intake between those fed 50% and 75% inclusion levels of the sun-dried cassava tuber meal.However,feed intake was significantly higher ($P<0.05$) in group fed 50% than group fed 25% of cassava tuber meal as a replacement for maize. Surprisingly,there is increased feed intake with decreased crude protein level. This contradicts the report by Whyte *et*

al.(2000) and Rakpotobar and Ijiwo (2003) that quails fed 24% crude protein recorded better growth performance.

There was no significant difference (P>0.05) in weight gain between T_1 and T_3 and between T_2 and T_4 groups. Values of weight gain were significantly higher(P< 0.05) in T_3 than T_2 groups. This is seemingly difficult to explain but Olubamiwa*et al.* (1999) has stated that growing quails are able to keep body growth rate over a wide range of dietary energy levels.

Feed conversion ratio (FCR) varied significantly (P<0.05) among the different treatment groups. It was highest in T_4 group with 75% inclusion level of cassava tuber meal followed by T_3, then T_2 and lowest in T_1 with zero percent inclusion level of cassava tuber meal as a replacement for maize. This implies that there was increasing FCR with decreasing crude protein level.

Table 3: Performance characteristics of quails *(Coturnixcoturnix japonica)*fed varying levels of cassava tuber meal as a replacement for maize.

	Inclusion levels of sun-dried cassava tuber meal (%)				
Parameters	T_1(0)	T_2(25)	T_3(50)	T_4(75)	SEM

MWFI(g)	136.10±11.42[b]	131.94± 11.24[b]	152.22±12.07[a]	153.60±12.12[a]	9.25
MWWG(g)	123.75±10.88[a]	111.13±10.31[b]	125.60± 10.96[a]	105.25 ±10.40[b]	8.38
MWFCR	1.18± 0.10[c]	1.25± 0.16[c]	1.31± 0.21[b]	1.58± 023[a]	0.15

MWFI: Mean weekly feed intake; MWWG: mean weekly weight gain and MWFCR: mean weekly feed conversion ratio

a,b,c:Means with different superscripts in the same row are statistically different ($P<0.05$) according to least significant difference test

CONCLUSION AND RECOMMENDATION

It can be concluded that the best level of inclusion of cassava tuber meal as a replacement for maize is 50% since the quails achieved their highest feed intake and weight gain at this level.

In view of the high cost of maize and the uncertainty about their sustainable supply as energy source for livestock and poultry, we recommend that cassava tuber meal can be used as a replacement for maize at 50% level in quail diet. This will obviously improve on the productivity.

REFERENCES

Abatcha ,M,G,Emenna, P,E.,Musa ,U.,Ahmed ,M.S., Njam, L.S., Kansin, P.D. Jamilu,H. and Ajibloa ,H.O. 2009.Hatching success and embryonic mortality in Japanese quail (Coturnixcoturnix japonica) farm in North central Nigeria. Proc. of 14th annual conference of Animi. Sci. of Nig. (ASAN) .September 14 – 17 LAUTECH ,Ogbomoso , Nigeria. Pp. 556 – 558.

Abeke, F.O., Ogunduge, S.O., Sekonil, A.A., Adeyink, A., Abukar, B.Y., Oni, O.O. and Nwagu,B.I., 2003. Response of laying hens to dietary levels of heat-treated sheep manure. Trop .J. Anim. Sci. 2: 111-116

Agiang, E.A., Ayuk, A.A., Nweke, J.B. and Ozegbu, H.O. 2004. Performance of broilers fed diet with graded level of cassava waste meal as energy source. J.Agne food Sci. 2:13-9.

Aringeniwa,A.,Mafimisela,T.E.,Alabi, R. A.,Esobawana, A.O.andOviasogie, D.I. 2000. Socio-economic analysis of artisanal fishery in Edsako East Local Government Area of Edo State. In: proc. of 5th Annual conference of Anim. Sc. Ass of Nigeria pp. 176-178.

Bamgbose, A.M., Ogungherro, S.D., Obasoha, M.B., Oteku, I.T., Igene, U.R., Otokhian, C.S.O. and Imasuen, J. A. 2004. Replacement value of maize offal/ cashew nut for maize in Broiler diet. Proc. of 29th annual conf. of N.S.A.P pp. 219-221.

Chinkwuju, C.D. and Osuagwu C.N. 2000. Analysis of indigenous and migrant farm family livestock production in Delta State. In. proc. 5thASAN Conf. PP. 188-191.

Durunna, C.S., Udebibie. A.B. and Ayanwu, G.A. 2000. Combination of maize / sorghum and Cassava tuber meal as a substitude for maize in diet of laying hens. In: proc. 25th annual conf. of NSAP, held in Federal University of Agriculture, Umudike, Nigeria.

Food and Agriculture Organization (FAO), 1985, Food and Agricultural Organization year book 1986. Vol. 139.

Haruna, E.S., Musa, U., Lombin, L.H., Tat, P.M.,,Shammaki, P.D., Okowole, P.A. and Molukwu, J.U. 1997. Introduction of quail production in Nigeria. Nig. Vet. J. 18: 104-107.

Ijaiya,A.T.,Aremu,A.Alabi,J.O.,Tiya.,E.Z.,Malik,A.A.,Chakwen,S.J.and Onyemerekwe,C.D.A.2009.Replacement value of millet for maize in practical diet fed to Japanese quail chicks. NigP.Sci. J. 6:11 - 16

Muhammad.L.U .2006. Management of housing of Japanese quail. In: A training manual for quail production for sustainable household protein intake by NAERLS,Ahmadu Bello University, Zaria ,Nigeria, 11- 13th September, 2006

Olubamiwa, D., Haruna E.S., Musa, U., Akinwale, T.O., Lombin, L.H. and Longe, D.G. 1999. Effect of different energy levels of cocoa husk-based diets on production performance of Japanese quails. Nig.J. Anim. Prod. 26:88-92.

Oluyemi , J.A. and Roberts ,F.A. 2000. Poultry production in warm climate. Spectrum books Ltd, Ibadan , Nigeria .pp. 202 – 209

Oyenuga,V.A. and Opeke ,L.A. 1957.The value of cassava ration for pork and bacon production. West African Journal ofBiol.Chem. 1: 3 - 14

Rakpotobar, P.N and Ijiwo, S.J. 2003. Modified Step-up protein feeding levels on the growth performance of quails in Vom, Nigeria. Nig. Vet. J. 27:669-672.

Steel, R.GD and Torrie, J.H. 1980. Principles and produdure of statistics. A biometric approach, 2ndedn, Mcgraw-Hiv, New York. United States of America.

Tewe, O.O Job, A., Looshi, J.K and Oyeruga, V. 1976. Composition of cassava varieties and the effect of process on their hydrocyanic content and nutrient intization by rat Nig. J. Anni. Production 3(2): 60-66

Whyte, E.P., Ahmed, Y., Usman, M., Haruna, E.S. and Ndam, J. 2000. Performance of quail birds fed different levels of protein. Nig. J. of Biotechnology 11:67-71.