

## Original Research Article

Growth response of quails (*Coturnix coturnix japonica*) to varying levels of cassava (*Manihot esculenta*) tuber meal as a replacement for maize (*Zea mays*)

### **ABSTRACT**

The study was conducted to determine the growth response of quails (*Conturnix coturnix 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 ( $T_3$ )  $152.2\pm2.07$  than  $T_2(131.94\pm11.24)$  group. No significant difference in weight gain ( $P>0.05$ ) was observed in 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 significantly higher ( $P<0.05$ ) in  $T_3$  ( $125.60\pm10.96$ ) than  $T_2$  ( $111.41\pm10.31$ ) groups. MWFCR was highest in  $T_4$  ( $1.58\pm0.23$ ) with 75% inclusion level of cassava tuber meal and lowest in  $T_1$  ( $1.18\pm0.10$ ) 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

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## 28 **INTRODUCTION**

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

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

44       The quest and effort to substitute maize in poultry feed with other  
45 less costly energy sources was inculcated significantly to reduce the cost of  
46 production in poultry (Bamgbose *et al.*, 2004). Cassava tuber, a primary  
47 source of carbohydrate can, completely replace maize as an energy source  
48 in feeds of pigs and birds. As a matter of fact, its use for this purpose is  
49 presently limited to research centre and small scale pig producers. For  
50 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). Quail meat is renowned for its low caloric value in addition to having high quality protein of high biological value (Haruna *et al.* 1999). 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<sup>0</sup> 4<sup>1</sup>N and Longitude 08<sup>0</sup> 65<sup>1</sup> E South West and 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<sup>0</sup>C.

### Experimental birds

Thirty-two (32) Japanese quails (*Coturnix coturnix 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%

inclusion levels of sun-dried cassava tuber meal as a replacement for maize.

## Experimental diets

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 I.

Table I. Composition of the experimental diets.

| Ingredients                   | Treatments          |                      |                      |                      |
|-------------------------------|---------------------|----------------------|----------------------|----------------------|
|                               | T <sub>1</sub> (0%) | T <sub>2</sub> (25%) | T <sub>3</sub> (50%) | T <sub>4</sub> (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                     | 5.00                | 5.00                 | 5.00                 | 5.00                 |
| Salt                          | 0.25                | 0.25                 | 0.25                 | 0.25                 |
| Premix                        | 0.50                | 0.50                 | 0.50                 | 0.50                 |
| 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 <sup>-1</sup> ) | 2527                | 2509                 | 2491                 | 2473                 |

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## 88 Experimental procedure

89 Thirty two(32) quails sourced from Songhai farm, Amukpe, Sapele  
 90 local Government Area of Delta State, Nigeria were housed and managed  
 91 intensively in battery cage. Each cage was assigned to each of the four  
 92 dietary treatments consisting of 0, 25, 50 and 75% levels of cassava tuber  
 93 meal respectively. The diets and clean water were offered respectively  
 94 *ad libitum* throughout the experimental period.

## 95 Data Collection and analysis

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

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## 102 RESULTS AND DISCUSSION

103 Results of performance characteristics of quails fed varying levels of  
 104 cassava tuber meal as a replacement for maize are as summarized in Table  
 105 2. There was no significant difference ( $P > 0.5$ ) 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. Surprisingly, there is increased feed intake with decreased crude protein level. This contradicts the report by Whyte *et al.* (2000) and Rakpotobar and Ijiwo (2000) 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. This implies that there was increasing FCR with decreasing crude protein level.

125 Table 2: Performance characteristics of quails (*Coturnix coturnix japonica*)  
126 fed varying levels of cassava tuber as a meal replacement for maize.

| Parameters | Inclusion levels of sun-dried cassava tuber meal (%) |                            |                            |                            | SEM  |
|------------|------------------------------------------------------|----------------------------|----------------------------|----------------------------|------|
|            | T <sub>1</sub> (0)                                   | T <sub>2</sub> (25)        | T <sub>3</sub> (50)        | T <sub>4</sub> (75)        |      |
| MWFI(g)    | 136.10±11.42 <sup>b</sup>                            | 131.94± 11.24 <sup>b</sup> | 152.22±12.07 <sup>a</sup>  | 153.60±12.12 <sup>a</sup>  | 9.25 |
| MWWG(g)    | 123.75±10.88 <sup>a</sup>                            | 111.13±10.31 <sup>b</sup>  | 125.60± 10.96 <sup>a</sup> | 105.25 ±10.40 <sup>b</sup> | 8.38 |
| MWFCR      | 1.18± 0.10 <sup>c</sup>                              | 1.25± 0.16 <sup>c</sup>    | 1.31± 0.21 <sup>b</sup>    | 1.58± 0.23 <sup>a</sup>    | 0.15 |

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

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

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## 132 CONCLUSION AND RECOMMENDATION

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

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

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## REFERENCES

- 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.and Oviasogie, D.I. 2000. Socio-economic analysis of artisanal fishery in Edsako East Local Government Area of Edo State. In: proc. of 5<sup>th</sup> Annual conference of Anim. Sc. Ass of Nigeria pp. 176-178.
- Bamgbose, A., Ogungherro, E., Obasana, M.B., Oteku, L.T., Igene, U.F., Otikhian, C.S.O. and Imasuen, J. A. 2004. Proc. Of 29<sup>th</sup> 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. 5<sup>th</sup> ASAN 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 substitute for maize in diet of laying hens. In: proc. 25<sup>th</sup> 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.

- 166 Haruna, E.S., Musa, U., Lornnom, L.H., Tat, P.M.,, Shammaki, P.D.,  
167 Okowole, P.A. and Molukwu, J.U. 1997. Introduction of quail production in  
168 Nigeria. Nig. Vet. J. 18: 104-107.
- 169 Olubamiwa, D., Haruna E.S., Musa, U., Akinwale, T.O., Lombin, L.H. and  
170 Longe, D.G. 1999. Effect of different energy levels of cocoa husk-based  
171 diets on production performance of Japanese quails. Mg.J. Anim. Prod.  
172 26:88-92.
- 173 Rakpotobar, P.N and Ijiwo, S.J. 2003. Modified Step-up protein feeding  
174 levels on the growth performance of quails in Vom, Nigeria. Nig. Vet. J.  
175 27:669-672.
- 176 Steel, R.GD and Torrie, J.H. 1980. Principles and produdure of statistics. A  
177 biometric approach, 2<sup>nd</sup> edn, Mcgraw-Hiv, New York. United States of  
178 America.
- 179 Jewe, O.O Job, A., Looshi, J.K and Oyeruga, V. 1976. Composition of  
180 cassava varieties and the effect of process on their hydrocyanic content  
181 and nutrient intization by rat Nig. J. Anni. Production 3(2): 60-66
- 182 Whyte, E.P., Ahmed, Y., Usman, M., Haruna, E.S. and Ndam, J. 2000.  
183 Performance of quail birds fed different levels of protein. Nig. J. of  
184 Biotechnology 11:67-71.