Journal of Agriculture and Veterinary Sciences
Volume 11, Number 2, 2019
ISSN: 2277-0062

GROWTH PERFORMANCE OF GROWING JAPANESE QUAILS (*Coturnix coturnix japonica*) FED DIETS CONTAINING FERMENTED MANGO (*MANGIFERA INDICA*) KERNEL COMPOSITE MEAL AS REPLACEMENT FOR MAIZE

Yerima Shettima Kolo and Felicia Ayuba
Department of Animal Production,
Federal University of Agriculture, Makurdi.
Email: Yerimashettimakolo@gmail.com

ABSTRACT
One hundred and ninety five (195) unsexed Japanese quails (*Coturnix coturnix japonica*) of uniform weight were randomly allotted to five dietary treatments comprising of 0%, 10%, 15%, 20% and 25% inclusion levels of FMKCM for T1, T2, T3, T4 and T5 respectively. Each treatment was replicated thrice with thirteen (13) birds per replicate. The quails were fed the experimental diet over a period of four (4) weeks. Feed intake was measured daily and the quails were weighed once weekly. Mean daily feed intake of quail fed FMKCM was significantly ($P<0.05$) higher in 0% and 10% level than quail fed 15%, 20% and 25% FMKCM. In terms of Mean final body weight, mean daily weight gain and efficiency of feed utilization, there were no signification ($P>0.05$) difference across the treatments. The findings suggested that FMKCM could replace maize up to25% level in growing Japanese quail's diet without deleterious effect on growth indices.
Keywords: Fermented mango kernel, maize, Japanese quail, Growth parameters

INTRODUCTION

In recent times, a new genus of poultry, Japanese quail (*Coturnix coturnix japonica*) was introduced into Nigeria by National Veterinary Research Institute (NVRI) Vom to expand the poultry sub sector and help supplement the domestic chicken production through meat and egg (Edache *et al.*, 2007; Ani *et al.*, 2009). The quails have unique characteristics and advantages over other species of poultry which include early attainment of sexual maturity, short generation interval making it possible to have many generations in a year (Anon, 1991), high rate of egg production between 200-300 eggs in 360 days and are very resistant to common epidemics of poultry (NRC, 1991). Quails are birds that which strive very well in cages and are relatively inexpensive to maintain. They are birds that every household can keep without stress. The common Japanese quail matures in about six weeks and is usually in full egg production by 50 days of egg. If properly mated, quail birds have high fertility and hatchability. The quails are hardy birds that can adapt easily to different environments (Haruna *et al.*, 1997). Their meat and eggs are renowned for their high quality protein, high biological value and low caloric content, making it a choice product hypertensive patient (Haruna *et al.*, 1997; Olubamiwa *at al.*, 1999). Despite all this benefits, there are no improved feeding regimes; the most relevant option to arrest the present feed crisis of the livestock industry is by-product utilization (Atteh, 1986). These point clearly to alternative feed stuff for livestock feed production in order to cut down feed prices and make them more affordable by livestock farmers. As a result of shortage of convectional feed stuffs. Livestock nutritionists have continued with their search for

alternative feedstuffs. These alternative feed must be cheap, readily available and less competed for by man and industries or not competed at all (Akinmutimi, 2004). The search for substitute has led to the discovery of non-conventional energy feed such as cocoyam, cassava, mango kernel etc.

Mango kernel is a good source of soluble carbohydrates (Saadany *et al.*, 1980; Jansman *et al.*, 1995; Teguia 1995; Diarra 2008). The protein of the kernel (7.80-8.00%) is comparable to that of maize but it has higher fats (7.80-9.00%) than maize (Saadany *et al.* 1980). Mango kernel flour is reported to be equal to rice in food if tannin is free (Morton, 1987). Tannins are known to interfere with protein digestibility and render it unavailable. There are other anti-nutrients contain in mango kernel such as; phytate, hydrogen cyanide, trypsin inhibitor, oxalate, saponin etc. processing methods such as; boiling, fermentation, drying have been reported to be effective in reducing these anti-nutrients (Abang *et al.*, 2013; Diarra *et al.*, 2008).

The aim of this research is to determine the effect of replacing maize with fermented mango kernel composite meal on the growth performance of growing quails.

MATERIALS AND METHODS

Experiment site

This experiment was conducted at the Poultry Unit of the Teaching and Research Farm of the Federal University of Agriculture, Makurdi, Benue State. Makurdi is located at the longitude 6° 10' East and latitude 6°8' North. The area is warm with a minimum temperature range of 29.8-35.6°C.Rainfall is between 508-1016mm and relative humidity is 47%-87% (Anon, 1995). One important geographical features of this area is the river Benue which divides Makurdi into the

Northern and Southern parts. Makurdi local Government has an area of 16km radius. It lies within the Guinea savannah region of the Nigeria vegetative belt located in the Benue valley. Makurdi experiences a typical tropical climate with two distinct seasons (dry and wet). The dry season begins in November and ends in March while the wet season starts in April and ends in October. Harmathan with cool weather is experienced from December to early February (Anon, 1995).

Preparation of Experimental Materials

Different cultivars of both indigenous and improved mango were collected during the month of May (peak of the mango season) in Gboko and Makurdi area of Benue state, Nigeria. Mango kernel was removed by cracking manually with the aid of hammer. The fresh kernels were soaked in water at room temperature to allow it ferment for a period of 2 days (48hrs) in order to reduce the anti-nutrients to a more tolerable level and rinsed thoroughly with clean cool water. The fermented kernel was sundried in order to reduce the moisture content to less than 10% to prevent microbial build up and for prolonged storage. The ingredients were crushed separately into fine grit and were later mixed at varying inclusion levels with other ingredients to formulate the various diets.

Chemical Analysts

Chemical analysis of fermented mango kernel and experimental diets were analyzed using (AOAC, 1995).

Formulation of Diets

Feeds were formulated to meet the nutritional requirements for quails during the growing phase. Fermented mango kernel composite meal replaced maize at 0% (control diets was compounded With 100% maize and 0% FMKCM) 10% (diet was compounded with 90% and 10% FMKCM) 15% (diets was compounded with 85% maize and 15% FMKCM) 20% (diet was compounded with 80% maize and 20% FMKCM) and 25% (diet was compounded with 75% maize and 25% FMKCM) in treatments I, II, III, IV, V respectively.

Table 1: Composition of Diets with Varying Levels of Fermented Mango Kernel Composite (FMKCM) Meal for Growing Quails (Kg)

INGREDIENTS	T1 (0%)	T2 (10%)	T3 (15%)	T4 (20%)	T5 (25%)
Maize	45.00	40.50	38.25	36.00	33.75
FMKCM	0.00	4.50	6.75	9.00	11.25
Soybean meal	21.00	21.00	21.00	21.00	21.00
Groundnut cake	15.95	15.95	15.95	15.95	15.95
Maize offal	9.00	9.00	9.00	9.00	9.00
Bone meal	4.00	4.00	4.00	4.00	4.00
Blood meal	2.50	2.50	2.50	2.50	2.50
Fish meal	2.00	2.00	2.00	2.00	2.00
Vit/min premix	0.30	0.30	0.30	0.30	0.30
Salt	0.25	0.25	0.25	0.25	0.25
Analyzed Nutrients:					
ME(Kcal/kg)	2968.03	2995.84	3006.95	3018.05	3029.16
Crude protein	24.46	24.53	24.59	24.64	24.70

Animal Grouping

A total of one hundred and ninety five two weeks old un-sexed Japanese quails of about 33.60g of weight purchased with the

national veterinary research institute Vom –Jos, Nigeria. At the start of the feeding trial, three groups were allotted to five dietary treatments of 39 quails each. Each treatment was replicated thrice with 13 quails per replicate.

Housing

The birds were managed intensively in cages of three tiers. Each tier was separated with wood. Wire mesh was used for the walls and doors to allow adequate ventilation/lighting. The dimension of each tier was ($1.0m^2$ x $0.78m^2$). Litter materials (wood shaving) were used on the wooden floors. Each tier was equipped with adequate drinkers and feeding troughs. A floor space of about 0.007 m^2 to 0.009 m^2 per quail was provided. Artificial lighting was provided with the use of one battery lantern for each tier to ensure adequate feed intake.

Routine Operations

Feeds were weighed with a micro scale balance of 5kg before serving to ensure a uniform amount across treatments. Quails were served with 250grams of feeds for the first week at about 8 am on daily basis; the quantity was increased by 50grams on weekly basis. Fresh clean water was supplied ad-libitum. Drinkers and feeders were washed and disinfected using izal when appropriate. Litter materials were changed when due and replaced accordingly.

Design and Analysis

All the experimental quail were fed at 8:00am with the 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 completely randomized designed as described by Steel and Torries (1980). The least significant means method was used to separate means that differed significantly (Steel and Torries, 1980).

RESULTS AND DISCUSSION

The mean final body weight of quails fed diets containing FMKCM ranged from 131.67-153.02 g. The results revealed that there was no significant (P>0.05) differences. This result is in agreement with Lee (1999) who suggested that a dietary protein level of 22% 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 20% and 25% levels of fermented mango kernel meal in quail's diet. The mean daily weight gain ranged from 3.50- 4.27g. The non significant (P>0.05) effect on the mean daily weight gain is an indication that the diets were adequately utilize by the quails probably because of the processing method employed. Fermentation process enhances the nutrients; vitamins and essential amino acid by improving protein and fiber digestibility. The finding agrees with the reports of Abang *et al*. (2015) and Diarra *et al*. (2011) who observed no significant (P>0.05) difference in mean daily weight gain when sundried mango kernel meal (SMKM) and boiled mango seed kernel meal (BMSKM) replaced maize at 25% dietary inclusion levels in the diets of growing quails and broiler chicks respectively. Mean daily feed intake of quails fed diets containing FMKCM ranged from 13.07-15.35g. Results revealed that feed intake was significantly (P<0.05) influenced by the treatments. Quails place on 0% and 10%

dietary inclusion levels of FMKCM consumed more feed than those fed diets containing 15%, 20% and 25% FMKCM. Probably because of the low energy content of the diet, it was noted that Metabolizable energy increased with increased supplementation with FMKCM across treatments. These agrees with the reports of Diarra *et al*. (2011) and Abang *et al*. (2015) who observed a progressive decrease in feed intake with increased supplementation across treatments when boiled mango kernel meal replaced maize up to 100% in chicks diets and sun-dried mango kernel meal up to 50% in quails diets respectively. The result obtained on efficiency of feed utilization did not differ significantly ($P>0.05$) among the treatments. Quails place on 20% and 25% inclusion levels of FMKCM were the best converters of feed to flesh. The result was in agreement with the finding of Teguia (1995) and Abang *at al*. (2015) who reported no significant ($P>0.05$) difference when 25% of boil mango kernel meal and sundried mango kernel meal was served to growing quails and broiler chicks. The better result recorded in this findings could be attributed to fermentation as the effective method of reducing anti-nutrients to a more tolerable level (Elboushy *et al*., 1990).

Table 2: Performance of Growing Japanese Quails Fed Fermented Mango Kernel Composite Meal.

Parameters	(0%)	(10%)	(15%)	(20%)	(25%)	SEM	P-Value
Mean initial body weight (g)	33.60	33.60	33.60	33.60	33.60	0.31	-
Mean final body weight (g)	131.67	136.00	142.09	148.13	153.02	3.31	0.12
Mean daily weight gain(g/)	3.50	3.65	3.87	4.09	4.27	0.09	0.07
Mean daily feed intake (g)	15.35[a]	15.07[b]	14.09[c]	13.97[d]	13.07[e]	0.28	0.03
Efficiency of feed utilization (g)	4.39	4.13	3.64	3.42	3.06	0.17	0.16

Means with different superscripts (a,b,c,d,e) within the same row differed significantly (P<0.05)
SEM= Standard error mean

CONCLUSION

It was concluded that fermented mango kernel composite meal could replace maize up to 25% without any growth depression.

REFERENCES

Abang, F. B. Ayuk, A. A. and Okon, B. I. (2013). Cost Effectiveness of Feeding 48 Hours Fermented Taro Cocoyam Meal *(Colocasia esculenta var esculenta)* to Growing JAPANESE Quails *(Coturnix coturnix japonica*). *Indian Journal Resources, (PARIPEX)* 2(8): 286-287.

Abang, F.B.P., Abeke, M. and Shittu, H. (2015). Performance of Quails (*Coturnix coturnix japonica*) Fed Graded Levels of Sun-Dried Mango (*Mangifera indica*) Kernel Meal as a

Replacement for Maize. *International Journal of Agriculture Bioscience*, 4(1): 4-7.

Akinmutimi, A.H. Ewa, E.U. Ojewole, G.S. Okoye, F.C. Abasiekong, S.F. (2004). Effect of Replacing Soyabean Meal with Lima Bean Meal on Finishing Broiler Chicken. *Global Journal of Agricultural Science*, 3(1): 1-4.

Ani, A.O. Okeke, G.C. Ameh, M.B. (2009). Response of Growing Japanese Quail (Coturnix coturnix japonica) Chicks to Diets Containing Different Energy and Protein Levels. Proceedings of the 34th Annual Conference of Nigeria Society for Animal Production. 15th-18th March, Uyo. 328-331.

Anon, A. (1995). Council on Regulation of Environmental Information.Pp. 1-3.

Atteh, J.O. (1986). Towards Animal Protein Self-sufficiency. A Case of Increased Production of Monogastric Animals. University of Ilorin Farmer. 2nd Edition, University of Ilorin, Nigeria. P. 12.

Diarra, S.S. and Usman, B.A. (2008), Growth Performance and Some Blood Parameters of Broiler Chickens Fed Raw or Cooked Mango Kernel Meal. *International Journal of Poultry Science,* 7(4): 315-318.

Diarra, S.S., Saleh, B., Kwari, I.D. and Igwebuike, J.U. (2011). Evaluation of Boiled Mango Kernel Meal as Energy Source by Broiler Chickens in the Semi-Arid Zone of Nigeria. *International Journal of Science and Nature*, 2(3): 55-59.

Edache, J.A., Musa, U. Karison, P.D. Esionu, J.O. Yisa, A. Okpala, E.J. Zwandor, N.J. (2007). The feeding value of cassava meal diets for growing Japanese quail (*Coturnix coturnix Japonica*). *Nigeria Journal for Animal Production*, 34: 77-82.

El-boushy, A.R. and Vander Poel, F.B. (1990). Feather meal: A Biological Waste, its Processing and Utilization as a Feedstuff for Poultry. *Biological waste*, 32: 39-74.

Jansman, A.J.M. Vestegen, M.W.A. Huisman, J. Van den Berg, J.W.O. (1995). Effect of Hulls Faba Beans (*Vivia faba* L.) with a Low or High Content of Condensed Tannins on the Apparent Illeal and Fecal Digestibility of Nutrients and the Excretion of Endogenous Protein in Illeal Digesta and Feces of pigs. *Journal of Animal Science*, 73: 118-127.

Lee, H.B. and Shim, K.F. (1971). Calcium Requirement of Japanese Quails. *Nanyang University Journal*, 5: 122-131.

Morton, J.F. (1987). Banana. In: Fruits of Warm Climates, Florida Flair Books, Miami.

National Research Council- National Academy of Sciences. (1991). Nutrient Requirements of Domestic Animals. Nutrient Requirements of Poultry.7th Ed. NRC- NAS, Washington, D.C, P. 62.

Official Methods of Analytical Chemists (AOAC).16th edition, Arlington, Virginian, U.S.A, 1995.

Olubamiwa, O. Haruna, E.S. Musa, U. Akinwale, T.O., Lombin, L.H., and Longe, O.G. (1999). Effects of Different Energy Levels of Cocoa Husk Based Diets on Productive

Performance of Japanese Quails. *Nigerian Journal of Animal Production*, 26: 88-92.

Steel, R.G.D. and Torries, J.H. (1980). Principles and Procedures of Statistics. A Biometrical Approach 2nd Edition. McGraw Hills Books CO. New York U.S.A. 1980.

Teguia, A.I. (1995). Substituting Ground Mango Kernels (*Mangifera indica* L.) for Maize in Broiler Starter Diets. *Animal Feed Science Technology*, 56: 155-158.

References to this paper should be made as follows Yerima Shettima Kolo and Felicia Ayuba (2019), Growth Performance of Growing Japanese Quails (*Coturnix Coturnix Japonica*) Fed Diets Containing Fermented Mango (*Mangifera Indica*) Kernel Composite Meal as Replacement for Maize. *J. of Agriculture and Veterinary Sciences,* Vol. 11, No. 2, Pp. 30-41