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PERFORMANCE OF LAYING JAPANESE QUAILS (*Coturnix coturnix japonica*) FED DIETS CONTAINING FERMENTED MANGO (*mangifera spp*) KERNEL COMPOSITE MEAL AS REPLACEMENT FOR MAIZE

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ABSTRACT

A study was conducted to investigate the effect of FMKCM on the performance of laying Japanese quails. One hundred and ninety five Japanese quails were randomly allotted to five dietary treatments (I –V) of 39 hens each. Each treatment was replicated thrice with 13 hens per replicate. In each of the five diets, FMKCM was used to replace maize at 0%, 10%, 15%, 20% and 25% for i, ii, ii, iv, and v respectively. Quails in this study were fed over a period 84 days. Feed intake was measured daily and the number of egg laid per replicate per day was recorded. Hen day egg production, hen house egg production, mean daily feed intake show no significant ($P>0.05$) difference across the treatment. The results obtained on efficiency of feed utilization differed significantly ($P<0.05$) across treatment groups. Quails placed on 20% and 25% inclusion levels of FMKM were best converter of feed to eggs. It was equally observed that treatment influenced time of lay, with early lay as levels of Fermented mango kernel meal increased in the diets of laying quails.

Keywords: *Laying performance, Japanese quails, fermented mango kernel, maize*

INTRODUCTION

Poultry depends on cereals and leguminous crops as sources of energy and protein. These crops form the largest percentages of poultry feeds and constitute the highest cost of ingredient in formulating feeds especially when supplied from conventional feed sources (Anyachie and Madubuike, 2007). Cereal and leguminous sources of feed stuffs are in short supply for livestock feed due to stiff competition from man, industries, seasonal effect on availability and low production. These have resulted in increased feed cost which translated into high cost of livestock products. The incorporation of agro- industrial by products and non- convectional feed stuff in poultry feed is now being encouraged and explored in order to sustain poultry industry (Abang *et al.*, 2015).

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 objective of the study is to evaluate the effect of fermented mango kernel composite meal (FMKCM) on the performance of laying Japanese 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 Analysis

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 Diet with Fermented Mango (*Mangifera spp*) Kernel Composite Meal (FMKCM) for Laying Japanese Quails (*Coturnix coturnix japonica*)

INGREDIENTS	(0%)	(10%)	(15%)	(20%)	(25%)
Maize	52.00	47.00	45.10	42.80	40.50
FMKCM	0.00	5.00	6.90	9.20	11.50
Soybean meal	23.00	23.00	23.00	23.00	23.00
Groundnut cake	16.00	16.00	16.00	16.00	16.00
Bone meal	7.00	7.00	7.00	7.00	7.00
Lysine	0.50	0.50	0.50	0.50	0.50
Methionine	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50
Vit/min premix	0.50	0.05	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00
Analyzed nutrients: Crude protein	20.85	20.96	21.02	21.07	21.13
M.E(Kcal/kg)	3043.42	3050.36	3051.09	3061.22	3069.61

Key: M.E= Metabolizable energy; FMKCM= Fermented mango kernel composite meal

Animal Grouping

A total of one hundred and ninety five (195) 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 12 weeks. Fresh water was supplied ad-libitum and daily records of feed intake and number of egg laid per replicate per day were kept, Feed conversion ratio, Hen- day egg production, Hen- housed egg production, was calculated using this formula

F.C. R= Feed intake (g) / egg produced (g)

Hen-day egg production= (No. of eggs produced/ No. of birds) x 100

Hen-housed egg production= (No. of eggs produced/ No. of birds housed) x 100

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

Hen day egg production and hen house egg production of (62.58-71.16) recorded in this research were identical because there was no mortality during the experimental period and the values agreed with the recommendation of Randal and Bolla (2008) who opined that 60 to 80% is good for the farmer. The result was higher than 40-68.28 % reported by Ghazvnian *et al*. (2011), 16.19-30.06% by Edache *et al*. (2012), and 16.51-29.5% reported by Ijaiya *et al*. (2015) but lower than 69.60-86.33% by Tuleun *at al*. (2013), and 63.24-84.16 reported by Orayaga and Sheidi (2018). Though there was no significance (P>0.05) difference. Hen day egg production and hen house egg production of birds on 0% inclusion of FMKM recorded the lowest values 62.58% and the 25% inclusion of FMKM recorded the highest value of 71.16%.

The mean daily feed intake of laying quails fed diets containing FMKM ranged from 22.81-25.73(g/hen/day). The results revealed that mean daily feed intake was not significantly (P>0.05) influenced. Mean daily feed intake (22.81-25.59g) was higher than the 20.32-21.11g reported by Bawa *et al*. (2011) and 22.53-22.59g reported by Orayaga and Sheidi (2018) when laying Japanese quails were fed diets

containing mango fruits reject meal and sundried mango kernel meal.

The results obtained on efficiency of feed utilization differed significantly ($P<0.05$) across treatment groups. Quails placed on 20% and 25% inclusion levels of FMKM were best converter of feed to eggs. It was observed that, the values for efficiency of feed utilization decreased across treatment groups with increased supplementation. The better efficiency of feed utilization was observed in this work probably because fermentation method was able to reduce the anti-nutrients to a more tolerable form there by making available the nutrient. Literature has it that mango seed kernel contain essential amino and protein. This result was in agreement with the report of Tuleun *et al*. (2013) who reported that higher protein support better efficiency of feed utilization.

It was equally observed that treatment influenced time of lay, with early lay as levels of Fermented mango kernel meal increased in the diets of laying quails.

Table 2: Performance of Laying Quails Fed Diets Containing Graded Levels of Fermented Mango Kernel Meal

Parameters	(0%)	(10%)	(15%)	(20%)	(25%)	SEM	P-Value
Hen- day Egg production (%)	62.58	64.52	67.98	69.14	71.16	5.72	0.89
Hen-house Egg production (%)	62.58	64.52	67.98	69.14	71.16	5.72	0.89
Mean daily feed intake (g)	25.73	24.90	24.37	22.91	22.81	1.57	0.19

Feed conversion ratio	3.60[a]	3.41[b]	3.31[c]	2.91[d]	2.88[d]	0.14	0.04
Time of lay (days)	46 days of age	44 days of age	42 days of age	39 days of age	38 days of age	-	-

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

CONCLUSION

It was concluded that fermented mango kernel composite meal could replace maize up to 25% in the diet of laying Japanese quails without affecting laying performance.

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