Dr. SSA Egena
Dept. of Animal production.
FUT Minna.

PROCEEDINGS

19th European Symposium on Poultry Nutrition

Potsdam | Germany, August 26–29, 2013

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PLENARY LECTURES

Growth Response and Egg Production of Japanese Quails (*Coturnix coturnix japonica*) Fed Diets Containing Varying Levels of Fermented Cassava (*Manihot esculenta*) Peel Meal

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Abstract

A two phased study was conducted to determine the effect of feeding varying levels of fermented cassava (*Manihot esculenta*) peel meal as a replacement for maize on the growth performance and egg production of Japanese quails (*Coturnix coturnix japonica*) using 300 two weeks old growing Japanese quail chicks with an initial mean body weight of 26.67g of both sexes. Fermented cassava peel meal was prepared by soaking fresh cassava peels in twice its weight of water for three days. The peels were put in a jute bag and kept for 12 hours under a local hydraulic press and then sun-dried before being coarsely milled. The birds were randomly allotted to four dietary treatments with 75 birds per treatment, each replicated thrice designated T_1, T_2, T_3 and T_4 containing 0, 25, 50, and 75% of fermented cassava peel meal (FCPM) as a replacement for the dietary maize respectively. The crude protein level was set at 24% in the growing phase. The parameters measured in the first six weeks (growing phase) were feed intake, weight gain, feed conversion ratio and nutrient digestibility. The results showed significant ($P<0.05$) difference in daily feed intake, while daily weight gain and feed conversion ratio showed no significant ($P>0.05$) difference among the treatment means. There were significant ($P<0.05$) differences in nutrient digestibility of the birds among the treatment groups. The second phase (laying) involved 120 female quails, after sexing and were allotted to 4 dietary treatments with 30 birds per treatment, replicated thrice and was fed with diets set at crude protein level of 20% with the same levels of replacement of maize as was in phase 1 which lasted for 8 weeks. The parameters measured were daily feed intake, hen-day production, hen-house-production and egg quality traits such as egg weight, egg length, egg width, egg shape index, yolk weight, yolk width, shell thickness, yolk index, Haugh unit, yolk height, albumen height and albumen weight. The results showed that there were no significant ($P>0.05$) differences in the daily feed intake, hen-day production, hen-house-production and all the egg quality traits. Therefore, it was concluded that dietary maize could be replaced with FCPM up to 50% level without any deleterious effect on the growth performance while up to 75% level could be used to replace dietary maize in the diet of laying Japanese quail without any adverse effect on egg production and egg quality traits.

Key words: Japanese quails, fermented cassava peel meal, growth response, egg production.

Objectives

One of major sector of the livestock industry in Nigeria is poultry production. This sector was hitherto, dominated by the rearing of domestic chickens. However, there are new entrants into the sector. One of the birds slowly gaining prominence is the Japanese quail (*Coturnix coturnix japonica*). Japanese quails are suited for commercial rearing, egg and meat production under intensive management (EGBEYALE *et al.*, 2013). This is because of their hardiness and ability to thrive in small cages (ODUNSI *et al.*, 2007), and the relative short time and cheaper cost of production (OJO *et al.*, 2011). Quails have lower feed requirement compared to the chicken. Quails also require minimal space meaning they can be reared anywhere. Successful rearing of quail is a factor of feed availability at reasonable cost, quality chicks and proper management. Management seems not to be a problem as such as quails are resistant to most poultry diseases hence requiring less vaccination. The major constraint therefore to the rearing of quails and other poultry species in Nigeria, is the high cost of feed especially energy source (maize, guinea corn), and protein (soya bean meal, groundnut cake). The reason for the high cost of these feed ingredients is mainly the competition that exists for them between man, the industry and livestock. Many energy supplying ingredients have been evaluated as possible alternatives to maize (the main energy feed ingredient) in poultry feeding. One of such alternatives is cassava and its derivatives. One of such derivatives is cassava peel, a by-product of cassava production which is readily available in the country. OMOIKHOJE *et al.* (2008) have reported on the extensive use of cassava peel meal as a cheaper substitute for maize in the diet of monogastric animals. The objective of the study was to investigate the growth response and egg production of Japanese quails fed diets containing varying levels of fermented cassava peel meal.

Materials and Methods

The research work was carried out at the poultry unit of the Department of Animal Production, Federal University of Technology, Minna, Niger State, Nigeria. Minna lies on latitude 9° 28' and 9° 37' north and on longitude 6° 23' and 6° 33' east. The mean annual rainfall is between 1000-1500mm. the vegetation is southern guinea savannah (FUTMIN, 2012). The research work lasted 14 weeks divided into 2 phases. These were the growing phase (6 weeks) and the laying phase (8 weeks). Cassava peels used for the research were collected from cassava processing plants within Minna metropolis. These were processed into cassava peel meal using the method described by TEWE AND KASALI (1986). After fermentation, the peels were evenly spread on polythene sheets to sun-dry. The sun-dried fermented cassava peels were then milled and stored until when needed for use. The processed meal was termed fermented cassava peel meal (FCPM). Other ingredients used for the research were: maize, groundnut cake (GNC), maize bran, fish meal, bone meal, limestone, salt, methionine, lysine and premix. The ingredients were used to prepare the experimental diets in which FCPM replaced maize at 0, 25, 50 and 75%, respectively (Table 1). Three hundred two weeks old Japanese quails sourced from the National Veterinary Research Institute, Vom, Plateau State, Nigeria were used for the first phase of the experiment. The birds were housed in deep litter pens equipped with feeders and drinkers. Heat and lighting were provided using 100 watts electric bulbs. Seventy five birds were randomly allotted to the four treatments. The birds were further divided into three replicates (25birds/replicate). Routine management operations carried out include feeding, cleaning of drinkers and turning of litter material to prevent caking up and ensure dryness. The experimental design used was the complete randomized design. Data collected were on mean feed intake, body weight gain, feed conversion ratio (FCR) and on nutrient digestibility. At the end of the grower phase of the experiment, 120 female Japanese quails were selected out of the initial 300 used. The females were retained in their original treatments. Sexing was done making use of the cloacae gland. This emits a whitish foamy substance when depressed. The parameters measured during this phase of the experiment were: daily feed intake, hen-day egg production, hen-house egg production and egg quality parameters such as egg weight, egg length, egg width, egg shape index, yolk weight, yolk width, shell thickness, yolk index, Haugh unit, yolk height, albumen height and albumen weight. Data collected from the two experiments were subjected to analysis of variance using SPSS version 17.0.

Table 1: Composition of experimental diets (growing and laying) fed to Japanese quails (%)

	Growing phase				Laying phase			
Ingredients	**T_1**	**T_2**	**T_3**	**T_4**	**T_1**	**T_2**	**T_3**	**T_4**
Maize	44.40	32.63	21.18	10.38	54.27	39.87	25.88	12.69
FCPM	0.00	10.87	21.18	31.14	0.00	13.29	25.88	38.06
GNC	38.90	39.80	40.94	41.78	28.03	29.14	30.54	31.55
Maize bran	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50	3.00	3.00	3.00	3.00
Limestone	1.50	1.50	1.50	1.50	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
*Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated values								
ME (Kcal/Kg)	2565.62	2409.77	2255.77	2100.75	2579.28	2161.26	1743.25	1325.23
Crude protein (%)	24.00	24.00	24.00	24.00	20.00	20.00	20.00	20.00
Crude fibre (%)	3.76	4.51	5.27	6.02	3.68	4.51	5.33	6.16
Methionine	0.30	0.28	0.22	0.23	0.29	0.27	0.24	0.23
Lysine	0.88	0.85	0.82	0.79	0.80	0.77	0.73	0.70

*premix supply per 2.5 Kg: Vitamin A (7,500iu), vitamin D (500,000iu), vitamin E (1,000iu), vitamin B_1 (375mg), vitamin B_2 (125mg), vitamin B_3 (500mg), vitamin B_6 (150mg), vitamin B_{12} (2.5mg), vitamin K (150mg), vitamin C (10mg), folic acid (150mg), Ca (12.5mg), Cu (8.0mg), Fe (32mg), I (0.8mg), Se (100mg), Mg (0.25mg), Chlorine (250mg), panthothenic acid (14.4mg).

FCPM = fermented cassava peel meal; GNC = groundnut cake; T_1 = 0% FCPM: 100% maize; T_2 = 25% FCPM: 75% maize; T_3 = 50% FCPM: 50% maize; T_4 = 75% FCPM: 25% maize.

Results and Discussion

The results of growth performance and nutrient digestibility are presented in Table 2. Body weight gain, total feed intake and daily feed intake were affected ($P<0.05$) by the replacement of maize with FCPM in the diets of the birds. The increased feed intake observed in birds fed FCPM might be because it contained more fibre compared to maize which tend to increase the fibre content of diets containing it thereby diluting the other nutrients especially energy. The birds therefore had to eat more to meet their energy needs to sustain growth and development. This is in agreement with SALAMI and ODUNSI (2003) who reported that increase in crude fibre decreases metabolizable energy thereby leading to increase feed intake to meet metabolizable energy requirement. Quails fed 50% FCPM had better ($P<0.05$) nutrient digestibility. ONYIMONYI and UGWU (2007) reported that birds could tolerate cassava peel meal at levels up to 50% at the expense of maize beyond which decrease in weight, feed efficiency and poor digestibility may result attributable to higher fibre content, dustiness and powdery nature of the cassava peel meal. The similarity in egg shell thickness means the diets supplied the required Calcium and Phosphorus needed for egg shell formation. The values obtained (0.20-0.21mm), is similar to the 0.231mm reported by KUL and SEKER (2004).

Table 2: performance and nutrient digestibility of Japanese quails fed dietary levels of fermented cassava peel meal

Parameter	T_1	T_2	T_3	T_4	SEM
Initial body weight (g)	26.67	26.67	26.67	26.67	2.67ns
Daily weight gain (g)	2.77	2.53	2.67	2.53	0.62ns
Total feed intake (g)	685.49^b	674.12^b	772.87^b	967.31^a	77.50*
Daily feed intake (g)	17.02^c	16.73^c	17.85^b	23.06^a	1.87*
FCR	6.14	6.61	6.69	9.11	0.72ns
Nutrient digestibility coefficients (%)					
Dry matter	88.40^b	88.43^b	90.36^a	73.20^c	2.61*
Crude protein	80.47^c	82.42^b	85.15^a	71.92^d	1.87*
Crude fibre	75.41^c	76.81^b	85.00^a	59.23^d	3.53*
Ether extract	95.04^b	95.65^b	97.60^a	83.93^c	2.02*
Nitrogen free extract	94.13^a	94.33^a	93.73^a	78.33^b	3.14*
Ash	74.42^b	70.24^c	82.93^a	59.82^d	2.58*

Means on the same row with different superscripts differ ($P<0.05$) significantly; T_1 = 0% FCPM: 100% maize; T_2 = 25% FCPM: 75% maize; T_3 = 50% FCPM: 50% maize; T_4 = 75% FCPM: 25% maize; SEM = standard error of mean; ns = not significant ($P>0.05$)

Conclusion

Results of the study showed that dietary maize could be replaced with FCPM up to 50% level without any deleterious effect on the growth performance while up to 75% level could be used to replace dietary maize in the diet of laying Japanese quails without any adverse effect on egg production and egg quality traits.

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Table 3: Egg production and egg quality traits of Japanese quails fed dietary levels of fermented cassava peel meal

Parameter	T_1	T_2	T_3	T_4	SEM
Hen-day production (%)	17.76	22.24	20.86	15.48	2.08ns
Hen-house production (%)	11.67	12.14	11.93	10.63	0.70ns
Daily feed intake (g)	23.52	26.02	25.38	22.07	0.66ns
Yolk weight (g)	3.24	3.62	3.29	3.31	0.10ns
Yolk width (mm)	2.79	2.82	2.78	2.91	0.03ns
Yolk height (mm)	8.94	9.71	9.81	8.86	0.28ns
Yolk index	3.23	3.45	3.54	4.13	0.27ns
Albumen weight (g)	2.20	2.49	2.66	2.76	0.13ns
Albumen height (mm)	2.96	2.72	2.55	2.74	0.10ns
Shell thickness (mm)	0.20	0.21	0.21	0.21	0.004ns
Egg weight (g)	7.65	8.07	7.79	7.74	0.17ns
Egg length (mm)	2.97	3.13	3.02	3.11	0.04ns
Egg width (mm)	2.48	2.42	2.44	2.49	0.03ns
Egg shape index	0.93	0.86	0.92	0.91	0.003ns
Haugh unit (%)	84.25	81.97	81.03	83.18	0.76ns

T_1 = 0% FCPM: 100% maize; T_2 = 25% FCPM: 75% maize; T_3 = 50% FCPM: 50% maize; T_4 = 75% FCPM: 25% maize; SEM = standard error of mean; ns = not significant (P>0.05)