INFLUENCE OF AFRICAN NUTMEG (*Monodora myristica*) ON THE EGG QUALITIES OF JAPANESE QUAILS (*Cortunix Cortunix*)

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Abstract
The study evaluated the influence of toasted *Monodora myrisica* spice as feed additive in egg qualities of quail. The study took a duration of eight weeks in a Completely Randomized Design. A total of 120 quails were allocated to 4 dietary treatments having 0%, 0.5%, 1.0% and 1.5% *Monodora myristica* respectively. Each treatment was replicated 3 times at 10 quails per replicate. From the results, significant differences ($P<0.05$) were observed only in the egg number, egg length, egg width and yolk weight. Egg number recorded 10, 16, 18 and 11 for 0%, 0.5%, 1.0% and 1.5% respectively. Egg length and egg width respectively were reported to be 29.54mm, 29.60mm, 23.14mm and 23.45mm; 22.62mm, 22.96mm, 23.14mm and 23.45mm for 0%, 0.5%, 1.0% and 1.5%. Yolk weights were reported to be 1.54g, 3.46g, 3.49g and 3.54g respectively for 0%, 0.5%, 1.0% and 1.5%. There was no significant difference ($P<0.05$) in the Haugh unit but it was observed to increase numerically as the level of inclusion increase. Quail weight at the point of lay ($P>0.05$) were 100g, 110g, 120g and 117g respectively for 0%, 0.5%, 1.0%and 1.5%.

Keywords: Feed additive, *Monodora myristica,* Japanese quail and egg qualities

Introduction

Poultry is one of the major sources of animal protein and generally accepted worldwide (FAO, 2004). Chicken, duck, guinea fowl, turkey are the major classes of poultry. The Japanese quail was introduced in Nigeria in 1992. In the recent times, attempts are being made to domesticate and popularize quail production. Since 1993, quail farming has been growing in popularity in Nigeria (Owosibo *et al*., 2013). Quails are small bodied birds of weight varying between 150 – 700 g when fully matured. It has feathers and the female lay small eggs of less than 15g compared to egg laying chicken of about 40 – 70g. The meat is a delicacy and highly nutritious. The high prolificacy and hardy nature of the quail bird as well as the recent discovery of the health benefits of its egg have made rearing of Japanese quails suitable for the resource poor tropical Sub-Saharan African countries.

Egg remains the only source of supply of day-old chicks for the success of the poultry production chain. External and internal quality of egg is of major importance to both layer and breeder industries worldwide. Production of eggs and its quality are influenced by many factors both genetic and non-genetic such as breed, nutrition, mortality rate, culling age and season (Oluyemi and Roberts, 2000). Hen's egg has been traditionally considered as an important source of nutrients for humans (Fetuga *et al*., 1976). It is a source of protein, lipids, mineral and vitamin easily renewable. The study involved assessment of the effect of *Monodora myristica* on the egg qualities of Japanese quail

Materials and Methods

Experimental Location

The Research work was carried out at the Poultry Unit of the Teaching and Research farm of Michael Okpara University of Agriculture, Umudike located within the tropical rain forest zone and lies between latitude $5^0$29'N and longitude $7^0$32'E and 122m above sea level and the environment is

characterized by an annual rainfall ranging from 60-68mm. The ambient temperature ranges between 30^0C – 32^0C while the relative humidity is in the range of 60 -80% (NRCRI, 2014)

Test Material

Seeds of *Monodora myristica* were bought from Ndoro market in Ikwuano Local Government Area of Abia State. They were cleaned and toasted for one hour at 65^0Cmilled into powder and bottled in air tight container for the chemical analysis and for the feeding trial.

Proximate Composition Analysis

Determination of the proximate composition of the test ingredient was carried out according to the procedure of A.O.A.C. (AOAC, 1990). The Proximate composition of raw and toasted seeds of *Monodora myristica* is presented in Table 1.

Table 1:Proximate Composition of raw and toasted *Monodora Myristica* (% DM basis)

Nutrient Content	Raw	Toasted
Moisture content (%)	10.10	8.24
Dry matter (%)	89.90	91.76
Ash (%)	8.84	9.40
CF (%)	9.64	6.24
EE (%)	28.60	21.54
CP (%)	15.75	25.38
NFE (%)	37.17	37.44
Gross (gcal/kg)	469.08	445.14

CF, EE, CP and NFE represent crude fibre, ether extract, crude protein and nitrogen-free extract

Experimental Birds and Design

One hundred and twenty unsexed quail birds were brooded for 2 weeks in deep litter and thereafter allocated to the four experimental diets designated as D1, D2, D3 and D4 in a Completely Randomized Design with 30 birds per treatment and replicated three times with 10 quails per replicate. The dietary treatments designated D1, D2, D3 and D4 contained 0.0, 1.0, 1.5 and 2.0% *Monodora myristica* respectively (Table 2). Throughout the experimental period, the quails were given feed and water *ad-libitum* and all the routine vaccination programs were duly administered. Feed consumption was measured daily while the weight of the birds was taken weekly in groups.

Table 2: Dietary Composition of the experimental diets supplemented with *Monodora myristica*

Ingredients	D1 (0%)	D2 (1.0%)	D3 (1.5%)	D4 (2.0%)
Maize	25.00	25.00	25.00	25.00
Maize offal	15.00	15.00	15.00	15.00
Wheat offal	15.00	15.00	15.00	15.00
P.K.C	4.00	4.00	4.00	4.00
G.N.C	4.00	4.00	4.00	4.00
S.B.M	15.00	15.00	15.00	15.00
Fish meal	5.00	5.00	5.00	5.00
Monodora	0.00	1.50	1.50	2.00
Methionine	0.50	0.50	0.50	0.50
Lysine	0.50	0.50	0.50	0.50
Bone meal	4.00	4.00	4.00	4.00
Oyster	2.00	2.00	2.00	2.00
vit/min premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Rice Bran	9.50	9.50	9.50	9.50
Total	100	100	100	100

P.K.C; G.N.C and S.B.M represent palm kernel cake, groundnut cake and soybean meal respectively

Data Collection

At the end of the rearing phase that lasted for 8 weeks, the quails were evaluated for egg production parameters. Eggs were collected daily from each replicate for 2 weeks and the total number of eggs at the end of each week was recorded and two eggs from each replicate were randomly picked for

analysis of the egg quality parameters. Egg weight, yolk weight and albumen weight were measured using an electronic weighing balance with sensitivity of 0.0lg. Yolk width and albumen height were measured using Vernier calipers with sensitivity of 0.05 mm and shell thickeners measured using a micrometer screw guage. (DIN – 863/11) with a sensitivity of 0.01mm. The albumen heights were taken at the widest expanse and midway between the yolk edge and the external edge of the thick albumen. The height did not include that of the chalaza or air bubble. The egg lengths were measured to the nearest of 0.01mm using micrometer screw gauge (Burodock, 1994). The lengths were measured as the distance between the broad and narrow ends of the egg. The egg number was assessed by counting total number of eggs laid by the birds for the selected two Weeks period of collection. The average number of eggs was calculated by dividing the total number of eggs by the number of laying birds. The thickness of the individual dry egg shell was measured with a micrometer screw guage to the nearest of 0.01mm. The mean of three measurements at three different points (the narrow, broad ends and mid points) was taken as the shell thickness. The yolk was carefully separated from the albumen using a plastic egg separator and weighed individually with an electronic sensitive scale to the nearest 0.01g. Yolk index value was calculated as the ratio of yolk height (mm) to yolk diameter.

The Haugh unit was estimated using the equation according to Haugh (1937).

Hu = $100 \log (H + 7.57 - 1.7W^{0.37)}$

H = Observed albumen height (mm)

W = Observed weight of egg (g)

Statistical Analysis:

The data collected were subjected to Analysis of Variance (ANOVA) for Completely Randomized Design. Where significant differences occurred, means were further subjected to Duncan's Multiple Range Test (Duncan, 1955) as packaged in SPSS (2010) for windows; version 16, SPSS Inc.

Results and Discussion

The effect of *Monodora myristica* on the egg qualities of quail birds presented in Table 3.

Table 3: Egg qualities of quails fed varying levels of Toasted *Monodora myristica* spice

Parameter	0%	0.5%	1.0%	1.5%	SEM
Weight at point of lay (g)	100	110	120	117	103.17
Egg Number (mm)	10.00[a]	16.00[b]	18.00[b]	11.00[a]	1.71
Egg Weight (g)	9.16	9.57	9.30	9.87	1.27
Egg length (mm)	29.54[a]	29.60[a]	23.14[b]	23.45[b]	0.50
Egg width (mm)	22.62[a]	22.76[a]	23.14[b]	23.45[b]	0.50
Shell weight (mm)	1.07	1.00	1.07	1.67	0.47
Shell Thickness (mm)	0.67	0.70	0.70	0.93	0.22
Albumen weight(g)	4.97	5.31	5.19	5.32	0.49
Albumen height(mm)	4.58	4.50	4.64	4.68	0.49
Haugh unit (%)	90.31	91.21	91.92	92.33	0.54
Yolk weight (g)	1.54[a]	3.46[b]	3.49[b]	3.54[b]	0.35
Yolk height (mm)	10.49	11.32	11.45	11.59	0.51
Yolk diameter (mm)	21.07	21.69	21.15	22.16	0.47
Yolk index (%)	48.35	50.54	51.70	52.34	0.67

There was no significant differences ($p>0.05$) in the age of the quails at point of lay and other parameters except in the number of eggs laid, egg length, egg width and yolk weight. The weight of the quail at point of lay were 100g, 110g, 120g and 117g for quails fed diets containing 0%, 0.5%, 1.0% and 1.5% respectively. The number of eggs laid by the quails were 10, 16, 18 and 11 respectively for diets 1, 2, 3 and 4. The number of eggs laid within the period of investigation was improved by 0.5 and 1.0% inclusion levels of *Monodora*, while inclusion level up to 1.5% resulted

to a decrease in egg number. The egg weight were observed (P>0.05) to be 9.17g, 9.57g, 9.30 and 9.87g respectively for quails fed diets 1,2,3 and 4.

The highest (p>0.05) egg weight was achieved by the addition of 1.5% *Monodora*. This was followed in weight (9.57g) by the egg of quails fed diet 2 (0.5%). There was significant difference (p<0.05) in the yolk weight, egg length and egg width of the quails fed the varying diets. The yolk weight recorded were 9.17g, 9.57g, 9.30 and 9.87g respectively for quails fed 0%, 0.5%, 1.0% and 1.5% toasted *Monodora myristica.* The egg length and egg width were observed to be 29.5mm and 22.62mm; 29.60mm and 22.76mm; 23.14mm and 23.14mm; 23.45mm and 23.45mm for 0%, 0.5%, 1.0% and 1.5% *Monodora myristica* levels respectively. Inclusion of *Monodora myristica* above 0.5% enhanced egg width. The shell weights were (P>0.05) 1.54g, 1.60g, 1.62g and 1.64g for quails fed diets 1, 2, 3 and 4 respectively. However, shell weight was observed to increase as level of *Monodora myristica* inclusion increased. Shell thickness for eggs of the quail fed different levels of *Monodora* were observed (P>0.05) to be 0.67mm, 0.70mm, 0.70mm and 0.93mm for quails fed 0.05%, 1.0%, 1.5% *Monodora myristica*. This implies that rate of egg breakage may be reduced with increased level of *Monodora myristica* inclusion above the control. Haugh unit and yolk index appeared to improve (P>0.05) as the level of inclusion of *Monodora myristica* increased.

Conclusion

The findings from the study carried out to evaluate the influence of toasted *Monodora myristica* spice as a viable quail feed additive in improving quail egg qualities showed increase in the number of eggs laid by the quails, the egg length, egg width and yolk index. Shell thickness was only improved numerically by *Monodora myristica*. This can be a promising feed additive in quail feed industry.

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