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Full length Research papers

Effect of *Telfaria Occidentalis* supplemented diet on Egg Production and Egg quality traits of Japanese Quail

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The research was conducted to investigate the effect of dietary supplementation of *Telfairia occidentalis* leaves on egg production traits and egg quality traits of Japanese quail. A total of forty eight (48) six weeks old female Japanese quail were randomly selected from an existing flock and distributed into 4 treatments (A,B,C,D) of 12 birds each in 3 replicates. The formulated basal diet contained 23%CP and 2800kcal/kg of Energy. Treatment A (basal diet and 0% antibiotic and 0% *T. occidentalis* as negative control), treatment B (basal diet with antibiotics, 0% *T. occidentalis* as positive control), treatment C (basal diet with 0.2% inclusion *T. occidentalis* with no antibiotic) and treatment D (basal diet with 0.4% inclusion *T. occidentalis* with no antibiotic). The experiment lasted for five (5) weeks. Data were obtained on egg production and egg quality traits. Data obtained were subjected to analysis of variance using SPSS package. The result revealed no significant differences (p<0.05) among the treatment means in egg production and egg quality traits even though there were numerical differences among them. It was concluded that *T. occidentalis* supplementation in quail diet compares favorably with antibiotics and therefore may be used as a replacement for antibiotics in Japanese quail.

Keywords: egg production, egg quality traits, Antibiotics, *Telfairia occidentalis,* Japanese quail

INTRODUCTION

The livestock industry, moat especially the poultry industry is a predominant source of animal protein in both developed and developing countries. However, the shortage of this animal protein is worsened by the state of economy, increase in population and climate change in most developing African countries (Nigeria inclusive) which makes domestic production of animal protein to decline rapidly giving room for the importation of several frozen meat especially poultry meat. Also, the desired growth of the poultry industry depends largely on the availability of good quality feed in sufficient quantities at good prices which are affordable to both producers and consumers (Adejinmi *et al*. 2011). This is a very important aspect, especially in layers which are very sensitive to nutrition such that inadequacies in nutrient supply often lead to fall in egg production and even cessation of laying.

Coturniculture is an important activity that is currently highly relevant in agricultural sector but despite the increasing production, much is still unknown about Japanese quail nutrition. To make rational production viable, researches aimed at implementing appropriate feeding programs is needed during both the initial and production stages, where there is scarce research on the subject. Japanese quail (*Coturnix coturnix japonica*) is used as a model animal and also is one of the sources for eggs and meat, particularly for the niche market. Several research has revealed that Japanese quail showed desired improvement in growth because they respond quickly to selection for BW (Anthony *et al*., 1986; Caron *et al*., 1990; Marks, 1996).

According to Ani *et al*., (2009) Japanese quails have less feeding requirement (about 20-25 g per day) compared to chicken (120-130 g per day). Quail attain a market weight of 140-180 g between 5-8 weeks of age and reaches peak egg production at the age of 5-8 weeks

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(Garwood and Diehl, 1987). Quails lay between 200-300 eggs in their first year of production and these birds have a high rate of production. However, they are not commercially well known around the world and certainly deserve recognition. In the Philippines, demand for quail eggs is growing over supply because of the discovery of the rich taste of the quail egg. Japanese quail egg regardless of their small size has been reported to be packed with nutrients which may be 3-4 times greater than that of chicken egg (Abduljaleel *et al*. 2011 and Tunsaringkarn *et al*. 2013), hence the need to improve the production of egg to tackle the increase concerning over dietary protein sources particularly in addressing malnutrition and undernourishment in the country. The increase in the resistance to antibiotic in both human and animal has led to the ban on the use of antibiotics by the European Union in 2006 in the livestock industry (Grasshorn, 2010).

In Nigeria and many other tropical and subtropical countries, there abound many plants with widespread acceptance and utilization scientifically for improving the health status and performance of animals (Onu, 2012). In recent years, there has been a growing interest in the antioxidant ability and benefit of phytochemicals in vegetables and other tropical plants which have been used for a large range of purpose including nutrition, medicine, flavoring, amongst other industrial uses (Oboh, 2005). These vegetables and herbs contain phytochemicals with significant antioxidant capabilities to lessen the toxic load (oxidative stress) in animals by aggressively binding to various harmful substances including heavy metals. Vegetables and other leafy plants are known to be rich in protein, essential fatty acids and most especially in vitamins and minerals which make them to be a good potential source of these nutrients to livestock and human populations at a reasonably cheaper rate (Farinu *et al*., 1992). However, their incorporation is still at a relatively low rate in view of the huge dependence on vitamin mineral premixes which are already certified, tested and well adopted as sources of these micro nutrients to the livestock.

The use of these vegetables along with other herbs is still increasingly being examined because of the numerous phytochemicals in addition to antioxidant present in them (Oboh and Akindahunsi, 2004). One of such vegetables is fluted pumpkin (*Telifera occidentalis*) leaves are popularly consumed in many homes in Nigeria as food due to the medicinal potentials ascribed to the plant. Preliminary investigation by Oboh (2005) revealed that the leaf of this plant is very rich in phytochemicals and antioxidants like phenols and ascorbic acid. Many phenolies, such as flavonoids, have antioxidant potentials better than those of vitamins C and E. Apart from the antioxidant properties of this plant. It is use locally in the treatments of some ailment such as leukemia, convulsion and anemia which have been reported by Omoregie and Osagie, (2002) and as a result of this, there has been increased consumption of the leaves or its extract.

Although record has shown that the leaf has been use on other poultry birds, however, its effect on egg production and egg quality traits of Japanese quail is yet to be documented. The nutritional value of fluted pumpkin which includes potassium, iron and antioxidant property has been found to be of importance in the improvement of egg production trait in other birds however no record has been documented on Japanese quail. Hence the significance of this study which is to determine the effect of dietary supplementation of fluted pumpkin leave on egg production and quality trait of Japanese quail.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at Teaching and Research Farm of the Faculty of Agriculture, University of Ilorin, located at Latitude 8'30'N and Longitude 4’33'E with an average annual temperature of 26.5°C, an average rainfall of 107mm and a 51.1% average relative humidity. The experiment lasted for five (5) weeks.

Experimental Birds and their Management

A total of forty eight (48) six weeks old female Japanese quail were randomly selected from an existing flock and kept. The birds were assigned using completely randomized into 4 diet treatment levels designated A.B,C and D. A basal diet was formulated contains 23% crude protein and 2800kgcal/kg of metabolizable energy. Treatment A contains s the basal diet and with no antibiotic and no *T. occidentalis* as negative control, B contains the basal diet with antibiotics without *T.occidentalis* as positive control, treatment C contains the basal diet with 0.2% inclusion level of *T. occidentalis* and treatment D contains the basal diet with 0.4% inclusion level of *T. occidentalis.* Each treatment level has 12 birds with 3 replicates with 4 birds to each replicate. The birds were fed ad libitum throughout the experimental period. Water and ventilation was provided and adjusted according to the standard of quail management. The feed composition is shown in table 1

Collection of Fluted Pumpkin Leaf

Freshly harvested fluted pumpkin leaves was bought from a reputable market in Ilorin Kwara state Nigeria. The leaves were rinsed with clean water to remove dirt and sand, drained and chopped. It was then air dried at room temperature to ensure it maintain its green coloration and nutrient. After drying it was grinded into powder using an electric blender.

Data Collection

The following data were collected during the experimental period.

Egg production trait data includes: Egg Number, Hen Day Production (HDP), Age at First Egg (AFE), Body Weight at First Egg (BWFE) while *data on internal and external egg quality traits* which includes: Weekly Egg Weight (g):

Table 1: Composition of Basal Diet

Feed ingredients	Percentage (%)
Maize	50.00
Wheat offal	13.00
Soya bean meal	20.00
Full fat soya bean	10.00
Fish meal (72%)	3.00
Oyster shell	1.00
Bone meal	2.00
DL- Methionine	0.25
Lysine	0.25
Salt	0.25
Broiler Premix	0.25
Total	**100**
Analyzed composition %	
Dry Matter	90.20
Crude Protein	22.20
Crude fat	6.00
Crude fiber	19.50
Total ash	11.32
Nitrogen free extract	31.18
Metabolizable energy (KCal)	2800

Shape Index: Albumen Height: Yolk Index: The height of the yolk (mm): Haugh Unit and The yolk index parameters were collected according to (Card *et al*., (1979);Doyon *et al.,* (1986) and Anderson *et al*., 2004).

Statistical Analysis

Data obtained were subjected to a Complete Randomized Design (CRD) analysis of variance (ANOVA) according to SPSS (2008). Significant differences among the means were determined using the Duncan Multiple Range Test.

RESULTS AND DISCUSION

Phytochemical screening (quality and quantity) of Telfiaria occidentalis

Table 2: Phytochemical screening (Quality and Quantity) of Phyllanthus amarus

Phytochemicals	Quality	Quantity (mg/kg)
Saponin	+	7.337112
Tannin	-	
Pholobatanin	-	
Phenolics	+	30.286535
Steroids	+	165.6
Flavonoids	+	358.0
Coumarins	+	55.36735
Anthyocayanin	-	
Amino acid	-	
Terpenoid	+	34.167345
Glycosides	+	7.88394
Triterpenes	-	303.68335
Alkaloids	+	41.77778
Fixed oils	+	

+ :detected and - :non detected

Table 2 shows the proximate composition (qualitative and quantitative) of *Telfairia Occodentalis* which contains Saponin, Phenolic, Steroids, Flavonoids, Coumarins, Terpenoid, Glycosides, Triterpenes, Alkaloids and Fixed Oil.

Effect of Telifairia occidentalis leave on egg production traits

Table 3 shows the effect of supplementation of *T. occidentalis* on egg production trait of Japanese quail. The table shows no significant differences ($p<0.05$) among the treatment levels on age at first lay, body weight at first lay, hen day production and egg number.

Table 3: Effect of *Telfaria occidentalis* supplemented diet on egg production traits of Japanese quails

Parameters	Treatment A	Treatment B	Treatment C	Treatment D	P- value	SEM
AFE (days)	47.33	46.67	49.00	49.50	0.752	0.938
Egg Number	0.76	1.17	2.67	4.33	0.380	0.462
BWFE (g)	135.45	129.35	148.44	143.45	0.109	2.924
HDP	10.87	16.76	36.43	29.44	0.43	6.639

AFE =Age at first egg, BWFE = Body Weight at First egg, HDP = Hen Day Production: Treatment A = (No *T. occidentalis* and no Antibiotics): Treatment B = (0% *T. occidentalis* with antibiotics) : Treatment C = (0.2% *T. occidentalis*) and Treatment D = (0.4% *T. occidentalis*)

Effect of dietary supplementation of Telfiaria occidentalis leaves on External and Internal egg quality traits.

The result shown on Table 4 and Table 5 shows the effect of supplementation of *T. occidentalis* on external (table 4) and internal (table 5) egg quality traits of Japanese quail. The table shows no significant differences ($p<0.05$) among the treatment levels on egg weight, egg length, egg width, egg shape index, shell weight, albumen weight, yolk weight, haugh unit, albumen height, yolk height and shell thickness.

Table 4: Effect of *Telfaria occidentalis* supplemented diet on external egg quality traits of Japanese quail

Parameters	Treatment A	Treatment B	Treatment C	Treatment D	SEM	P- value
Egg weight (g)	8.73	9.175	9.30	9.12	0.461	0.857
Egg length	2.36	2.50	2.49	2.35	0.071	2.257
Egg width (cm)	1.75	1.81	1.80	1.84	0.042	0.606
Shell thickness (mm)	0.25	0.29	0.31	0.29	0.035	0.683
Shell Weight (g)	0.62	0.64	0.72	0.65	0.057	0.605
Egg Shape	74.44	72.80	72.52	78.38	2.011	01114
Shell Ratio	7.061	0.640	0.717	0.652	0.057	0.605

Means with no common superscripts letter within a row differ significantly ($P<0.05$), Treatment A = (No *T. occidentalis* and no Antibiotics): Treatment B = (0% *T. occidentalis* with antibiotics) : Treatment C = (0.2% *T. occidentalis*) and Treatment D = (0.4% *T. occidentalis*)

Table 5: Effect of *Telfaria occidentalis* supplemented diet on the internal egg quality traits of Japanese quail

Parameters	Treatment A	Treatment B	Treatment C	Treatment D	SEM	P- value
Albumen weight (g)	4.76	4.62	4.84	4.72	0.300	0.940
Yolk Weight (g)	2.77	3.23	3.26	3.12	0.209	0.388
Albumen Height (mm)	4.30	3.61	3.48	4.02	0.324	0.267
Albumen Ratio	54.55	50.48	52.19	51.28	2.185	0.165
Yolk Ratio	31.53	35.00	35.40	34.35	1.557	0.350
Haugh Unit (%)	90.01	86.27	85.42	88.52	1.926	0.320

Means with no common superscripts letter within a row differ significantly ($P<0.05$), Treatment A = (No *T. occidentalis* and no Antibiotics): Treatment B = (0% *T. occidentalis* with antibiotics) : Treatment C = (0.2% *T. occidentalis*) and Treatment D = (0.4% *T. occidentalis*)

DISCUSSION

Telfaria occidentalis supplemented diet didn't significantly affect egg production parameters, such as hen-day production, age at first egg, body weight at first egg and egg number of Japanese quail hens as there were no significant differences, this is in accordance to Hammershoj and Steenfeldt (2012) study on the effect of feeding the following phytobiotics to layers; kale (*Brassica oleracea ssp. acephala*), thyme (*Thymus vulgaris*) and basil (*Ocimum basilicum*) as a forage material who reported no significant difference in laying rate between treatment groups. This is also in line with the study of Gharaghani *et al*., (2015) who studied effects of fennel in productive performance showed no significant difference.

The none significant effect among treatment means of *Telfairia occidentalis* supplemented diet on Egg quality traits, different from what occurred in this study, Saraswati *et al*. (2013) analyzed the supplementation of quail feed with turmeric powder (0, 13.5, 27 and 54 mg/quail/day) and observed an improvement in the internal and external quality of the eggs; the values of the response variables increased in increasing turmeric levels in the feed.

CONCLUSION AND RECOMMENDATION

The supplementation of *T. occidentalis* in the diet of Japanese quail shows no deleterious effect on egg production and egg quality traits among the treatments. It is therefore concluded that it can be used in Japanese quail diet in place of antibiotics.

The study recommends that Japanese quail diet can be supplemented with *T. occidentalis* at 0.4% to replace antibiotics. Also, further studies should be carried out subjecting the birds to a longer duration of supplementation and probably a higher inclusion level of *T. occidentalis*.

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