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Performance of laying Japanese quails (Coturnix coturnix japonica) fed graded levels of neem (Azadirachta indica) leaf meal

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Abstract
Six weeks feeding trail was conducted to evaluate the effects of neem (*Azadirachta indica*) leaf meal on performance of laying quails. Four layers diet were formulated to contain leaf meal at 0%, 5%, 10% and 15% of overall diet. One hundred and twenty laying Japanese quails already 6 weeks old were divided into 4 treatments in a complete randomized design (CRD). Feed intake was measured daily, and the quails were weighed once weekly. Performance records were taken while the body composition, as well as egg production levels were also analysed at the end of the experiment. There was significant (P<0.05) difference in feed intake and egg production. Result from this experiment shows that inclusion of neem leaf meal in laying Japanese quails more than 5% of overall diet has serious adverse effects on their performance.

Keywords: Neem leaf, laying, Japanese quails, performance

1. Introduction

Due to growth of human and livestock population which has created increase in demand of food and feed in developing countries, alternative sources must be identified and evaluated for livestock production. One possible alternative source of cheap feed resource for the livestock is the neem leaf meal [1].

The neem leaf (*Azadirachta indica*) is a hardy plant from the family Milliaceae. It is popularly known as Neem tree and is native of India and Burma, and is adapted favourably to areas with severe drought, poor, shallow and even saline soil. The Neem leaves, neem oil and de-oiled neem seed cake are used as animal feeds [2]. The Neem leaves contain appreciable amount of proteins, minerals, carotene and adequate amount of trace minerals [3]. Neem tree as one of the most researched tree in the world has attracted world-wide prominence due to its vast range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepatoprotective and various other properties without showing any adverse effects in rats [4].

The neem leaf meal has been extensively researched in the chickens [1, 5-13]. In all of these studies in chicken, the neem leaf meal has been reported to have positive impacts on the studied parameters at varying dietary inclusion levels.

However, in quail production in general, neem leaf has received very little attention. Mahmud *et al*. [14] reported inclusion of neem leaf meal up to % 5 of overall diet in growing Japanese quails without serious adverse effects on performance. Elangovan *et al*. [15] reported inclusion of neem kernel meal in growing quails reduced the growth besides inducing mild pathological changes in liver and kidney tissues. Elangovan *et al*. [16] reported that feeding neem kernel meal to Japanese laying quails from day 1-20 weeks of age supported normal feed intake, egg production and egg quality, however, the ingredient on long term feeding induced pathological changes in liver and kidney. Therefore the present study was conducted as a preliminary study on the performance of laying Japanese quails fed graded levels of neem leaf dietary inclusion.

2. Materials and Methods

2.1 Birds' management and experimental designs

The present study was conducted in the poultry unit, livestock farm of Niger State College of Agriculture, Mokwa. Mokwa is located at latitude 9° 17′38″ North and longitude 5° 3′16″ East [17].

The leaves of neem (*Azadirachta indica*) were harvested from around the Niger State College of Agriculture, Mokwa, Nigeria. The method of neem leaf meal preparation as described by [1] was used. Briefly, the leaves were chopped for faster and effective drying. The chopped leaves were sun-dried for three days until they became crispy while still retaining the greenish colouration. The dried leaves were milled using a hammer mill to produce a leaf meal. Sample of the leaf meal was then subjected to proximate analysis according [18]. Four experimental growing diets were formulated such that they contained Neem (*Azadirachta indica*) leaf meal at 0.0%, 5.0%, 10.0% and 15.0% dietary levels respectively.

120 laying Japanese quails were randomly divided into four treatments in a completely randomised design, with each treatment further replicated into three of ten birds per replicate. The birds were weighted at the beginning, weekly till the end of the trial. Feed intake was recorded daily and eggs collected once in a day afternoon. Total number of egg laid per treatment was recorded.

At the end of the 8th week six (6) quails (two from each replicate) were randomly selected from each of the treatment group, deprived of feed but not water for 24 hours slaughtered using *Halal* method of slaughtering [19]. Carcass weight and eviscerated carcass traits were recorded.

The egg production level was scored based on (+ or –) values. Therefore, (+++) denoted the highest egg producers and (++) denoted moderate egg producers. The least egg producers were

denoted by (+) and no egg producers were represented by (-). The intensity of the colouration and shelling of the eggs were also based on that score.

2.2 Statistical Analysis

Data collected were recorded as means ± SEM (Standard Error of mean) and were subjected to Analysis of Variance (ANOVA) using Statistical Package for the Social Sciences (SPSS version 17). Where there was difference in means, they were separated using Turkey's Honestly Significant Difference (HSD). Values of ($P \leq 0.05$) were considered significant.

3. Results & Discussion

The composition of the experiment diet is shown in Table 1. Data on performance, dress carcass characteristics of laying Japanese quails on the various dietary levels of the leaf meals are presented in Table 2. Weekly feed consumption of the treated groups was significantly different from that of the control group ($P<0.05$). All other parameters measured were not significantly different from each other.

Based on the score levels of egg production (+ or -) values, +++ denotes the highest egg producers, followed by (++) moderate egg producers, followed by the least egg producers (+) and no egg producers (-). The intensity of the colouration as well shelling of the eggs based on that score levels too, increased with the increase levels of neem meal inclusion in the diets.

Laying quails on the 0% NLM (T_0) performed generally better than those on the NLM diets (T_1, T_2, T_3,). The higher feed intake recorded by the quails on the NLM diet (T_1 T_2, T_3) was however understandable. The diets have low energy values due to high fibre content which had an energy dilution effect on these diets and a consequential increase in feed intake. This result is similar to the reports of [20]. Who reported lower feed intake by WL hens fed neem kernel meal at levels more than 100 g/kg. However, the result contradicts reports of [8].in laying pullets fed neem kernel meal diet and [16].in laying Japanese quail fed neem kernel meal. Both reported positive weight gain with increase percentage of neem kernel meat in the diets.

The intensity of the shell colouration that increased with increased levels of the neem leaf meal inclusion is an indication of efficient utilization of the pigmenting xanthophylls present in the neem leaf meal. Similar result was also obtained by [1].in layers diets containing increased levels of neem leaf meal. The decrease in shelling as well as the egg production observed with increased graded levels of leaf meal inclusion indicated that neem leaf meal could not supply adequate amount of minerals and vitamin required for proper growth and development of shell and bone formation as well as egg production in quails. These results contradict report of [1].in laying hens fed neem leaf meal. This dissimilarity could be attributed to the difference in species as well the level of dietary inclusion of the neem leaf meal.

Table 1: The percentage composition formulated layer mash diet from 6-12 weeks

Ingredients	T_0 (0% NLM)	T_1 (5%NLM)	T_2(10%NLM)	T_3 (15% NLM)
Yellow maize	63.50	60.33	57.15	53.97
Neem leaf meal	0.00	5.00	10.00	15.00
Fish meal	3.50	3.32	3.15	2.99
Limestone	3.40	3.23	3.06	2.89
Salt	0.30	0.29	0.27	0.26
Bone meal	2.87	2.73	2.46	2.44
Vit& min premix (L)	0.30	0.29	0.27	0.26
Methionine	0.13	0.12	0.12	0.11
Soya bean meal	26.00	24.70	23.40	22.10
Total	100	100	100	100

Premix contained the following: (Univit 15 Roche) 1500 I.U. Vit A, 1500 I.U. Vit D, 3000 I.U. Vit E, 3.0g Vit K, 0.3g Vit B_2, 8.0g Vit B_6, 0.3g Vit B_{12}, 3.0g Nicotinic Acid, 5.0g Ca-Panthothenate, 10.00g Fe, 0.2g Al, 3.5g Cu, 0.15g Zn, 0.02g I, 0.01g Co,0.01g Se.

Table 2: Effects of different dietary levels of neem leaf meal on performance of laying quails

Parameters	T_0 (0% NLM)	T_1(5%NLM)	T_2(10%NLM)	T_3(15% NLM)
Weekly feed consumption	972.75± 57.01[b]	2316.75± 186.74[a]	3152.50 ±313.21[a]	4462.75±570.27[a]
Weekly weight gain	12.03± 56.78	12.17± 2.71	8.65 ± 2.08	9.95 ± 7.54
Weekly feed conversion ration	6.73 ± 0.66	20.24 ± 2.46	26.77 ± 3.28	37.14 ± 6.57
Final body weight	150.00 ± 15.73	125.50 ± 2.43	140.67 ± 5.17	134.40 ± 5.08
Eviscerated carcass weight	100.00 ± 4.00	91.00 ± 3.00	94.00 ± 4.00	106.00 ± 2.00
Carcass weight	126.00 ± 4.00	114.00 ± 0.00	118 ± 4.00	131.00 ± 5.00
Hind limb weight	10.00 ± 0.00	8.00 ± 0.00	10.00 ± 0.00	9.50 ± 0.33
Wing weight	5.00 ± 1.00	4.00 ± 0.00	3.00 ± 1.00	4.00 ± 0.38
Breast weight	29.00 ± 1.00	27.00 ± 3.00	26.00 ± 2.00	35.00 ± 1.00
Heart weight	2.00 ± 0.00	2.00 ± 0.00	2.00 ± 0.00	2.00 ± 0.00
Level of egg production	+ + +	+ +	+	-
Level of colouration	-	+	++	+++
Level of shelling	+ + +	+ +	+	-

[a, b] means within a row with different superscripts are significantly different at ($p<0.05$)

4. Conclusions

The results obtained in this study, indicated that inclusion of neem leaf (*Azadirachta indica*) more than 5% overall level adversely affects the performance of the laying quails.

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