Quails Response to Aqueous Extract of Bush Marigold (Aspilia africana) Leaf

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Abstract: Problem statement: The effects of inclusion of aqueous extract of Bush marigold (Aspilia africana) leaf in quail diet were investigated. One hundred and fifty Japanese quail chicks were used in the study. Approach: In the 14-weeks feeding experiment, the birds were assigned to five treatments of; 0, 2.5, 5.0, 7.5 and 10% inclusion of aqueous extract of Bush marigold leaf. Each treatment had 3 replicates of 10 birds per replicate in a randomized complete block design. Results: The results indicated that feeding Aqueous extract of Bush Marigold Leaf (AeBML) did not affect (p>0.05) daily weight gain, feed conversion ratio and carcass yield. Mortality and % cracked eggs were reduced (p<0.01). Feed intake and dressed weight of growing quails were significantly (p<0.05) affected by dietary supplementations with AeBML. Egg number and hen day production increased (p<0.001) as level of AeBML increased, though egg weight decreased (p<0.01). Feeding AeBML improved (p<0.001) albumen weight, shell thickness and yolk colour when compared to the control. Conclusion: The study concluded that dietary inclusion of up to 5% aqueous extract of bush marigold leaf in the diets of growing and laying quails could enhance growth performance and egg production traits.

Key words: Bush marigold, egg quality, growth promoter, Japanese quail, plant extract

INTRODUCTION

Innovative technologies for sustainable production of high quality animal products are the current research focus in the livestock industries of many countries (Levic et al., 2009; Al-Kirshi et al., 2010; Kostadinovic et al., 2010; Runjaic-Antic et al., 2010). Dietary manipulations involving nutritional, sensory, chemical, physical and physiological characteristics of feed materials are one of the strategies developed for improving the quality of animal products (Runjaic-Antic et al., 2010). Poultry meat and eggs offer considerable potentials for bridging the protein gap, because high yielding exotic poultry adapt easily to the tropical environment and the technology of production is relatively simple with returns on investment appreciably high (Ekenyem and Madubuike, 2006). The incessant rise in feed cost and the resultant shortage in animal protein supply have encouraged the exploitation of locally, available and cheap animal and feed resources to forestall threat to the future of poultry production (Runjaic-Antic et al., 2010; Obuzor and Ntui, 2011).

Quail farming as an alternative poultry enterprise has only recently been introduced into Nigeria, where it is reared for its excellent meat and egg characteristics due to its numerous nutritive and economic benefits (Odugbo, 2004). Quail meat and egg are renowned for their high quality protein, high biological value and low caloric content.

The suitability of a number of plant species in the sustainable production animal feed is being exploited CTA, 2006. Medicinal ingredients of plant origin have different chemical nature and show a very wide range of pharmacological effects such as antibacterial activity, anti-inflammatory, astringent, antidiarrhoeal, digestion-stimulating, laxative, sedative, spasmylic and choleretic (Runjaic-Antic et al., 2010; Hashemi et al., 2008). Plants also have high amount of vitamins, minerals and contain pigments such as oxy-carotenoids, xanthophyllys useful for skin and egg pigmentations in birds (D’Mello and Acamovic, 1989). Plant materials such as herbs, spices, plant extracts, essential oils and meals are also receiving increased attention as possible natural alternatives to antibiotic growth promoter to boost monogastric performance (Al-Kirshi et al., 2010; Hashemi et al., 2008; Hernandez et al., 2004).

Several in-vitro studies have been conducted on bush marigold (Aspilia africana-Asteraceae) leaf as antimicrobial agents (Kuate et al., 1999; Okoli et al., 2007). However, limited publish reports are available on the effect of bush marigold leaf meal or extracts as growth promoter in monogastric production. Therefore,
the objective of this present study was to evaluate the
effect of aqueous extract of bush marigold leaf meal on
the productive and laying performance of quails.

MATERIALS AND METHODS

The experiment was conducted at the Poultry unit
of the Teaching and Research Farm, Faculty of
Agriculture, University of Calabar, Nigeria. Bush
marigold was obtained by harvesting whole field plant
above 3 cm stubble height within the mid vegetative to
flowering stage of development as described. The
leaves were sorted to remove any contaminants, dead
matter and sand particles. They were air-dried for 96 h
and the dried leaves were ground to fine powder to
form bush marigold leaf meal using a hammer mill fitted with
a 1mm screen. 100g of leaf meal was measured into a
conical flask and soaked in 600 mL of distilled water for
48 hours at room temperature. The mixture was filtered
into 250 mL conical flask with Whatman filter paper
no.1. The filtrate was then concentrated in vacuo (40°C)
to produce gel-like Aqueous extract of Bush Marigold
Leaf (AeBML).

Basal (antibiotic-free) diets were formulated to
meet the nutrient requirements of growing and laying
quails (Table 1). 0, 2.5, 5, 7.5 and 10% Aqueous extract
of Bush Marigold Leaf (AeBML) were supplemented
into the basal diets. One hundred and fifty, 1-week old
quail chicks were randomly assigned to each of the five
experimental diets in a randomized complete block
design. Each treatment had three replicates of 10
birds/replicate. Each replicate was housed in separate
pen and maintained on their various test diets
throughout the feeding period of 14 weeks. Feed and
water were offered ad libitum.

At the growth phase, growth parameter (feed intake,
weight gain and feed conversion ration) and mortality
rate were monitored weekly. At the end of the sixth
week, six quails were picked from each treatment for
carcass evaluation. At the laying phase (week 7-14), eggs
were collected twice (9.00 and 16.00 h) daily while feed
intake, egg weight, egg size and egg quality indices were
monitored weekly. Two eggs from each replicate were
broken into flat plates for the determination of egg
quality traits; albumen, yolk and shell weights as
percentages of egg weight. The number of cracks per egg
was also recorded. The shell thickness was measured
with the micrometer screw gauge and yolk colour was
determined using the Roche fan score method. Data
collected were subjected to the one way analysis of
variance and significant differences between means were
separated using Duncan’s multiple range tests as outlined
by Steel and Torrie (1960).

Table 1: Composition of basal diets (%)

| Ingredient               | Starter | Layer |
|--------------------------|---------|-------|
| Maize                    | 41.57   | 37.80 |
| Soy bean meal            | 35.43   | 41.70 |
| Crayfish dust            | 5.00    | 5.00  |
| Palm kernel cake         | 4.00    | 2.00  |
| Wheat offall             | 10.00   | 4.00  |
| Bone meal                | 2.50    | 4.00  |
| Lime stone               | 0.00    | 4.00  |
| Vitamin premix*          | 0.50    | 0.50  |
| Salt                     | 0.50    | 0.50  |
| Lysine                   | 0.30    | 0.30  |
| Methionine               | 0.20    | 0.20  |
| Total                    | 100.00  | 100.00|

| Calculated nutrient      |         |
|--------------------------|---------|
| % CP                     | 24.00   |
| ME (kcal/kg)             | 2750.00 |
| Salt                     | 0.50    |
| Crayfish dust            | 5.00    |
| Soy bean meal            | 4.00    |
| Wheat offall             | 4.00    |
| Bone meal                | 4.00    |
| Lime stone               | 4.00    |
| Vitamin premix*          | 0.50    |
| Salt                     | 0.50    |
| Lysine                   | 0.30    |
| Methionine               | 0.20    |
| Total                    | 100.00  |

Treatment 1: Basal diet; Treatment 2: Basal diet + 2.5% (25 g kg<sup>-1</sup> of feed) AeBML; Treatment 3: Basal diet + 5% (50 g/kg of feed); eBML; Treatment 4: Basal diet + 7.5% (75 g/kg of feed) AeBML; Treatment 5: Basal diet + 10% (100g/kg of feed); AeBML; *Supplied the following per kg of diet: Vitamin A 75,000iu; Vitamin D; 15,000iu; Vitamin E 75iu; Vitamin K<sub>1</sub>; 12.5 mg; Vitamin B<sub>1</sub>; 5 mg; Vitamin B<sub>2</sub>; 50 mg; Vitamin B<sub>3</sub>; 20 mg; Folic Acid 10 mg; Biotin 0.5 mg; Niacin 350 mg; BHT 625 mg; Calcium –D- Pantotic Acid 100 mg

RESULTS

Results on growth performance indicated that final
body weight, daily weight gain and feed conversion
ratio were not significantly (p>0.05) influenced by
dietary treatments Table 2. There were significant
(p<0.05) effects of aqueous extract of bush marigold leaf
on the average final weight, daily feed intake and mortality
rate in growing quails. The mean value for the final body
weight was 126.87, 120.65, 116.21 and 116.12 g for quails
fed 2.5%, 5, 7.5 and 10% AeBML diet, respectively
meaning that Aqueous extract of Bush Marigold
Leaf (AeBML) supplementation had no effect
(p>0.05) on the carcass characteristics of growing quails
Table 3. However at increased levels of AeBML
supplementation, dressed weight of quails was
significantly (p<0.01) improved. There was progressive
decrease in egg size as level of supplementation increased
Table 4. Egg number (82.38-132.00) was higher (p<0.001)
in quail hens fed 5% AeBML, followed by those on 7.5,
10 and 2.5% AeBML diets, respectively. The lowest
value was obtained from birds fed the control diet.
2004) that plant products had no significant effects on the carcass characteristics of birds. This could suggest that different plant extracts have varying effects on the carcass characteristics of birds.

Hen day production was improved especially in hens fed 5% AeBML agreeing with the results of Akande et al. (2008) that supplementation with Tephrosia bracteolata leaf meal improves hen day production in laying hens.

The inclusion of AeBML in the diets was observed to improve shell thickness and reduced (p<0.05) the amount of cracked or broken eggs in laying quails in line with the report of Akande et al. (2008). Also, the addition of AeBML in the diet of laying quails improved yolk pigmentation, indicative of high bio-availability of pigmenting agents in the leaf of bush marigold. The results supported the reports by earlier researchers (Al-Kirshi et al., 2010; Nhan et al., 1997; Cetingul et al., 2008) that supplementation with mulberry, peppermint, Trichantera gigantea and American J. Animal & Vet. Sci., 6 (4): 130-134, 2011

### Table 2: Influence of AeBML on the mean performance of growing quails

| Characteristics          | 0% AeBML | 2.5% AeBML | 5% AeBML | 7.5% AeBML | 10% AeBML | Sem   | LSD   | Level of Sig. |
|--------------------------|----------|------------|----------|------------|-----------|-------|-------|---------------|
| Initial body weight (g)  | 16.52    | 15.52      | 14.45    | 14.00      | 17.11     | 0.53  | 4.22  | NS            |
| Final body weight (g)    | 107.32   | 126.87     | 120.65   | 116.21     | 116.12    | 3.65  | 26.60 | NS            |
| Average body weight (g)  | 84.75    | 82.19      | 84.71    | 80.41      | 82.28     | 6.13  | 2.27  | **            |
| Daily feed intake (g/day)| 15.70    | 13.97      | 14.31    | 14.26      | 14.25     | 0.18  | 1.18  | *             |
| Daily weight gain (g/day)| 18.87    | 18.79      | 19.69    | 18.85      | 18.07     | 0.62  | 2.91  | NS            |
| Feed conversion ratio (%)| 0.83     | 0.74       | 0.73     | 0.77       | 0.79      | 0.04  | 0.26  | NS            |
| Mortality (%)            | 4.00     | 1.33       | 1.33     | 1.33       | 1.33      | 0.02  | 0.10  | *             |

### Table 3: Influence of AeBML on the carcass characteristic of growing quails

| Characteristics          | 0% AeBML | 2.5% AeBML | 5% AeBML | 7.5% AeBML | 10% AeBML | Sem   | LSD   | Level of Sig. |
|--------------------------|----------|------------|----------|------------|-----------|-------|-------|---------------|
| Live weight (g)          | 107.32   | 126.87     | 120.65   | 116.21     | 116.12    | 3.65  | 26.60 | NS            |
| Daily weight gain (g/day)| 2.16     | 2.65       | 2.53     | 2.43       | 2.35      | 0.22  | 0.52  | NS            |
| Dressed weight (%)       | 65.53    | 69.37      | 72.64    | 73.89      | 81.06     | 0.88  | 6.41  | **            |
| Yolk color               | 3.03     | 4.48       | 5.28     | 5.12       | 4.54      | 0.02  | 0.08  | ***           |

### Table 4: Effects of AeBML on the morphometric qualities of quail eggs

| Morphometric trait        | 0% AeBML | 2.5% AeBML | 5% AeBML | 7.5% AeBML | 10% AeBML | Sem   | LSD   | Level of Sig. |
|---------------------------|----------|------------|----------|------------|-----------|-------|-------|---------------|
| Egg size (g)              | 9.61     | 9.75       | 9.54     | 9.49       | 9.47      | 0.07  | 1.80  | *             |
| Egg no                    | 82.35    | 113.75     | 132.00   | 117.13     | 114.25    | 5.31  | 11.17 | ***           |
| Hen day production (%)    | 61.38    | 77.05      | 86.24    | 79.80      | 71.62     | 2.19  | 3.44  | NS            |
| Albumen weight (% EW)     | 47.80    | 49.75      | 52.07    | 50.45      | 52.11     | 0.38  | 0.05  | ***           |
| Yolk weight (% EW)        | 30.63    | 32.13      | 32.64    | 32.79      | 33.84     | 0.31  | 0.03  | ***           |
| Shell weight (% EW)       | 21.57    | 18.12      | 15.29    | 16.76      | 15.51     | 0.48  | 0.12  | ***           |
| % Crack                   | 0.87     | 0.70       | 0.68     | 0.68       | 0.65      | 0.01  | 0.18  | *             |
| Shell Thickness (mm)      | 0.29     | 0.29       | 0.33     | 0.29       | 0.29      | 0.03  | 0.01  | *             |
| Yolk color                | 3.03     | 4.48       | 5.28     | 5.12       | 4.54      | 0.02  | 0.08  | ***           |

**Different superscripts (a, b, c, d and e) indicate significanc (p<0.05, 0.01, 0.001) differences between treatments; the % albumen, yolk and shell weights were between 47.80-52.07, 30.63-32.88 and 15.51-21.57%, respectively. % albumen and yolk weights increased as level of AeBML supplementation increases, while % shell weight decreased**

**DISCUSSION**

The non-significant phytogenic effects of dietary AeBML supplementation on the performance of growing quails were in line with earlier reports (D’Mellow and Devandra, 1995; Alicicek et al., 2003; 2004) that plant products had no significant effects on the body weight of birds. The presence of some toxic factors inherent in leaf products have been implicated for the depression in feed intake (D’Mellow and Devandra, 1995) as observed in quails fed AeBML. Generally, it appears that dietary AeBML at 2.5-5% improved the growth performance of quails.

The present findings supported the notion that plant extracts improved the carcass yield of birds as reported by Alicicek et al. (2004) but contradicted the findings of Sarica et al. (2005) and Cabuk et al. (2006) that oregano leaf extracts had no significant effect on the carcass characteristics of birds. This could suggest that...
**Tephrosia bracteolate** leaf meal, respectively increased the yolk pigmentation of laying birds. This however contradicts the report by Odunsi (2003) that supplementation with *Lablab purpureus* leaf meal had no significant effect on the internal egg quality of birds. These findings indicated that aqueous extract of bush marigold leaf exert significant phytogenic effects on egg production traits than on the growth performance in quails.

### CONCLUSION

The study concludes that aqueous extract of bush marigold leaf has the potential to improve the growth performance, carcass yield and egg quality of quails. Optimum performance is achieved at dietary supplementation of 5% aqueous extract of bush marigold leaf in Japanese quails. This study recommends further investigation on the efficacy of aqueous extract of bush marigold leaf in other poultry species as alternative antibiotics.

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