

PRODUCTION STATUS OF LAYING HENS FED DIET CONTAINING DIFFERENT SPECIES OF FIG MEAL AND VITAMIN C SUPPLEMENTATION

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ABSTRACT

The demand for poultry products is on higher level due to increase in population. This study was carried out to evaluate the production status of laying hens fed diets containing different species of fig meal and vitamin C supplementation. Eight experimental diets were prepared with different inclusions of *Ficus* species leaf powder while the vitamin C supplement used was procured from pharmaceutical shop. Folliculogenesis and cholesterol of egg were calculated. Birds on diet 5 had deeper yolk colouration (13.29 ± 0.18), while those on diet 8 (9.70 g) recorded significantly ($p = 0.013$) had lower abdominal fat than the control (31.30 g). Significantly abdominal fat was observed in birds fed Diet 7 (68.35 g). The yolk cholesterol of egg fed Diet 2 had significantly (80.59mg/100g) lower value, while the treatment group fed control diet was significantly higher (143.83mg/100g). Birds fed diet 8 recorded the lowest abdominal fat while significantly higher abdominal fat was observed in those fed diet 7 (68.35 g). The yolk cholesterol of egg fed diet 2 had significantly (80.59mg/100g) lower value, while the treatment group fed control diet was significantly higher (143.83mg/100g). It can be concluded that *Ficus* species can be used to improve egg yolk colour while vitamin E and *Ficus* species can be used to reduce abdominal fat

KEYWORDS; Cholesterol, *Ficus* species, abdominal fat, egg, Hens.

INTRODUCTION

There is a great interest in the search for alternative, plant-based medicines with antimicrobial activity. The antimicrobial activity of the *Ficus* genus is well documented (Tariq *et al.*, 2019). However, knowledge about their applications in poultry nutrition and laying performance of layer birds is still rather limited. Alberto *et al.* (2020) reported the benefits and adverse effects of medicinal plants as feed supplements in poultry nutrition and stated that some of these plants show adverse influence by decreasing egg production, egg mass and in the same vein it reduces the growth of pathogenic microbes and improve egg yolk colour and immunity. One of the most important foundations of the poultry industry is to achieve high production and reach the best feed efficiency and maintain the best levels of bird health (Mohammed, 2018), and this requires adopting several strategies, including the use of feed additives, where herbs, trees and extracts are considered good feed additives, as they are safe and contain antioxidants, enzymes, vitamins, minerals and the required and cheap organic acids (Ravindran, 2013; Bagal *et al.*, 2016). Vitamin C supplementation might be useful because, although poultry can biosynthesize it, its endogenous synthesis may not be adequate to always meet the full poultry requirements, specifically during stress periods, when they may exceed the synthesizing ability (Portocarero, *et al.*, 2021). The innate immunity and antioxidant defense system play an important role against stress in all animals (Zhou *et al.*, 2012). Consequently, immune and defense systems stimulate and provide necessary protection to the body against stress (Ullah, 2012). There is therefore the need to study the effect of different inclusion levels of fig leaf meal and vitamin C supplemented diet on the reproductive physiology of laying hen.

Methodology

Experimental Area

The research was carried out at the School of Agriculture and Agricultural Technology Teaching and Research Farm, The Federal Polytechnic, Ado Ekiti, Ekiti State.

Experimental Birds and Management

One hundred and forty-four Lohman Brown breed of layers were bought at the point of lay from reputable farm at the age of 18 weeks. The birds were randomly allocated to eight dietary treatments of 18 birds per treatment with three replicates of six birds per replicate in a Completely Randomized Design (CRD). A basal diet (Table 1) was formulated to meet the NRC (1994) requirement for layers. Eight experimental diets were prepared with different inclusions of *Ficus species* leaf powder while vitamin C supplement used was procured from pharmaceutical shop. The fresh leaves of the fig tree (*Ficus carica*), sandpaper (*Ficus exasperata*), and strangler fig (*Ficus thonningii*) was harvested from their mother plants within the premises of the Federal Polytechnic, Ado Ekiti, Ekiti State. The leaves were chopped and air-dried under the shed to prevent loss of vital nutrients. The air-dried leaves were milled with a hammer mill to produce leaf powder, labeled and stored in a container and kept in a cool dry place until used.

Table 1: The gross composition of the basal (control) diet

Ingredients	Layer's basal diet
Maize	55.00
Soybean meal	15.00
Groundnut cake	7.00
Wheat offal	5.48
Palm kernel cake	5.67
Di-calcium phosphate	2.00
Fish meal	0.50
Limestone	8.50
Lysine	0.15
Methionine	0.15
Common salt	0.30
Premix	0.25
Total	100.00
Calculated analysis (%)	
Metabolizable energy (kcal/kg)	2687.36
Crude protein	16.85
Crude fibre	1.95
Methionine	0.50
Lysine	0.89
Calcium	3.75
Av. Phosphorus	0.47

The diet was divided into eight equal portions and labeled treatment 1 to 8 and described as follows: Control (no supplementation); Diet 2: 200 mg Vitamin C/kg of feed; Diet 3: 1.0 g *Ficus carica*/kg of feed; Diet 4: 1.0g *Ficus exasperata* /kg of feed ; Diet 5: 1.0g *Ficus thonningii* /kg of feed; Diet 6: 200 mg vitamin C + 1.0g *Ficus carica* /kg of feed; Diet 7: 200mg vitamin C + 1.0 g *Ficus exasperata* /kg of feed ; Diet8: 200 mg vitamin C + 1.0g *Ficus thonningii* /kg of feed.

Determination of Follicles in Laying Hen

At the end of the experimental trial, two samples of eggs from each replicate totaling six eggs per treatment were selected for folliculogenesis examination. The follicles in each of the birds were counted, measured with digital calipers..

Determination of Cholesterol level

At the end of the experimental trial, two samples of eggs from each replicate totaling six eggs per treatment were selected and broken after which the albumen and yolk were separated and placed separately in a petri dish. A method outlined by Emmanuel et al. (2011) was used to examine the yolk cholesterol.

Data analysis

The general linear model (GLM) of SPSS version 25 was used to analyze the data. The main factors' effects (CLM and Vitamin C) and their interaction was also assessed. The differences between the mean values were separated by Duncan's multiple range tests.

RESULTS AND DISCUSSION

Table 2 shows the effect of *Ficus spp.* meal and Vitamin C supplementation on folliculogenesis of laying birds. The results revealed that the treatment effect was not significant ($P>0.05$) for all follicular parameters measured except the abdominal fat that was recorded significantly ($P<0.05$) lower in birds fed Diet 8 (19.70g) than other treatment diets. The result of the cholesterol of egg of laying birds fed fig leaf powder and vitamin C supplemented diets is presented in Figure 1. The result indicated that the laying birds fed with fig leaf powder and vitamin C supplemented diets significantly ($P<0.05$) decreased yolk cholesterol content of the egg. The yolk cholesterol of egg fed with 200mg/kg vitamin C had significantly (80.59mg/100g) lower value, while the treatment group fed control diet was significantly higher (143.83mg/100g). Treatment fed with 1g/kg *Ficus carica* with the addition of 200mg/kg vitamin C and 1g/kg *Ficus exasperata* with addition of 200mg/kg vitamin C had statistically ($P>0.05$) similar value. Vitamin C and *Ficus spp.* treated layers showed improvement in primordial, primary, preantral, and antral follicles at the levels used in this study. Since vitamin C works in cooperation with other antioxidants, its administration in diseases that are followed by oxidative stress is more effective when used in combined preparations with phytogetic additives (Qureshi *et al.*, 2010). Murray *et al.* (2001) also reported that Vitamin C is necessary for remodelling the basement membrane during follicular growth and that the ability of follicles to uptake Vitamin C confers an advantage in terms of granulosa cell survival. The inclusion of fig leaf powder and vitamin C supplemented diet in the diet of laying hens significantly reduced the cholesterol content of the egg. The observed reduction may be due to the presence of phytochemical component of the leaves and the addition of vitamin C in the diet (Oloruntola *et al.*, 2016). The layer birds fed with 200mg/kg vitamin C significantly decreased the level of egg yolk cholesterol. The result obtained in this study has further proved the lowering effect of vitamin C on egg yolk cholesterol reported by Sanda and Suleiman, (2015). Mohiti-Asli and Zaghari (2010) also reported decreased trend in the concentration of egg yolk cholesterol with the increase in vitamin C supplemented diet.

Table 2. Effect of *ficus spp.* Meal and vitamin c supplemented diets on folliculogenesis of laying birds

Parameters	D1	D2	D3	D4	D5	D6	D7	D8	Pvalue
Ovary Weight (g)	69.70	74.45	74.40	66.40	63.15	67.85	69.20	75.85	0.32
Pre-Ovulatory 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pre-Ovulatory 2	5.50	4.00	5.50	5.50	5.00	4.50	5.00	5.00	0.47
Pre-Ovulatory 3	18.00	29.50	19.50	27.00	23.00	25.00	14.50	22.00	0.13
Abdominal Fat	31.30 _{bc}	43.35 ^a _b	39.90 ^{ab} _c	25.00 ^{bc}	27.75 ^b _c	31.35 ^{bc}	68.35 ^a	19.70 ^c	0.03

a, b and c = Means on the same rows but different superscripts are statistically ($P<0.05$) significant. Diet 1: Control (no supplementation); Diet 2: 200 mg Vitamin C/kg of feed; Diet 3: 1.0 g *Ficus carica*/kg of feed; Diet 4: 1.0g *Ficus exasperata* /kg of feed ; Diet 5: 1.0g *Ficus thonningii* /kg of feed; Diet 6: 200 mg vitamin C + 1.0g *Ficus carica* /kg of feed; Diet 7: 200mg vitamin C + 1.0 g *Ficus exasperata* /kg of feed ; Diet8: 200 mg vitamin C + 1.0g *Ficus thonningii* /kg of feed.