

## **Effect of Feeding Powdered *Nigella Sativa L.* (Kalongi) Seeds on Poultry Egg Production and Their Suitability for Human Consumption**

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### **Abstract**

The effect of *Nigella sativa L.* (Kalongi) seeds was studied on the performance of layers and cholesterol contents of their egg-yolk. Ninety-six White-Leghorn layers of 40 weeks of age were divided into 12 experimental units/replicates (8 birds per replicate). These units were randomly distributed among four treatments (3 replicate per treatment). Four test rations were prepared by supplementing a commercial layer-ration with powdered Kalongi seeds at the rates of 0, 0.5, 1.0, 1.5 %. Results showed that *Nigella sativa* seeds significantly ( $P < 0.05$ ) increased egg production, egg mass, egg shell thickness, and Haugh unit value. However, there was no significant ( $P > 0.05$ ) change in yolk index, blood and meat spots. The *Nigella sativa* seeds also significantly ( $P < 0.05$ ) reduced yolk cholesterol contents. The serum triglyceride, low-density lipoprotein cholesterol and total cholesterol levels were also reduced, while serum high density lipoprotein cholesterol level was increased by supplementing the commercial layer-ration with *Nigella sativa* seeds.

### **Introduction**

Poultry eggs have a high concentration of cholesterol, i.e. 213 mg per egg (Anonymous, 1989). Normally, a person is able to consume about 300mg of dietary cholesterol to avoid the risks associated with coronary heart disease (Anonymous, 1986). This necessitated a drastic reduction or even elimination of egg intake in the human diets in order to stay below the recommended level. The high cholesterol level in egg has been a possible contributory factor to the decrease their consumption.

*Nigella sativa* (Kalongi) seeds have been reported to possess a favorable effect on serum lipid profile by decreasing its total cholesterol, low density lipoprotein, triglycerides and by elevating the high density lipoprotein level (El-Dakhkhny *et al.*, 2000). Administration of seed oil has decreased serum cholesterol and total lipids in rats (Bashandy, 1996). Soliman *et al.* (1999) studied the synergistic effect of feeding black seeds and garlic on the broiler performance and immunity. However the information regarding the use of Kalongi in layer diets is scanty. In the present study the effect of feeding rations supplemented with powdered Kalongi seeds on poultry egg production and their quality for human consumption were determined.

### **Material and Methods**

Ninety-six White Leghorn layers aged 40 weeks were divided into 12 experimental units/replicates (8 birds per replicate). These units were randomly distributed among four treatments (3 replicate/treatment). Kalongi (*Nigella sativa L.*) seeds were purchased from the local herbal market and after grinding were mixed in the commercial layer ration at rates of 0, 0.5, 1.0 and 1.5 %. An adjustment period of two weeks was provided and the treatments were then given for a period of 12 weeks. Eggs were collected and weighed daily. Data on feed intake and refuse were collected weekly. Live body mass of birds were taken bi-weekly. Egg production, feed conversion ratio, egg shell thickness, Haugh unit, yolk-index, blood spots, meat spots, and egg yolk total cholesterol levels were determined biweekly. Blood samples of two birds selected at random from each replicate were taken at 0, 6 and 12 weeks. Serum was analyzed for total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol and triglyceride content. Data thus obtained were analyzed by using analysis of

variance technique under Completely Randomized Design with factorial arrangement. The significance of difference between the treatments was calculated by the Least Significant Difference Test (Steel and Torie, 1986).

**Determination of serum cholesterol:** Serum cholesterol was determined by enzymatic CHOD-PAP method (Schettler and Nussel, 1975) by using the kit manufactured by Diagnostic Systems International (DiaSys).

**Determination of serum Triglycerides:** Serum triglycerides were determined by enzymatic GOP-PAP method (Trinder, 1969) by using the kit manufactured by Human.

**Determination of serum HDL-cholesterol :** Serum HDL-cholesterol was determined by enzymatic CHOD-PAP method (Schettler and Nussel, 1975) by using the kit manufactured by Diagnostic Systems International (DiaSys).

**Determination of serum LDL-cholesterol :** Serum LDL-cholesterol was determined by calculation method with the help of Friede-Wald *et al.*, (1972) formula.

$$\text{LDL-Cholesterol (mg/dl)} = \text{Total cholesterol} - \frac{\text{Triglycerides}}{5} - \text{HDL cholesterol}$$

## Results and Discussions

Supplementation of layer ration with Kalongi seeds significantly increased egg production, as egg production of the control group was 4.10 vs 5.39 eggs/bird/week for the group treated with 1.5% Kalongi seeds. Feed conversion ratio was improved from 1.97 to 1.50 by feeding N.S seeds at level of 1.5%. These results are in close agreement with those of EL- Sheikh *et al.*, (1998) and EL-Ghamry *et al* 1997. Supplementation of layer rations with Kalongi seeds increased egg mass from 229.9 to 303.6g/bird/week. The **mortality** rate decreased from 16.67 to 4.17% by supplementation of layer ration with Kalongi seeds\*(Mortality rate for control group with 0% N.S seeds was highest i.e 16.67% with four mortalities while lowest for group fed ration containing 1.0 and 1.5% N.S seeds, with one mortality in each group during the experimental period. The results of the present experiment showed that mortality rate was decreased from 16.67 to 4.17 % by the supplementation of N.S seeds in the layer rations. Nigella sativa seeds improved the immunity due to the presence of pharmacologically active constituents; thymoquinone, dithymoquinone, thymohydroquinone, thymol, nigellidine, nigellimine, and nigellidine (Osman and El-Barody, 1999). Similar results were found by Abd-Rehman and Abu-Bakar (1997) , El-Ghamray *et al.* ( 1997), El- Sheikh *et al.* (1998) and Osman and El-Barody (1999) and Soliman *et al.*(1999)). The **body mass** was decreased significantly.\*(The average body mass of the birds decreased during the experimental period from 1610g to 1573.49g. The body mass for group fed 1.5% N.S seeds was decreased up to 1569.61g, while for control group fed with 0 % N.S seeds the body mass increased up to 1618.27g. For groups fed with 0.5 % and 1.0% N.S seeds the final body mass was 1542.25 and 1563.83g. The treatment have significantly (P<0.05) reduced body mass of layers as compared with the control group).Our finding is also similar to EL-Sheikh *et al.*, (1998), who have also recommended the use of N. sativa seeds in layer rations.\***Egg shell** thickness was significantly increased by supplementation of seeds in layer-ration. Feeding of diet containing 1.5% N.S seeds resulted in highest (P<0.05) shell thickness i.e. 0.3371mm, while shell thickness for 0, 0.5 and 1.0% were 0.318, 0.336 and 0.332mm respectively.) This may be due to response of ample amount of nutrients and especially calcium in the seeds. These findings are in line with the study of EL-Sheikh *et al.*, (1998). Albumin quality was improved but the yolk index remained unaffected by the inclusion of N.S seeds in layer diets. Egg yolk cholesterol was decreased significantly (P<0.05) by supplementation of Kalongi seeds in layer rations. Supplementation of 1.5% N. S seeds in layer rations resulted in 199.72 mg/egg yolk cholesterol compared to 227.63 mg/egg from birds fed control ration.. Since liver and serum cholesterol were decreased by supplementation of Kalongi seeds, deposition of cholesterol in egg yolk may also be decreased. Thus, the decrease in egg yolk cholesterol by

supplementation of Kalongi seeds may be due to a lesser deposition of cholesterol by liver in egg yolk during yolk synthesis. Serum triglyceride level were decreased from 941.4 to 896.6 mg/dl ( $P < 0.05$ ). Serum total cholesterol contents were also decreased ( $P < 0.05$ ) by feeding a diet containing 1.5% N.S seeds to the layers. The presence of high percentage of monounsaturated fatty acids (MUFA) in Kalongi seeds may have favorable effect, either alone or in combination with other factors, on synthesis of cholesterol in liver (EL-Dakhakhny *et al.*, 2000). Our findings are in agreement with those reported by Tayyab *et al* (1995) and Chaudhry *et al.*, (1996) who showed that Kalongi seed supplementation in diets of rats reduced serum total cholesterol level. Similar results were obtained by Hussain and Hassan (1996) and Badari *et al.*, (2000) with thymoquinone on the serum total cholesterol in rats. Supplementation of Kalongi seeds increased serum HDL-cholesterol significantly ( $P < 0.05$ ) from 22.11 mg/dl in control to 33.77 mg/dl in T4. Our results are in agreement with Chaudary *et al* (1996), who observed that Kalongi seeds supplementation to rats increased their HDL level. Supplementation of Kalongi seeds decreased serum LDL-cholesterol significantly ( $P < 0.05$ ). The decrease in serum LDL-cholesterol by supplementation of Kalongi seeds showed colorectal activity of *Nigella sativa*, as reported by EL-Dakhakhny *et al.*, (2000), LDL level may be decreased by increasing the production of LDL receptors (Chaudary *et al.*, 1996)

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