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Effect of Feed Manipulation on Egg Production, Egg Cholesterol and Blood Constituents of White Leg Horn Layers.

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Abstract

Present study was carried out at Poultry Research Center, Department of Poultry Husbandry, University of Agriculture Faisalabad, Pakistan, to investigate the effect of a mixture of garlic powder and ground kalongi on the performance of layers. Ninety-six White Leghorn molted layers were randomly divided into 12 experimental units with 8 birds each. These units were randomly allotted to 4 treatments (3 experimental units/treatment). Commercial layer ration purchased from market was supplemented with a mixture of 50% garlic powder and 50% ground kalongi and fed @ 0%, 0.5%, 1% and 1.5% (A,B,C and D). Egg production, feed intake, feed conversion ratio and egg weight were recorded. After every two weeks the egg cholesterol of the eggs produced was determined. Egg production increased significantly (P<0.01) by the treatment D. Feed consumption decreased significantly (P<0.01) by the treatment A but increased in treatments B, C and D. The serum cholesterol decreased significantly (P<0.01) by garlic powder and Kalong mixture supplementation. The highest value of serum cholesterol (335.6 mg/dl) was found in treatment A and the lowest (282.3 mg/dl) in treatment D. The effect of treatments on egg yolk cholesterol was also found to be significant (P<0.01). The highest mean egg yolk cholesterol (275.7 mg/egg) was found in treatment A and the lowest (238.1 mg/egg) was in treatment D. The treatments showed significant (P<0.01) decrease in serum LDL cholesterol by supplementation of garlic powder and Kalongi mixture. The highest mean value of LDL (194.3) was found in treatment A and the lowest (156.7) in treatment D. The high-density lipoprotein cholesterol was not affected significantly by the treatments.

Keywords: Feed manipulation, white leg horn egg production, blood ,egg cholesterol,

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Introduction

Cholesterol occurs in tissues and plasma lipoprotein either as free cholesterol or cholesteryl ester. It is widely distributed in all cells of the body, particularly rich in brain and nervous tissue. Cholesterol plays a vital role as precursor of steroid hormones and bile salts. Higher serum cholesterol level causes arteriosclerosis and heart problems which is the most common lethal problem, it occur when serum cholesterol level is above 180 mg/dl.

Factors responsible for higher serum cholesterol concentrations include higher saturated fatty acid intake, higher body weight gain and more cholesterol intake. But polyunsaturated fatty acids, vegetable protein, phytosterols, and fibers lower the serum cholesterol concentration. Foods like eggs and meat can be modulated by the use of hypocholesterolaemic agents. This would be of great interest for the poultry industry and health conscious people in reducing blood pressure, heart problem and obesity.

Poultry meat is low in cholesterol but poultry eggs are high in cholesterol. Eggs are good source of nutrients but their high cholesterol contents is a contributory factor in reducing their consumption in developed countries (Pesti, 1997).

Garlic extract has its hypocholesterolaemic action, due to the organic tellurium compounds, which are found in high concentration in fresh garlic buds, may contribute to this action by inhibiting squalene epoxidase, the penultimate enzyme in the synthetic pathway of cholesterol. Tellurium may also contribute to the characteristic odour of garlic since the most obvious clinical sign of tellurium poisoning is a garlic-like odour (Haq *et al.*, 1999). A reduction of cholesterol contents of market eggs would be of great interest to both egg producers and health conscious consumers. The present study reports the combined effect of different levels of Garlic Powder (*Allium sativum*) and Ground Kalongi (*Nigella sativa*) on egg production, serum and egg cholesterol contents of commercial layers.

Materials and Methods

The experiment was conducted at Poultry Research Centre, Department of Poultry Husbandry, University of Agriculture, Faisalabad, Pakistan. Ninety-six, White Leghorn layers, having uniform body weight were

selected from a flock of Euribred strain. They were randomly divided into 12 experimental units with 8 birds each. These units were randomly allotted to 4 treatments (3 experimental units/treatment). During the experimentation, feed and fresh drinking water was provided *ad-libitum*. Commercial layer ration purchased from market was supplemented with a mixture of 50% garlic powder and 50% ground kalongi fed @ 0%, 0.5%, 1% and 1.5% (A,B,C and D). Weekly live weight, egg production, feed intake and egg weight were recorded. Feed conversion ratio per dozed eggs and per kg egg mass was calculated. After every two weeks the egg cholesterol was determined by kit using enzymatic CHOD-PAP procedure (Schettler and Nussel, 1975). Blood samples of two birds picked at random from each replicate were taken after every 4 weeks to determine serum triglycerides, high-density lipoproteins, low-density lipoproteins and total cholesterol as described by Trinder (1969).

The data thus collected was analyzed by analysis of variance technique using split plot design having treatments in whole plots and time in sub plots (Steel and Torrie, 1980). The difference between the means was calculated by Least Significant Difference test.

Results and Discussion

The experimental birds under the treatment of a mixture of garlic powder and ground kalongi gained 1.0 to 2.73 more live body weight. The increase in live weight may be due to allicin, an active component present in garlic powder, which inhibits the growth of pathogenic bacteria and aflatoxin producing fungi. Similar findings have been reported by Samanta and Dey (1991).

The results of present study showed that the egg production increased significantly ($P<0.05$) by different treatments containing a mixture of garlic powder and ground kalongi (Table1). Increase in average egg production by supplementing *Nigella saliva* in layer ration at different levels had also been reported by El-Sheikh *et al.* (1998). There was a significant effect of treatments on feed consumption. (Table1).

The experimental birds under "D" treatment of garlic powder and gound kalongi showed better FCR in terms of FCR/dozen eggs and significantly better FCR/kg egg mass as compared to control. Reddy *et al.* (1991) had also reported improved FCR in layers fed garlic oil @ 0.02% for 28-days period.

The layers under different treatments of garlic powder and ground kalongi showed a significant decrease ($P<0.05$) in yolk cholesterol ranging from 10 to 17% as compared with control (Table 2). The layers under treatment of garlic powder and ground kalongi had 9.5 to 12.3 % less serum cholesterol and 14 to 19 % less serum triglycerides than those of control. The low-density lipoproteins cholesterol was also significantly ($P<0.05$)reduced by supplementation of garlic powder and ground kalongi (Table 2). The high-density lipoproteins cholesterol was not significantly affected by supplementation of garlic powder and ground kalongi.

Similar findings had also been reported by Rehman (2001), Konjufca *et al.* (1995), Khalid *et al.* (1995), Pesti (1997) and Konjufca *et al.* (1997) whom used commercial garlic powder that significantly decreased the serum cholesterol and plasma triglycerides. Nasir (2001) also reported the similar results with Kalongi supplementation. Qureshi *et al.* (1983), Jain (1977), Dalvi and Salunkhe (1993) and Jafri and Iqbal (1993) reported significant decrease in blood triglycerides and serum cholesterol level. Myung *et al.* (1989) reported that the addition of garlic in 1.5% cholesterol fed rats decreased serum cholesterol by about 30%. Horton *et al.* (1991) also reported that plasma cholesterol was 10% lower with garlic supplementation @ 10g/ kg feed.

Table 1: Mean weight gain, egg production, egg mass/week/replicate, feed consumption, feed converstion ratio/dozen eggs and feed conversion ratio/kg egg mass.

Parameters	A (0%)	B (0.5%)	C (1%)	D (1.5%)
Weight gain (gm)	1578 ^{a}	1564 ^{a}	1536^{b}	1559 ^{a}
Egg production (no.)	4.61^{d}	5.83^{c}	5.51^{b}	6.09^{a}
Egg mass/week/replicate (kg)	0.248 ^{c}	0.326 ^{a}	0.302 ^{b}	0.344 ^{a}
Feed consumption (kg)	0.510^{c}	0.724^{a}	0.693^{b}	0.667 ^{b}
Feed Conversion Ratio/dozen eggs	1.32 ^{a}	1.49^{a}	1.51 ^{a}	1.31 ^{a}
Feed Conversion Ratio/kg egg mass	2.05^{a}	2.22^{a}	2.29 ^{a}	1.94 ^{b}

Same superscripts in a row show non-significant differences ($P<0.05$).

Table 2: Mean serum total cholesterol, LDL-cholesterol, HDL-cholesterol and triglycerides.

Parameters	A (0%)	B (0.5%)	C (1%)	D (1.5%)
Serum total Cholesterol (mg/dl)	335.6^{a}	290.1^{b}	287.4^{b}	282.3^{b}
LDL-Cholesterol (mg/dl)	194.3^{a}	168.2^{bc}	183.0^{ab}	156.7^{c}
HDL-Cholesterol (mg/dl)	21.11^{a}	28.33^{a}	23.33^{a}	27.33^{a}
Triglycerides (mg/dl	1046.33^{a}	1010.33^{a}	1036.56^{a}	1023.56^{a}
Egg Yolk Cholesterol (mg/egg)	275.7^{a}	269.7^{a}	262.5^{a}	238.1^{b}

Same superscripts in a row show non-significant differences ($P<0.05$).

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