



Effect of feeding Tulsi (*Ocimum sanctum*) Leaf Powder in diet of broilers for quality meat production

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ABSTRACT

The research was conducted to study the effect of dietary supplementation of tulsi (*Ocimum sanctum*) leaf powder on meat cholesterol and serum lipid profile of broiler from day old to six weeks of age. A total of 72 (Arbor-Acres) day old chicks were used in this study. Four levels of a Tulsi (*Ocimum sanctum*) leaf powder at the rate of 0.00%, 0.25%, 0.50%, and 1% were incorporated into the basal diet for six weeks. Feeding period for all groups was lasted for 42 days. All the birds were reared under standard managerial conditions. The observations were recorded for cholesterol content of meat and serum lipid profile of broilers. Supplementation of tulsi leaf powder at the rate of 1% for 42 days showed the significant decrease ($P<0.01$) in breast muscle and thigh muscle cholesterol. Group T₃ showed the significant reduction in thigh muscle cholesterol but not in breast muscle cholesterol. The average serum total cholesterol was reduced significantly ($P<0.01$) in T₄ group but not in T₃. The average serum HDL cholesterol was increased significantly ($P<0.01$) in T₃ and T₄. The average serum triglycerides were significantly reduced in T₃ and T₄. But higher reduction obtained in birds fed with 1% tulsi leaf powder in diet. The average serum LDL cholesterol was significantly reduced ($P<0.01$) in T₄ followed by T₃ group. The study concluded that supplementation of tulsi leaf powder at the rate of 1% in broiler diet for 42 days reduced meat and blood cholesterol levels of broiler.

Key words: Broiler, Tulsi, Serum lipid profile, Meat, cholesterol

INTRODUCTION

Poultry egg and meat in recent years become important and popular food for the 68% of non-vegetarian population (Mohapatra, 2005). Consequently meat plays an important role in Indian meal not only as it due to its increasing capability in coping up with the ever increasing population but also as a source of healthy, nutritious and protein rich food for the society and hence the quality of each food has to be tested as per health point of view. Meat quality is assessed through physical (*viz.* PH, colour, tenderness, water holding capacity), chemical (*viz.* moisture, protein, ether extract, cholesterol, fatty acid, oxidative status, residuals etc.), organoleptic (*viz.* taste, flavor, juiciness etc.) and microbiological characteristics. (Thakur *et al.*, 2008). Hence many researchers started to improve the meat quality by altering the meat composition. There is increasing incidences of coronary heart diseases (CHD) all

over the world, the consumer started thinking about the quality assurance in respect of cholesterol content of the meal he eats.

The various Studies have shown that high levels of cholesterol are associated with CHD, even in the absence of other risk factors such as high blood pressure, cigarette smoking, obesity, and diabetes. Many different types of epidemiological studies have not only quantitatively defined the relationship between cholesterol levels and CHD risk but also suggests that the greater the reduction in cholesterol, the greater the reduction of CHD, whether this is achieved through diet or drug either in the context of primary or secondary prevention. Epidemiological studies, also suggested that each 1% reduction in blood cholesterol is associated with an approximate 2% reduction in CHD manifestations (Rifkind, 1986). As nutrition and feeding of birds has a marked influence on meat quality, consumer's health and nutritional status,

thereby augmenting the nutritional profile of chicken meat through nutritional manipulation is a fast emerging concept. Hence Present study is undertaken to improve the quality of the meat thought the reduction of cholesterol content in meat by the incorporation of Tulsi (*Ocimum sanctum*) leaf powder in broiler diet.

MATERIAL AND METHODS

A total of 72 DOC of same hatch were randomly distributed into four groups i.e. T₁ (Control), treatment T₂, T₃ and T₄ with six sub groups comprising of three birds in each. Broilers in T₁ were fed diet as per (NRC, 1994) standard (CP 22 and ME 2900) but broilers in T₂, T₃ and T₄ were fed standard ration supplemented with Tulsi (*Ocimum sanctum*) leaf powder at the rate of 0.00%, 0.25%, 0.50%, and 1% were incorporated into the basal diet. All broilers were offered feed and water *ad libitum* throughout the experimental period. They were housed in metal type battery cages in small animal laboratory of S.S. and AH Dairying, SHIATS Allahabad. A bulb of 15 watt was left on in each cage. Initial weight of each chick was recorded on arrival and then weekly. Green Tulsi (*Ocimum sanctum*) leaves were dried for three to four days initially and then in oven at 60°C up to moisture content level below 10%. Then the leaves were crushed manually to make it fine. It was passed through fine meshed wire sieve to obtain uniform powder. Then it was mixed with standard feed mixture according to the ratio mentioned. Chicks were provided 0.8 sq.ft/bird space. Cages, feeders, waterers, and other equipments were properly cleaned disinfected and sterilized before use.

The waterers were disinfected with 0.02% KMnO₄ solution every day. The average live body weight, body weight gain, feed intake, mortality percent and feed conversion ratio were measured on weekly basis. Ten sample of each breast and leg muscle from each dietary treatment were randomly selected at the end of the experimental period for the estimation of total cholesterol content (Wybenga and Pileggi, 1970). Serum total cholesterol was estimated by the procedure of Libermann (1885). Serum HDL cholesterol was estimated by the procedure of Dernacker and Hifrnans (1980). Serum triglycerides were estimated by the procedure of Stein and Mayer (1995). The LDL cholesterol was calculated by using Friedwald's formula (Friedwald's *et al.*, 1972).

RESULTS AND DISCUSSION

The effect of dietary supplementation of tulsi (*O. sanctum*) on serum total cholesterol, HDL-cholesterol, LDL-cholesterol, serum triglycerides and on meat cholesterol is shown in table-2. It is revealed that there was a significant reduction in breast muscle cholesterol in group T₄ (P<0.01) as compared to T₁, T₂ and T₃. The findings of present study are in accordance with results of Usha Rani (1997) who inferred decreased breast muscle cholesterol when tulsi and nicotinic acid were incorporated in the broiler diets as compared to control. From Table 2 it is revealed that there was a significant reduction in thigh muscle cholesterol in group T₄ and T₃ (P<0.01) as compared to T₂ and T₁. Nagaraja Kumari *et al.* (2006) also found significant reduction in thigh muscle cholesterol by Amaranthus leaf meal (*A. tricolor*) in broiler. The results revealed that the average serum total cholesterol was significantly reduced (P<0.01) in group T₄ as compared to control T₁ group. However there was no difference in the average serum total cholesterol when T₂ and T₃ were compared. It might be due to the reason that blood and tissue levels of cholesterol are determined by balance achieved between dietary inputs and body synthesis on one hand and excretion of neutral sterols and oxidation of bile acid on other hand. Hence any experimental change induced in blood cholesterol levels must be due to the changes in one or more of these input- output factors. In present study the hypocholesterolemic effect of tulsi (*O. sanctum*) might be probably through inhibition of hepatic cholesterol biosynthesis and increased faecal bile secretion and stimulation of receptor mediated catabolism of low density lipoprotein. The present finding is in agreement with Usha Rani (1997) who reported the decrease in the serum total cholesterol with the supplementation of tulsi and nicotinic acid in broilers and Deshpande (2006) who reported the significant reduction in serum total cholesterol in laying hens with the supplementation of tulsi leaf powder. The average serum HDL cholesterol was significantly increased in group T₃ and T₄ as compared to control T₁ and T₂ group. Similar findings are also observed by Sarkar *et al.* (1994) in rabbits with supplementation of tulsi. It is revealed that the average serum triglyceride value of group T₃ and T₄ was significantly reduced (P<0.01) than T₂ and T₁ but not in between T₃ and T₄. The present findings are in agreement with the Usha Rani (1997) who reported the decrease in the serum triglyceride with the supplementation of tulsi and nicotinic acid in broilers.

Table 1 Ingredient and nutrient composition of experimental diet (%DM)

Ingredients (%) (22 – 42 days)	Broiler starter (0 – 21 days)	Broiler finisher
Maize	60.00	63.00
Ground nut cake	23.11	18.00
Fish meal	12.60	14.60
Premix*	2.50	2.50
Salt	0.30	0.30
Methionine	0.10	0.01
lysine	0.10	0.01
Di-calcium phosphate	1.20	1.20
Total	100	100
Calculated Chemical analysis		
Moisture (%)	6.29	6.22
Crude Protein (%)	23.29	21.28
Total Ash (%)	8.02	9.34
CP	22.00	19.00
ME (Kcal/Kg)	2900	3000
Calcium (%)	0.69	0.52
Available phosphate(%)	0.74	0.69
Methionine(%)	0.33	0.31
Lysine(%)	1.19	1.08

*Premix (2.5%) Provided the following (Per Kg of complete diets). Vit A. 367500 IU,133500 IU Vit. D3, 1920 mg Vit.E, 84.42 Vit. K3, 50 mg Vit. B1, 150 mg Vit. B2, 500 mg Vit. B3, 177.5 mg Vit. B6, 0.8 mg Vit. B12, 600 mg Vit. PP, 24.5 mg folic acid, 27 mg biotin, 5767.5 mg choline, 2667 mg Fe, 333.75 mg Cu, 3334.06 mg Mn , 203 mg Co , 2334.38 mg Zn , 100.75 mg Ca , 10 mg Se, 65446.46 mg Ph, 36667.5 mg DLMethionine, 200.02mg, Ethoxyquin,50mg Flavophospholipol, 30g Fish meal, 1800g wheat bran.

Table-2: Effect of supplementation of tulsi leaf powder on meat cholesterol and serum lipid profile in broilers

Parameter	T₁	T₂	T₃	T₄
Average breast muscle cholesterol (mg %) **	63.56±0.41 ^a	63.06±0.42 ^a	61.05±0.46 ^a	51.08±0.49 ^b
Average thigh muscle cholesterol (mg %) **	97.43±0.12 ^a	97.76±0.15 ^a	96.05±0.18 ^b	90.60±0.19 ^c
Average Serum total cholesterol (mg/dl) **	170.67±0.39 ^a	170.90±0.38 ^a	170.30±0.31 ^a	157.00±0.31 ^b
Average HDL cholesterol (mg/dl) **	60.65±0.31 ^a	61.67±0.33 ^a	73.87±0.34 ^b	80.43±0.36 ^c
Average Serum Triglycerides (mg/dl) **	97.53±0.23 ^a	96.52±0.21 ^a	90.18±0.18 ^b	86.83±0.19 ^b
Average Serum LDL-Cholesterol (mg/dl) **	95.34±0.52 ^a	92.00±0.48 ^a	78.38±0.42 ^b	59.2±0.39 ^c

** - Significant at 1% level

abc - different superscript in a row differ significantly

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