



Effect of Tulsi (*Ocimum sanctum*) on productive performance and blood biochemistry of broilers

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Abstract

An experiment was conducted to determine the performance of broilers fed diets supplemented with Tulsi (*Ocimum sanctum*) leaf powder. A total of 72 (Arbor-Acres) day old chicks were used in this study (6 replicates per treatment). Four levels of Tulsi leaf powder at the rate of 0.00% (T₁), 0.25% (T₂), 0.50% (T₃), and 1% (T₄) were incorporated into the basal diet for six weeks. Feeding period for all groups was lasted for 42 days. Results revealed a significant effect of Tulsi leaf powder on body weight, feed intake and feed conversion ratio in the treated groups ((T₂-T₄). Mortality and cholesterol decreased significantly in T₄ compared to other treatments while haemoglobin increased significantly in the same group. We found a linear increase in the performance of broiler by increasing the inclusion level of Tulsi.

Keywords: Performance; haematological; biochemical blood indices, broiler, Tulsi

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Introduction

Growth and development of the commercial broiler farming in the country during the last decades has been spectacular. Scientific production and management has made considerable progress to make broiler farming fastest growing industry. Antibiotic growth promoter (AGP) in poultry industry has been seriously criticized by governmental policy makers and consumers due to the development of microbial resistance to these products and the potential harm on human health (Williams and Losa, 2001; Botsoglou et al., 2004). The phasing out AGP will affect the poultry and animal industry widely to minimize the loss in growth. There is a need to find out an alternative to AGP, such as enzymes inorganic acids, probiotics, prebiotics, herbs, immunostimulant and some other management al practices (Banerjee, 1998). Since ancient times, herbs and their essential oils have been known for their varying degrees of antimicrobial properties (Juven et al., 1994; Chang, 1995). Recently, WHO (2003) recommended a global alliance on traditional medicine

and developed a guideline for the quality control of herbal drugs.

Tulsi (*Ocimum sanctum*) distributed mainly in the tropical and subtropical region of the world is considered to be a potential medicinal plant in the indigenous systems. It is being used as a medicine for treatment of bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, arthritis, painful eye disease, chronic fever, eye disease etc. However, there is little information about its role in poultry production. The aim of this study was to find the effect of different levels of Tulsi on the performance and blood biochemistry of broiler chicks.

Materials and Methods

A total of 72 day old chicks of same hatch were randomly divided 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 a diet as per NRC (1994) standard (Table 1) but broilers in T₂, T₃ and T₄ were fed standard ration diet supplemented with 0.25, 0.5 and 1% Tulsi leaves powder. All broilers

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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 A.H. 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 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, feed intake and feed conversion ratio were measured on weekly basis. Mortality percent was also recorded separately for each group. At the end of experiment, nine broilers from each group were selected. Blood samples (5ml) were collected from the bronchial vein with an anticoagulant (Sodium Ethylene Ditetra amine) to determine the number of red blood cells (RBC), white blood cells (WBC), packed cell volume (PCV) and hemoglobin (Hb) percentage. Another 5 ml of the blood sample was collected from each bird and serum was separated to determine the concentration of cholesterol and uric acid following the method described by Ellefson and Ganaway (1967).

Data obtained on various parameters were tabulated and statistically analyzed using analysis of variance (ANOVA) technique as per Snedecor and Cochran (1994).

Results and Discussion

The effect of Tulsi (*Ocimum Sanctum*) leaves powder on the growth performance (body weight gain, feed intake and feed conversion ratio) of broiler was presented in Table 2. Results showed significant effects ($P<0.05$) for chicks fed Tulsi (*Ocimum sanctum*) leaf powder for all treatments compared with control group. These results showed that the inclusion of Tulsi (*Ocimum sanctum*) leaf powder in the diets improved body weight, feed intake and feed conversion ratio which may be due to its role as stimulant, carminative, enhanced digestibility, antimicrobial properties and the prevention of gastric

toxicity (Jones et al., 1997; El-Husseiny et al., 2002) and to the activity of Tulsi (*Ocimum sanctum*) leaf powder as an antioxidant that stimulates protein synthesis (Oswa et al., 1995). Table 3 showed the effect of Tulsi (*Ocimum sanctum*) leaf powder on mortality, dressing and edible giblets percentages. It showed that there was significant difference ($P<0.05$) in mortality percentages between treatments as compared with the control group. The lower mortality percentage may be due to antibacterial and immunomodulatory activity of Tulsi (Al-Kassie, 2010). The same table showed that there was no significant difference ($P<0.05$) between treatments and control group in dressing percentage and edible giblets percentage. Table 4 showed a depression in cholesterol level in T₄ as compared with other groups and this may be due to the inhibition of the active enzyme hepatic 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) which is responsible for cholesterol synthesis in the liver (Crowell, 1999). Furthermore, the reduction in blood cholesterol could be attributed in some cases to the reduction in the

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

| Ingredients (%) | Broiler starter (0-21 days) | Broiler finisher (22-42 days) |
|------------------------------|-----------------------------|-------------------------------|
| Maize | 60.00 | 63.00 |
| Ground nut cake | 23.11 | 18.00 |
| Fish meal | 13.00 | 15.00 |
| Mineral mixture* | 3.00 | 3.00 |
| Common salt | 0.22 | 0.33 |
| Vitamin premix* | 0.02 | 0.02 |
| TM-100 | 0.10 | 0.05 |
| Amprosol | 0.05 | 0.05 |
| Nuvimin | 0.05 | 0.55 |
| Calculated Chemical analysis | | |
| Moisture (%) | 6.29 | 6.22 |
| Crude protein (%) | 23.29 | 21.28 |
| Total ash (%) | 8.02 | 9.34 |
| Crude protein | 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 Provided 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, 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

Table 2: Effect of adding Tulsi (*Ocimum Sanctum*) leaves powder on performance of broilers

| Treatment | 3 week | | | 6 week | | |
|----------------|----------------------|-----------------------|------------------------|------------------------|------------------------|-----------------------|
| | Body weight (gm) | Feed consumption (gm) | FCR (g/g) | Body weight (gm) | Feed consumption (gm) | FCR (g/g) |
| T ₁ | 698±8.3 ^c | 1198±8.4 ^c | 1.72±0.6 ^a | 2220±12.3 ^b | 4603±15.6 ^a | 2.09±1.3 ^a |
| T ₂ | 793±6.3 ^b | 1316±7.5 ^b | 1.66±0.5 ^b | 2340±11.2 ^b | 4580±17.5 ^a | 1.96±1.2 ^a |
| T ₃ | 961±5.6 ^a | 1596±9.6 ^a | 1.66±0.8 ^b | 2560±13.7 ^a | 4370±16.8 ^b | 1.7±0.9 ^b |
| T ₄ | 990±6.4 ^a | 1610±6.4 ^a | 1.63±0.5 ^{bc} | 2610±12.4 ^a | 4250±19.5 ^b | 1.63±1.3 ^b |

^{abc} means in the same column with no common superscript differ significantly ($P<0.05$); T₁: Control; T₂: 0.25% Tulsi; T₃: 0.5% Tulsi; T₄: 1.0% Tulsi

Table 3: Effect of adding Tulsi (*Ocimum Sanctum*) leaves powder on mortality percentage, dressing percentage and edible giblets percentage of broilers

| Treatments | Mortality percentage | Dressing percentage | Edible giblets percentage | | |
|----------------|----------------------|---------------------|---------------------------|----------|-----------|
| | | | Liver | Gizzard | Heart |
| T ₁ | 5.8±4.7 ^a | 74.4±1.7 | 4.1±0.3 | 4.3±0.06 | 0.74±0.04 |
| T ₂ | 4.3±3.3 ^b | 73.6±1.9 | 3.4±0.7 | 4.8±0.08 | 0.85±0.03 |
| T ₃ | 3.9±3.9 ^b | 71.4±1.6 | 3.5±0.1 | 4.9±0.07 | 0.89±0.02 |
| T ₄ | 2.9±3.8 ^c | 72.9±1.8 | 3.9±0.5 | 4.4±0.01 | 0.92±0.04 |

^{abc} means in the same column with no common superscript differ significantly (P<0.05); T₁: Control; T₂: 0.25% Tulsi; T₃: 0.5% Tulsi; T₄: 1.0% Tulsi

Table 4: Effect of Tulsi (*Ocimum Sanctum*) leaves powder on haematological and serum parameters of broilers

| Treatment | Hb (g/dl) | RBC (10 ⁶ /mm ³) | PCV (%) | WBC (×10 ³ cells/l) | cholesterol (mg/dl) | Uric acid (mg/dl) |
|----------------|------------------------|---|-----------|--------------------------------|-------------------------|-------------------|
| T ₁ | 10.46±0.5 ^b | 3.7±0.6 | 29.54±1.3 | 25.51±0.8 | 150.71±1.6 ^a | 4.6±0.7 |
| T ₂ | 10.42±0.6 ^b | 3.6±0.7 | 30.60±1.2 | 25.89±0.6 | 150.70±1.3 ^a | 4.7±0.4 |
| T ₃ | 10.92±0.7 ^b | 3.6±0.5 | 30.68±1.3 | 25.94±0.8 | 149.92±1.4 ^a | 4.4±0.6 |
| T ₄ | 11.37±1.2 ^a | 3.0±0.6 | 31.04±1.6 | 26.02±1.4 | 147.69±1.3 ^b | 4.1±0.6 |

^{abc} means in the same column with no common superscript differ significantly (P<0.05); Hb: Haemoglobin; RBC: Red blood cells; PCV: Packed cell volum; WBC: White blood cells; T₁: Control; T₂: 0.25% Tulsi; T₃: 0.5% Tulsi; T₄: 1.0% Tulsi

levels of some hormones secreted by the cortex of the adrenal glands, which decreases the secretion of fatty acids from the adipose tissue or as a result of fat oxidation process levels of fatty acids including blood cholesterol is depressed (Ganong, 2005).

It was concluded that there was a significant effect of different treatments of Tulsi leaf powder supplementation in diets of broilers. Best results were obtained in 1.0% Tulsi powder supplementation.

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