



RESEARCH ARTICLE.....

Effect of feed supplementation through turmeric and *Tulsi* leaves on growth of broiler chicks in deep litter system

U.K. Shukla, Deepak Pandey and Shri Kant

ABSTRACT..... The experiment was conducted at the livestock production and management unit, faculty of agriculture. MGCGV Chitrakoot – Satna (M.P.). To complete the research work following steps were followed. Day old 75 broiler chicks (DOC) of same hatch were produced and reared in of Deep litter system. The chicks were weighed, leg banded and distributed randomly into five groups of 15 chicks each as treatment. Chicks of each treatment were further divided into three sub groups of five chicks in each in Randomized Block Design (RBD). Chicks of each sub group were accommodated comfortably in deep letter system providing 1 sq. ft./ chick. Chicks were fed standard starter ration upto 3 weeks age (1 to 21 days) and then broiler finisher ration upto 3-4 weeks (22-28 days). An experiment was conducted with DOC to 75 broilers chicks divided into five groups T₀, T₁, T₂ and T₄ which were supplemented with turmeric and *Tulsi* leaves powder @ 1.0g, 2.0g, 3.0g and 4.0g/kg of broiler ration, respectively. Weekly observations were recorded for live body weight, weekly gain in weight, weekly feed consumption and feed conversion of broiler for four weeks. Based on the results of the experiment, it may be concluded that feed supplementation with turmeric (*Curcuma longa*) powder influenced the body weight, gain in body weight, feed intake and feed efficiency of broiler chicks. Based on the result of the experiment, it may be concluded that feed supplementation with turmeric + *Tulsi* leaves powder influenced body weight, gain in body weight, feed intake and feed efficiency of broiler chicks. Based on feed intake and feed efficiency, the best performance of broilers was obtained with feed supplementation of 3g turmeric + 3g *Tulsi* powder per kg of standard ration (T₃), followed by 4g turmeric + 4g *Tulsi* leaf powder (T₄). Treatment T₃ was economically superior over all other treatments and control.

KEY WORDS..... Broiler chicks, Growth performance, Turmeric, *Tulsi* leaves powder

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INTRODUCTION.....

Ocimum sanctum also known as *Tulsi* in Sanskrit language and holy basil in English which belongs to Lamiaceae family of plants is one such NTFP also found

in mountains and hills of the HKH region. *Ocimum sanctum*, an aromatic shrub, is a perennial plant with purple-pink flowers that produces light lemon scent. Historically, it is known for its healing properties that

dates back over thousands of years. *Tulsi* is in much demand for its medicinal and aromatic properties, particularly in Ayurveda. The plant acts as a natural anti-stress agent and boosts immune system (Krishna *et al.*, 2014). Besides, *Tulsi* is less water intensive crop and is less affected by animal depredation and pest-diseases as opposed to other major cereal crops (Horticulture; Medicinal Crop TANU, 2018). *Ocimum sanctum* is also found in the semi-tropical and tropical parts of India where it is considered as an important medicinal plant (Baliga *et al.*, 2013). Given its importance as medicinal and aromatic plant, *Ocimum sanctum* is also consumed as tea leaves. While *Tulsi* is believed to have originated in North Central India, it is widely popular today and is grown throughout the eastern world tropics (Prakash and Gupta, 2005). More recently, medicinal plants extracts were developed and proposed for use in food as natural antimicrobials (Hsieh *et al.*, 2001).

Tulsi, *Ocimum sanctum* queen of herbs, is one of the holiest and most cherished herbs in India. The plant is reported to possess anti-infertility, anticancer, antibacterial (Joshi *et al.*, 2009), antidiabetic, antifungal, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antioxidant (Subramanian *et al.*, 2005), antispasmodic, analgesic, anti-ulcerogenic and ulcerhealing properties, adaptogenic (Singh *et al.*, 2012). and diaphoretic actions (Mondal *et al.*, 2009). The main constituents responsible for these properties are eugenol, ascorbic acid, β -carotene, β -sitosterol, palmitic acid and tannins (Gupta *et al.*, 2006 and Choudhury *et al.*, 2010).

Turmeric *Ocimum sanctum* is an herbaceous evergreen plant in the *Zingiberaceae* (ginger) family. It is cultivated extensively in Asia mostly in India and China. Probably originated from India, turmeric has been used in India for at least 2500 years. Turmeric plant is distributed throughout tropic and subtropical region of the world. The origin of the plant is not certain, but it is thought to be originated from south eastern Asia, most probably from India. The plant is cultivated in all parts of India (Kapoor, 2000). India produces most of the world supply (Leung and Foster, 1996). but turmeric is cultivated also in southern China, Taiwan, Japan, Burma and Indonesia as well as throughout the African continent. In Brazil, turmeric use has increased mainly due to its coloring property and its ability to improve food odour (Neghetini *et al.*, 2006). The commercially available

material (*i.e.* turmeric powder) in Europe is obtained mainly from India and somewhat from other south eastern Asian countries (Muruganathi *et al.*, 2008).

Test tube and animal studies suggest turmeric may kill bacteria and viruses. But researchers don't know whether it would work in people. The aqueous extract of turmeric rhizomes has antibacterial effects (Kumar and BIRTHAL, 2001). Curcumin also prevents growth of *Helicobacter pylori* Cag A+ strains *in vitro*. Both curcumin and the oil fraction suppress growth of several bacteria like *Streptococcus*, *Staphylococcus*, *Lactobacillus*, etc. Curcumin has been shown to have antiviral activity (Araujo and Leon, 2001).

The rhizome of turmeric is the rich source of bioactive compounds used non-medicinally as a spice and medicinally as human remedies (Khan *et al.*, 2017). Turmeric is consisting of 69.4 per cent carbohydrates, 6.3 per cent protein, 5.1 per cent fat, 3.5 per cent minerals and 13.1 per cent moisture (Chattopadhyay *et al.*, 2004). It is also a rich source of phenolic compounds, such as curcumin, demethoxy curcumin and bisdemethoxy curcumin and tetrahydrocurcumin metabolites (Huang *et al.*, 1995).

Turmeric (*Curcuma longa*) is a rhizomatous herbaceous perennial herb of ginger family that is widely used and cultivated in India (Govindarajan and Stahl, 1980). It belongs to the family Zingiberaceae along with ginger, cardamom and galangal. This medicinal plant possesses rhizomes and underground root-like stems that had been originally used as a food additive in curries to improve the storage condition, appearance, flavour, palatability and preservation of food (Jayaprakasha *et al.*, 2005).

RESEARCH METHODS.....

The study was carried out in Rural farm of Livestock production and management (unit), Department of NRM, faculty of agriculture the experiment was conducted to determine performance of day-old broilers, experiment was conducted on 75 day-old broiler chicks, respectively.

Day old chicks were procured from Shakti Hatcheries Limited, through Shakti agencies, Prayagraj U.P. These chicks were reared in the Deep litter system of the LPM (unit) Department of NRM, Faculty of Agriculture Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M.P.).

The experiment was conducted for broiler, (05 Jan. to 03 Feb.) the period of four weeks for broiler.

Allocation of day – old chicks:

In experiment day-old chicks were weight, leg tagged and distributed randomly into five groups for different treatments, namely T₀, T₁, T₂, T₃ and T₄, consisting of 15 chicks in each.

Treatments:

T₀ Basal diet/standard ration

T₁ 1kg ration with 1g *Tulsi* leaves + 1g turmeric powder

T₂ 1kg ration with 2g *Tulsi* leaves + 1g turmeric powder

T₃ 1kg ration with 3g *Tulsi* leaves + 1g turmeric powder

T₄ 1kg ration with 4g *Tulsi* leaves +1g turmeric powder

Chicks were accommodate in Deep litter. The chicks of treatment were further divided into three sub groups of five chicks in each to accommodate in Litter of 05 sq. ft. size. The chicks were fed self prepared balanced feed and lib. With different leaves powder.

Self prepared broiler starter ration was given upto two weeks and broiler finisher ration upto four weeks. The composition of ration used is given in table

| Ingredients (%) | Broiler starter ration | Broiler finisher ration |
|-----------------------|------------------------|-------------------------|
| Maize | 45.6 | 46.8 |
| Rice polish | 10 | 20 |
| Ground nut cake | 30 | 19 |
| Bone meal | 0.80 | 0.70 |
| Salt | 0.4 | 0.5 |
| Min-mix and vita. mix | 0.1 | 0.1 |
| Crude protein | 23.1 | 20.31 |
| Crude fibre | 5.36 | 5.51 |
| Ether extract | 6.1 | 6.67 |
| Nitrogen free extract | 55.06 | 69.89 |
| Calcium | 1.43 | 1.43 |
| Phosphorus | 0.61 | 0.69 |
| Me. K. cal./kg | 2912.60 | 3000.00 |

Composition and proximate nutrients of broiler starter and finisher and Broiler ration:

Initial weight of each chick was recorded on arrival and then weekly to determine the growth rate. The feed

consumption was also recorded weekly to determine the feed conversion ratio (F.C.R.) of chicks. The mortality record was maintained during the experimental period.

Turmeric leaves and *Tulsi* leaves was purchased from Karwi Chitrakoot. It was dried in the shade for three to four days initially and then in oven at 6^oC upto moisture level below 10 per cent. Then its leaves were crushed manually to make its fine power. It was mixed with feed according to treatments. Also turmeric and *Tulsi* leaves was merge in mixture machine.

Housing feeding and management:

Chicks were housed in Deep litter providing 0.5 sq. ft./bird space. Litter, feeders, waters and other equipment were property cleaned, disinfected and finally sterilized before use.

The waters were disinfectled with .02 per cent KMnO₄ solution every day in the each groups a 100 watt bulb was provided for light during night. Water was distributed at 7.00 A.M. and 8.00 P.M. every day and lib.

Broilers chicks of all treatments were kept under similar management practices in Deep litter in LPM (unit) Department of NRM, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M.P.). The data collected were tabulation and statistically analyzed to determine significant differences between treatments as per CRD (Chandel, 1998) as follows:

| Analysis of variance (ANOVA) | | | | | | |
|------------------------------|------------|-----------------------|------------------------------|---------------------|---|-----------|
| Source of variation | d.f | S.S. | M.S.S. | F Value | | Result |
| | | | | Cal | T | |
| | | | | | | (5%) S/NS |
| Treatments | (t-1) | ss due to treatments | $\frac{ss(t)}{(t-1)} = MtSS$ | $\frac{MtSS}{EMSS}$ | F | (t-1) |
| Replication | (r-1) | ss due to replication | $\frac{ss(r)}{(r-1)} = MRSS$ | $\frac{MRSS}{EMSS}$ | F | (r-1) |
| Error | (t-1)(r-1) | Error ss | ESS (t-1)(r-1) | = EMSS | | |
| Total | (rt-1) | | | | | |

RESEARCH FINDINGS AND ANALYSIS.....

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Body weight (g) of broiler chicks:

In treatments T₀, T₁, T₂, T₃ and T₄, the mean weekly body weight of broiler chicks was 669.43, 729.03, 745.28, 778.05 and 756.48 g, respectively (Table 1). Irrespective of treatments, the mean body weight of chicks at first, second, third and fourth week of age was recorded 171.13, 484.84, 930.77 and 1355.85 g, respectively. The results revealed that feed supplementation caused significant increase and growth in body weight of chicks in different treatments in first, second, third and fourth week of age. The differences in weekly mean weight were significant. The differences in body weight between treatments were also significant. However, T₁, T₂, T₄ and T₂, T₃, T₄ were statistically at par. Overall, effect of treatment T₃ (3 g Turmeric + 3 g *Tulsi* leaf powder with 1 kg standard ration) was significantly superior over all other treatments.

Gain in body weight (g):

In treatments T₀, T₁, T₂, T₃ and T₄, the mean weekly gain in body weight of broiler chicks was 299.77, 325.68, 332.92, 346.45 and 336.90 g, respectively (Table 2). Irrespective of treatments, the mean gain in body weight of chicks at first, second, third and fourth week of age was recorded 128.65, 313.72, 445.92 and 425.08 g, respectively. The results revealed that there was a significant effect of different treatments as feed supplement on average weekly gain in body weight of chicks during first, second, third and fourth week of age. T₁, T₂, T₃, T₄ and T₃, T₄ were, however, statistically at par. The differences in weekly mean weight gain were also significant.

It was also noted that the dose of 3 g Turmeric + 3 g *Tulsi* leaf powder with 1 kg of standard ration (T₃) recorded significantly higher weight gain over all other

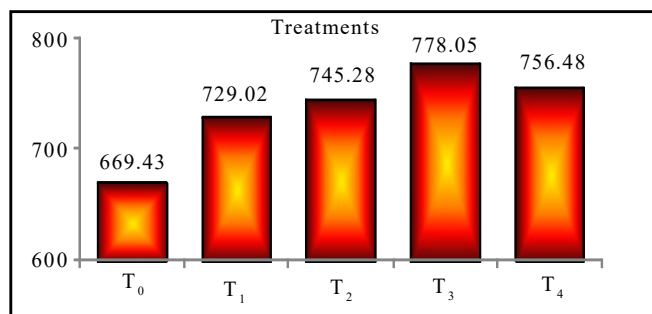


Fig. 1: Average weekly body weight (g) of broiler chicks in different treatments

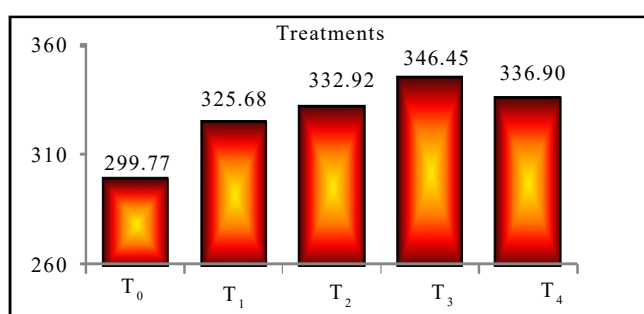


Fig. 2: Average weekly gain in body weight (g) of broiler chicks in different treatments

Table 1: Average weekly body weight (g) of broiler chicks in different treatments

| Weeks | Treatment wise weekly body weight of broiler chicks | | | | | |
|-------|---|----------------|----------------|----------------|----------------|---------|
| | T ₀ | T ₁ | T ₂ | T ₃ | T ₄ | Mean |
| 1 | 142.53 | 170.13 | 175.07 | 187.87 | 180.07 | 171.13 |
| 2 | 436.53 | 475.33 | 495.13 | 514.73 | 502.53 | 484.85 |
| 3 | 857.47 | 925.00 | 938.40 | 980.20 | 952.80 | 930.77 |
| 4 | 1241.20 | 1345.60 | 1372.53 | 1429.40 | 1390.53 | 1355.85 |
| Mean | 669.43 | 729.02 | 745.28 | 778.05 | 756.48 | |

Table 2: Average weekly gain in body weight (g) of broiler chicks in different treatments

| Weeks | Treatment wise weekly gain in body weight of broiler chicks | | | | | |
|-------|---|----------------|----------------|----------------|----------------|--------|
| | T ₀ | T ₁ | T ₂ | T ₃ | T ₄ | Mean |
| 1 | 100.40 | 127.27 | 134.20 | 144.27 | 137.13 | 128.65 |
| 2 | 294.00 | 305.20 | 320.07 | 326.87 | 322.47 | 313.72 |
| 3 | 420.93 | 449.67 | 443.27 | 465.47 | 450.27 | 445.92 |
| 4 | 383.77 | 420.60 | 434.13 | 449.20 | 437.73 | 425.08 |
| Mean | 299.77 | 325.68 | 332.92 | 346.45 | 336.90 | |

treatments and control, which indicates that Turmeric powder + *Tulsi* leaf powder was best suited for higher body weight gain of broiler chicks in the present investigation.

Feed consumption (g) of broiler chicks:

Average weekly feed consumption of broiler chicks irrespective of treatments ranged from 59.33 to 275.33 g, respectively (Table 3). In treatments T₀, T₁, T₂, T₃ and T₄, the mean feed consumption of broiler chicks was 207.92, 173.25, 165.50, 144.67 and 155.08 g, respectively. The mean feed consumption of chicks at first, second, third and fourth week of age was recorded 69.07, 167.73, 220.40, and 219.93 g, respectively. Minimum weekly feed consumption was in T₃ (155.08 g) and the maximum was in T₀ (207.92 g) followed by T₁ (173.25 g), T₂ (165.50 g) and T₄ (155.08 g). The results revealed that there was a

significant effect of different treatments through feed supplementation on average feed consumption of chicks as well as in different weeks. Feed intake increased with age of broiler chicks, which was a natural phenomenon. Treatments T₁, T₂, T₃, T₄ and T₃, T₄ were statistically at par. It was also observed that T₃ (3 g Turmeric + 3 g *Tulsi* leaf powder with 1 kg standard ration) recorded maximum body weight gain with minimum feed consumption, which clearly indicates that this treatment was economically viable.

Feed efficiency/Feed conversion ratio of broiler chicks:

In general, the weekly FCR of chicks ranged between 1.22 and 2.46. In treatments T₀, T₁, T₂, T₃ and T₄, the mean FCR of broiler chicks was 1.40, 1.86, 2.01, 2.39, and 2.16, respectively (Table 4). Irrespective of

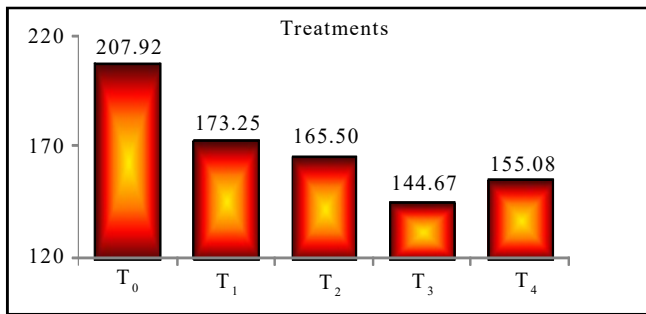


Fig. 3: Average weekly feed consumption (g) of broiler chicks in different treatments

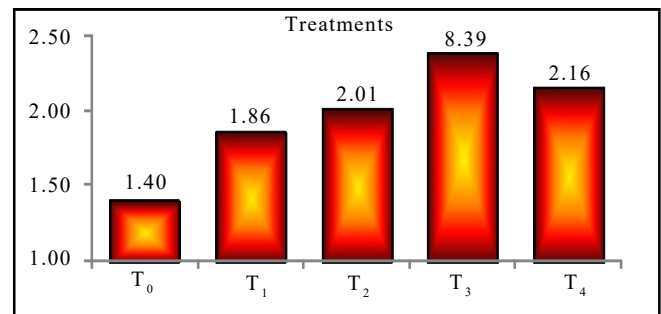


Fig. 4: Average weekly feed conversion ratio of broiler chicks in different treatments

Table 3 : Average weekly feed consumption (g) of broiler chicks in different treatments

| Weeks | Treatment wise weekly feed consumption of broiler chicks | | | | | |
|-------|--|----------------|----------------|----------------|----------------|--------|
| | T ₀ | T ₁ | T ₂ | T ₃ | T ₄ | Mean |
| 1 | 82.33 | 71.00 | 67.33 | 59.33 | 65.33 | 69.07 |
| 2 | 207.00 | 171.33 | 163.33 | 144.33 | 152.67 | 167.73 |
| 3 | 267.00 | 221.33 | 214.67 | 192.67 | 206.33 | 220.40 |
| 4 | 275.33 | 229.33 | 216.67 | 182.33 | 196.00 | 219.93 |
| Mean | 207.92 | 173.25 | 165.50 | 144.67 | 155.08 | |

Table 4 : Average weekly feed conversion ratio of broiler chicks in different treatments

| Weeks | Treatment wise weekly FCR of broiler chicks | | | | | |
|-------|---|----------------|----------------|----------------|----------------|------|
| | T ₀ | T ₁ | T ₂ | T ₃ | T ₄ | Mean |
| 1 | 1.22 | 1.79 | 2.00 | 2.43 | 2.10 | 1.91 |
| 2 | 1.42 | 1.78 | 1.96 | 2.27 | 2.11 | 1.91 |
| 3 | 1.58 | 2.03 | 2.07 | 2.42 | 2.18 | 2.05 |
| 4 | 1.39 | 1.84 | 2.02 | 2.46 | 2.24 | 1.99 |
| Mean | 1.40 | 1.86 | 2.01 | 2.39 | 2.16 | |

treatments, the mean FCR of chicks at first, second, third, and fourth week of age was recorded 1.91, 1.91, 2.05, and 1.99, respectively. Maximum FCR was obtained in chicks of treatment T₃ (2.39), followed by T₄ (2.16), T₂ (2.01), T₁ (1.86) and T₀ (1.40). In the week-wise mean FCR, the maximum was obtained in third week (2.05), followed by fourth week (1.99), second week (1.91); and first week (1.91). The results revealed that there was a significant effect of feed supplementation (treatments) on average weekly FCR of chicks from first to fourth week of age. The differences in weekly mean weight gain were, however, significant. Feed efficiency increased with age of broiler chicks upto third week, which was a natural phenomenon. In fourth week, however, there was a slight decline. Treatment T₃ was found significantly superior over other treatments as well as the control, which shows that this treatment of 3 g Turmeric + 3 g *Tulsi* leaf powder mixed with 1 kg standard ration was optimum for obtaining better body weight, gain in body weight, feed consumption and the

feed conversion ratio of the broiler chicks, in the present experiment.

Conclusion:

Based on the result of the experiment, it may be concluded that feed supplementation with Turmeric + *Tulsi* leaves powder influenced body weight, gain in body weight, feed intake and feed efficiency of broiler chicks. Based on feed intake and feed efficiency, the best performance of broilers was obtained with feed supplementation of 3 g Turmeric + 3 g *Tulsi* leaf powder per kg of standard ration (T₃), followed by 4 g Turmeric + 4 g *Tulsi* leaf powder (T₄). Treatment T₃ was economically superior over all other treatments and control.

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