



Effect of *Neem*, *Tulsi* turmeric and ginger powder as feed supplement on growth of broiler chicks in litter system

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ABSTRACT : The experiment was conducted at the Livestock Production and Management unit, 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 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 cage system providing 1 sq. ft./chick. Chicks were fed standard starter ration upto 2 weeks age (1 to 14 days) and then broiler finisher ration upto 2-4 weeks (22-28 days). An experiment was conducted with DOC to 75 broilers chicks divided into five groups T₀, T₁, T₂, T₃ and T₄ which were supplemented with turmeric powder @ 5.0g, 5.0g, 5.0g and 5.0g/kg of broiler ration, respectively. Weekly observations were recorded for live body weight, weekly gain in weight, weekly feed consumption and feed conversion of birds 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 feed intake and feed efficiency (low feed intake and higher feed conversion ratio), economically best performance of broilers was obtained with T₃ (feed supplementation of 5 g turmeric powder with 1 kg standard ration), followed by T₄ (feed supplementation of 5 g ginger powder with 1 kg standard ration). Economically T₃ was superior over all other treatment and control.

KEY WORDS : Broiler chicks, Growth performance, Turmeric powder

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INTRODUCTION

Livestock plays an important role as the back-bone of agriculture. Poultry play vital role in the national

economy. Demand of protein of this unbounded population is a great threat for us. There are so many source of protein but it is not possible to meet the demand without broiler. Because the duration of broiler rearing is very short and within 36-42 days it is ready for marketing and compatible for human consumption. It also gets very short time return to farmer. The meats of broiler are nutritious, tasty and contain low fat. The poultry production system have moved to marked increase in the production of poultry meat and eggs throughout the world (Armstrong, 1986).

It has triggered the finding and widespread use of a

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number of 'feed additives'. The main intention of adding feed additives is to aid animal performance by increasing their growth rate, better-feed conversion efficacy, greater livability and lowered mortality in poultry birds (Noman *et al.*, 2015).

The medicinal plant turmeric (*Curcuma longa*) is commonly used as a spice in human feed. Turmeric is a rhizomatous herbaraceae perennial plant of the ginger family, Zingiberaceae (Chan *et al.*, 2009) with medicinal properties known to possess antimicrobial and anti-oxidant properties. It is native to tropical south Asia and needs temperatures between 20°C and 30°C and a considerable amount of annual rainfall to thrive. Rhizome is the portion of medicinal important and is usually boiled, cleaned, dried and powdered before usage (Anonymous, 2001). In medieval Europe, turmeric become known as Indian saffron, since it was widely used as an alternative to the far more expensive saffron spice. Turmeric commonly called "pasupu" in Telugu, kaha in Sinhala, manjal in Tamil, "Arisina" in Kannada, "Haridra" in Sanskrit and haldar or Haldi in Hindi.

Dried turmeric contains 6.3per cent protein, 5.1 per cent fat, 3.5per cent mineral, 69.4per cent carbohydrates and 13.1per cent moisture (Chattopadhyay *et al.*, 2004). Turmeric contains upto 5per cent essential oils and upto 5per cent curcumin, a polyphenol. curcumin is the active substance of turmeric which is known as C.I. 75300, or natural yellow 3. The systematic chemical name is (1E,6E)-1,7-bis (4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione. The active ingredients of turmeric were tetrahydro curcuminoides, curcumin, dimethoxy curcumin and bismethoxy curcumin (Al-sultan, 2003).

Indigenous uses of *A. indica* (common name in Hindi is 'Neem') leaves in different parts of India for curing gastrointestinal disorder such as diarrhea and cholera is wide spread (Thakurta *et al.*, 2007). The medicinal property of *Neem* (*Azadirachta indica*) leaves in ayurvedic system of medicine is well recognized in Bangladesh, India and Pakistan. In general *Neem* leaves extract may be used therapeutically to control to respiratory problems, constipation and also as health promoter, constipation and also as health promoter (Biswas *et al.*, 2002). Aqueous extract of *Neem* leaves extract has a good therapeutic potential agent and could be used for controlling airborne bacterial contamination in the residential premise (Mishra *et al.*, 2013).

It was shown that *Neem* leaves extract acts as a

growth promoter (Landy *et al.*, 2011), improve performance and hematological parameters (Nayak *et al.*, 2013) and immune response (Nayaka *et al.*, 2012 and Jawad *et al.*, 2013) in broiler. However, no data is available about the combined effect as growth promoter and anticolibacillosis in broilers. Therefore, the objective was to investigate the growth performance of broiler supplemented with *Neem* leaves extract and to examine the effects of aqueous extract of *Neem* leaves against colibacillosis in broiler chicken.

Tulsi (*Ocimum sanctum*) has attracted worldwide prominence due to its vast range of medicinal properties without showing any adverse effects. *Tulsi* also promotes growth and feed efficiency of birds because of their antibacterial properties (WHO, 1997). Plants are the oldest friends of mankind. In modern animal feeding, they are forgotten because of use of antimicrobial growth promoters but due to the prohibition of most AGP plants extracts have gained interest in animal feed strategies (Borris, 1996).

Medicinal plants have been used for centuries before the advent of orthodox medicine (Demir *et al.*, 2005). The medicinal values of these plants lie in their component phytochemicals, which produce definite physiological actions on the human body (Sen, 1993). The juice of fresh leaves is also given to patients to treat chronic fever, dysentery, hemorrhage and dyspepsia (Gatne *et al.*, 2008). A decoction of tulsi leaf is a popular remedy for cold. *Tulsi* leaves also check vomiting and has been used as anthelmintic (Borris, 1996). As a prophylactic against malaria, fresh tulsi leaves are taken with black paper in the morning (Vinod-Krishna *et al.*, 2007).

Aqueous decoction of whole plant lowers the blood sugar (glucose) level and is said to control diabetes mellitus (Khanna and Bhatia, 2003).The investigation was, therefore, designed to study the hematological effects of tulsi leaf extract in broiler, with a view to establishing effect of *Tulsi* leaf extract as a growth promoter and its safety in broiler chickens. The main objective of adding feed additives is to boost animal performance by increasing their growth rate, better-feed conversion efficiency, greater livability and lowered mortality in poultry birds.

Ginger (*Zingiber officinale*) is a perennial plant which belongs to family Zingiberaceae. It is widely used in many countries as a food spice and as a herbal remedy used (Chrubasik *et al.*, 2005). The main important

compounds in ginger are gingerol, gingerdiol and gingerdione which have the ability to stimulate digestive enzyme, affect the microbial activity and having anti-oxidative activity (Dieumou *et al.*, 2009). Ginger have been reported to possess useful pharmacological potent chemical substances for use in poultry (Akhtar *et al.*, 1984), this is due to its antioxidants, antibacterial, anti-inflammatory, antiseptic, anti-parasitic and immunomodulatory properties. Positive effect of ginger on blood circulation, gastric secretion and enterokinesia were reported by (Ali *et al.*, 2008); (Incharoen and Yamauchi 2009). In addition to, ginger has been found to enhance digestive enzyme activities (Platel and Srinivasan, 1996 and 2000).

Many researchers that proved an increase in body weight and best feed conversion ratio when using herbal plants in broiler diets (Great, 2003; Iqbal *et al.*, 2011). On the other hand, research on the use of herbal mixtures in bird's diets has produced inconsistent results. The objective of this study was intended to gain more information about the effect of using different mixture levels of garlic and ginger powder on performance and carcass quality of broiler chicks.

Curcumin has also been studied broadly as a chemopreventive agent in several cancers (Duvoix *et al.*, 2005). It is used in gastrointestinal and respiratory disorders (Anwarul *et al.*, 2006). The significant biological properties of ginger powder put it a potential substitute for in feed antibiotics in livestock diets. There is growing part in developing natural alternatives to antibiotic growth

promoters in order to maintain both birds performance and health. Medicinal plants wrestle with the synthetic drugs. Majority of medicinal plants do not have the residual effects (Tipu *et al.*, 2006). Considering the present situation of poultry production, the work has been carried out to evaluate the growth performance of broiler supplemented with ginger solution.

MATERIAL AND METHODS

The study was carried out in Livestock Production and Management (unit), the experiment was conducted to determine performance of day-old broilers, experiment was conducted on 75 day-old layer chicks, respectively.

Day old chicks were procured from Arambagh hatcheries limited, Calcutta -20, W.B. through Amit agencies, Prayagraj U.P. These chicks were reared in the litter system of the Department of NRM, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna. M.P.

The experiment was conducted for broiler, (15 Jan. to 13 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

Ingredients (%)	Broiler starter ration	Broiler finisher ration	Layer chick starter ration
Maize	45.6	46.8	52
Rice polish	10	20	14
Ground nut cake	30	19	20
Bone meal	0.80	0.70	0.50
Salt	0.4	0.5	0.4
Min-mix and vit.mix	0.1	0.1	0.1
Proximate nutrients			
Crude protein	23.1	20.31	20.11
Crude fibre	5.36	5.51	5.05
Ether extract	6.1	6.67	6.1
Nitrogen free extract	55.06	69.89	58.64
Calcium	1.43	1.43	1.32
Phosphorus	0.61	0.69	0.8
Me. K. cal./kg	2912.60	3000.00	2700.00

- T₁ 1kg ration with 5.g *Neem* leaf powder
- T₂ 1kg ration with 5.g *Tulsi* leaf powder
- T₃ 1kg ration with 5.g turmeric powder
- T₄ 1kg ration with 5.g ginger powder.

Chicks were accommodate in litter. The chicks of treatment were further divided into three sub groups of five chicks in each to accommodate in litter of .5 sq. ft. size. The chicks were fed self prepared balanced feed ad lib. With different leaf powder.

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

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 of chicks was maintained during the experimental period.

Green neem lives and tulsi lives was purchased form karwi Chitrakoot. It was dried in the shade for three to four days initially and then in oven at 6°C upto moisture level below 10 per cent. Then its leaves were crushed manually to make its fine power. It was passed through wire mesh to obtain uniform powder. Then it was mixed with feed according to treatments. Also turmeric and ginger was mushed in mixture machin.

Housing feeding and management:

Chicks were housed in litter providing 0.5 sq. ft./bird space. Litter, feeders, waterers and other equipments were property cleaned, disinfected and finally sterilized by blow torch before use.

The waterers were disinfected 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 ad lib.

Broilers chicks of all treatments were kept under similar management practices in deep litter small animal

laboratory of the 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.

RESULTS AND DISCUSSION

The results obtained from the presnt investigation as well as relevant discussion have been summarized under the 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 148.99, 430.63, 813.73, and 1183.40 g, respectively (Table 1 and Fig. 1). Irrespective of treatments, the mean body weight of chicks at first, second, third, and fourth week of age was recorded 148.99, 430.63, 813.73, and 1183.40 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

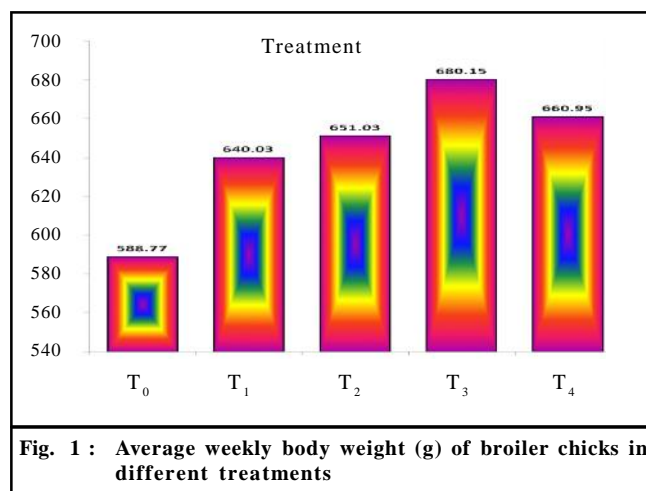


Fig. 1 : Average weekly body weight (g) of broiler chicks in different treatments

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

Weeks	Treatment wise weekly body weight of broiler chicks					Mean
	T ₀	T ₁	T ₂	T ₃	T ₄	
1	123.07	148.60	152.53	163.73	157.00	148.99
2	386.87	432.27	435.27	454.60	444.13	430.63
3	747.20	809.67	821.27	857.40	833.13	813.73
4	1097.93	1169.60	1195.07	1244.87	1209.53	1183.40
Mean	588.77	640.03	651.03	680.15	660.95	

weekly mean weight were significant. The differences in body weight between Treatments were also significant. However, T₁, T₂, T₄ and T₃, T₄ were statistically at par. Overall, effect of treatment T₃ (5 g turmeric powder with 1 kg standard ration) was significantly superior over all other treatments.

Gain in body weight:

In treatments T₀, T₁, T₂, T₃ and T₄, the mean weekly gain in body weight of broiler chicks was 265.10, 282.93, 289.73, 301.53, and 292.83 g, respectively (Table 2 and Fig. 2). Irrespective of treatments, the mean gain in body weight of chicks at first, second, third and fourth week of age was recorded 111.29, 281.64, 383.11 and 369.67 g,

respectively (Table 2). 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. T₂ and T₄ were, however, statistically at par. The differences in weekly mean weight gain were also significant.

Feed consumption (g) of broiler chicks:

Average weekly feed consumption of broiler chicks irrespective of treatments ranged from 60.67 to 258.67 g (Table 3). In treatments T₀, T₁, T₂, T₃ and T₄, the mean feed consumption of broiler chicks was 199.50, 166.42, 160.58, 141.75, and 150.92 g, respectively (Table 3 and

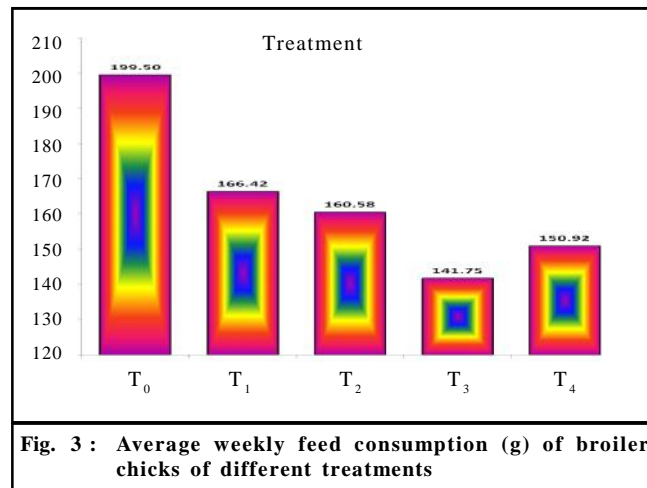
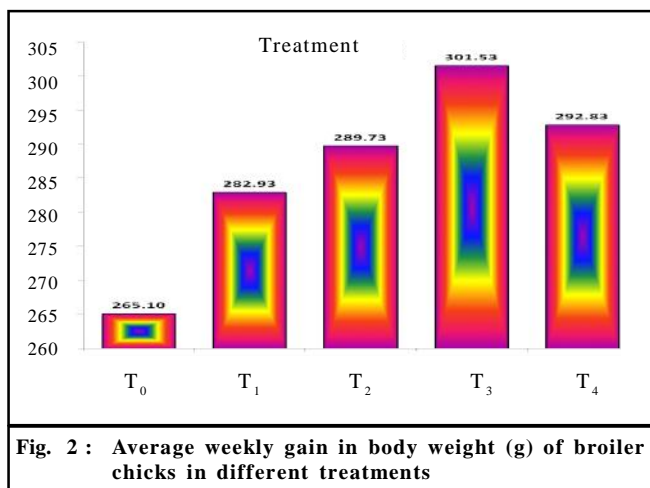


Table 2 : Average weekly gain in body weight (g) of broiler chicks in different treatments

Weeks	Treatment wise weekly gain in body weight of broiler chicks					Mean
	T ₀	T ₁	T ₂	T ₃	T ₄	
1	85.53	110.73	116.40	125.00	118.80	111.29
2	263.80	283.67	282.73	290.87	287.13	281.64
3	360.33	377.40	386.00	402.80	389.00	383.11
4	350.73	359.93	373.80	387.47	376.40	369.67
Mean	265.10	282.93	289.73	301.53	292.83	

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

Weeks	Treatment wise weekly feed consumption of broiler chicks					Mean
	T ₀	T ₁	T ₂	T ₃	T ₄	
1	80.33	69.00	65.33	60.67	65.67	80.33
2	201.33	166.33	158.67	140.33	148.67	201.33
3	257.67	208.00	207.67	188.00	199.00	257.67
4	258.67	222.33	210.67	178.00	190.33	258.67
Mean	199.50	166.42	160.58	141.75	150.92	199.50

Fig. 3). The mean feed consumption of chicks at first, second, third, and fourth week of age was recorded 80.33, 201.33, 257.67, and 258.67 g, respectively. Minimum weekly feed consumption was in T_3 (141.75 g) and the maximum was in T_0 (199.50 g) followed by T_1 (166.42 g), T_2 (160.58 g) and T_4 (150.92 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 T_1 , T_2 , T_4 and T_3 , T_4 were statistically at par. It was also observed that T_3 (5 g Turmeric 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 1.07 and 2.18. In treatments T_0 , T_1 , T_2 , T_3 and T_4 , the mean FCR of broiler chicks was 1.28, 1.69, 1.80, 2.11, and 1.92, respectively (Table 4 and Fig. 4). Irrespective of treatments, the mean FCR of chicks at first, second, third and fourth week of age was recorded 1.67, 1.76, 1.83 and 1.79, respectively. Maximum FCR was obtained in chicks of treatment T_3 (2.11), followed by T_4 (1.92), T_2 (1.80), T_1 (1.69) and T_0 (1.28). In the week-wise mean FCR, the maximum was obtained in

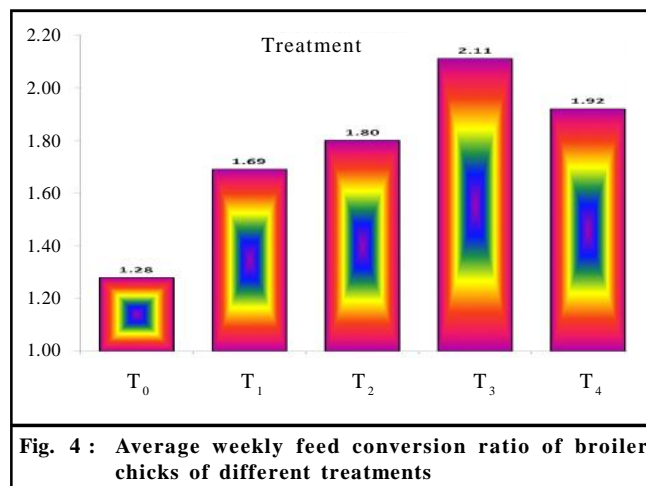


Fig. 4 : Average weekly feed conversion ratio of broiler chicks of different treatments

third week (1.83), followed by fourth week (1.79), second week (1.76) and minimum was in first week (1.67). 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 up to third week, which was a natural phenomenon. In fourth week, however, there was a slight decline. Treatment T_3 was found significantly superior over other treatments as well as the control, which shows that this treatment of 5 g turmeric powder mixed with 1 kg standard ration was optimum for obtaining better body weight, gain

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

Weeks	Treatment wise weekly FCR of broiler chicks						Mean
	T_0	T_1	T_2	T_3	T_4		
1	1.07	1.60	1.79	2.07	1.81	1.67	
2	1.31	1.71	1.78	2.07	1.93	1.76	
3	1.40	1.82	1.86	2.14	1.96	1.83	
4	1.36	1.62	1.78	2.18	1.98	1.79	
Mean	1.28	1.69	1.80	2.11	1.92		

Table 5 : Mean values of different parameters

Parameters (Mean values)	T_0	T_1	T_2	T_3	T_4	Result
Body weight of day old chicks (g)	37.53	37.87	36.13	38.73	38.20	NS
Body weight at fourth week (g)	1097.93	1169.60	1195.07	1244.87	1209.53	S
Gain in body weight (g) in fourth week	350.73	359.93	373.80	387.47	376.40	S
Feed consumption per broiler (g) in fourth week	258.67	222.33	210.67	178.00	190.33	S
Feed conversion ratio	1.36	1.62	1.78	2.18	1.98	S

NS= Non-significant

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 *Tulsi* leaf 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 5 g Turmeric powder per kg of standard ration (T₃), followed by 5 g ginger powder (T₄). Treatment T₃ was economically superior over all other treatments and control.

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