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Effect of *Eclipta alba* on growth performance of broiler chicken

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Abstract
A biological trial was conducted in commercial broiler chicken from day one to 35 days of age to evaluate the effect of *Eclipta alba* on growth performance of broiler chickens. One hundred and fifty day-old straight-run commercial broiler chicks were randomly assigned into three treatment groups with two replicates per treatment and containing 50 chicks per treatment. The treatment groups were fed broiler diets supplemented either without *E. alba* (Control – T_1) or with *E. alba* @ 0.25 g/kg diet (T_2) or with *E. alba* @ 0.50 g/kg diet (T_3). The control diet without experimental material was formulated as per BIS standard. The broiler chickens were fed *ad libitum* with standard and uniform management conditions under deep litter system in a thatch roofed open sided poultry house. The result revealed that the group fed diet supplemented with *E. alba* @ 0.50 g/kg diet (T_3) had significantly (p<0.01) higher body weight and weight gain than the control group (T_1) or the group fed diet supplemented with *E. alba* @ 0.25 g/kg diet (T_2). However, T_2 did not differ significantly with control group (T_1). The cumulative feed intake did not differ significantly between treatment groups on 35th day of age. The supplementation of *E. alba* at either level (T_2 and T_3) significantly improved the feed conversion ratio than the control (T_1) without supplementation of *E. alba.* However, there was no significant difference between T_2 and T_3. At the end of trial, the return over feed cost was significantly (p<0.05) higher in the treatment group supplemented with *E. alba* @ 0.50 g/kg diet (T_3) than the group either supplemented with *E. alba* @ 0.25 g/kg diet (T_2) or unsupplemented control group (T_1). However, there was no significant difference between T_1 and T_2. Hence, it may be concluded that *E. alba* could be supplemented in broiler diet @ 0.5 g/kg for increasing the body weight gain, improving the feed conversion ratio and for increasing the return over feed of broiler chicken.

Keywords: Broiler, *E. alba*, growth, performance, return over feed

Introduction
Poultry farming in India has assumed industry status and plays a major role in Indian economy. Extensive efforts are made to improve the performance of poultry in terms of growth and production. Commercial poultry farms often experiences problem of subclinical mycotoxicosis under field conditions. The mycotoxicosis at lower level affects liver and reduces it's functions, thereby affects the performance of broilers and other poultry species. Apart from this, broilers are continuously exposed to various compounds that affects liver such as pesticides, chemicals etc. either through feed or water.

Several substances are added in poultry feed as growth promoters with the aim of improving growth, fattening and production performances. Among these liver stimulants plays a major role in improving production performances and better profit margin in poultry.

It is conceivable that herbal agents could well serve as safe growth promoters due to their suitability and preference, lower cost of production, reduced toxicity risks and minimum health hazards. Growth promoters are generally liver tonics which optimize hepatic functions of the birds. They help in better digestion, absorption and synthesis of amino acids, better appetite, improved feed conversion, stimulation of the immune system and increased vitality, regulation of the intestinal microflora and improve the protein content etc.

Eclipta alba (syn. *Eclipta prostrata*) commonly known as False Daisy (Hindi: Bhringraj, Tamil: Karisalangkanni) is a plant belonging to the family Asteraceae. It is an erect or prostrate, much branched, roughly hairy, annual herb. Supplementation of *E. alba* as a natural growth promoter tends to improve the liver functions, thereby improves the performance of rats/ mice. However, researches on the use of *E. alba* as a growth promoter in broilers are very scanty.

Hence, an experiment was designed in broiler chicken to evaluate the effect of dietary supplementation of *E. alba* on growth performance (body weight, feed intake and feed conversion ratio) and return over feed cost of broiler chickens.

Materials and Methods

Preparation of *Eclipta alba* powder

The plant *E. alba* utilized for the study was authenticated by a taxonomist. The *E. alba* leaves were then collected, dried in shade and ground to make a powder and stored in air tight plastic container until use in the biological experiment.

E. alba plant

E. alba powder

Biological Experiment

The biological experiment was conducted with one hundred and fifty commercial day-old straight-run broiler chicks belonging to single hatch. The chicks were weighed and randomly allotted into three treatment groups with 50 chicks per treatment. Each group had two replicates containing 25 chicks per replicate. All experimental chicks were reared under deep litter system in a thatch roofed, open sided house. All the chicks were provided with uniform floor, feeder and waterer space and were reared under standard and uniform management conditions throughout the experimental period.

Experimental diets

The control diet (T_1) without supplementation of *E. alba* was formulated as per BIS standard. The *E. alba* powder was included in the basal diet at two levels i.e. 0.25 g/kg (T_2) and 0.5 g/kg (T_3) to prepare experimental diets. The broiler chickens were fed *ad libitum* with starter and finisher feed from 1 to 21 and 22 to 35 days, respectively.

Collection of data and Statistical Analysis

The body weight and feed consumption were recorded every week and the body weight gain and feed efficiency were calculated from the recorded data. Return over feed cost of broiler chicken reared under different treatment diets with different level of *E. alba* was worked out using the cost of feed ingredients and market price of broiler chicken that prevailed during the period of study. The data collected on various parameters were statistically analyzed as per the methods of Snedecor and Cochran (1989) [8] and the means of different experimental groups were tested for statistical significance by Tukey's HSD test (Tukey *et al.*, 1978) [10].

Results and Discussion

Body weight and body weight gain

The mean body weight and cumulative body weight gain during the study period, due to the effect of *E. alba* in broiler chicken are presented in Table 1 and 2, respectively. The result revealed that there was a significant difference (p<0.01) in body weight between treatment groups throughout the study due to the effect of *E. alba*. On day 7, the group fed diet supplemented with *E. alba* @ 0.50 g/kg (T_3) recorded higher body weight than the group fed diet supplemented with *E. alba* @ 0.25 g/kg (T_2) and the control group (T_1). However, there was no significant difference between the group supplemented with *E. alba* @ 0.25 g/kg (T_2) and the control group (T_1). Similar trend was observed through the study up to 35th day.

Statistical analysis of data on body weight gain revealed a highly significant difference (p<0.01) on 14th and 21st day and a significant difference (p<0.05) on 7th, 28th and 35th day of age between treatment groups due to supplementation of *E. alba*. The group fed diet supplemented with *E. alba* @ 0.50 g/kg (T_3) recorded higher body weight gain than the group supplemented with *E. alba* @ 0.25 g/kg (T_2) and the control group (T_1). However, there was no significant difference between the group supplemented with *E. alba* @ 0.25 g/kg (T_2) and the control group (T_1). Similar trend was observed throughout the study period.

The same opinion was expressed by Sharma *et al.* (2008) [5] who conducted an experimental study in 180 day-old broiler chicks to evaluate efficacy of herbal liver tonic and growth promoter product containing *E. alba* as one of the ingredient on overall growth, performance and carcass quality parameters and reported a significant improvement in growth performance traits in treated groups.

Growth promoters are generally liver tonics which optimize hepatic functions of the birds. They help in better digestion, absorption and synthesis of amino acids, regulation of the intestinal microflora and improved feed conversion. Supplementation of *E. alba* as a natural growth promoter tends to improve the liver functions, thereby improves the performance of rats/ mice.

Hepatoprotective effect of *E. alba* in animals/ mice is well expressed by Singh *et al*. (2010) [6], Song *et al.* (2010) [7], Prabu *et al.* (2011) [4], Akhilesh Sharma *et al.* (2011) [1], Khushdil *et al.* (2012) [3]. *E. alba* might have improved the liver functions and thereby increased weight gain in the treated broilers.

Table 1: Mean (± S.E.) body weight (g/bird) of broilers fed diet supplemented with *Eclipta alba*

Treatment	Day one	7th day	14th day	21st day	28th day	35th day
T_1	44.70±0.14	120.68^{B}±1.60	316.76^{B}±6.51	617.60^{B}±11.05	1064.14^{B}±17.07	1482.32^{B}±19.22
T_2	44.66±0.14	124.64^{B}±1.83	303.24^{B}±4.46	593.72^{B}±10.14	1035.84^{B}±12.18	1443.64^{B}±20.99
T_3	44.70±0.13	135.76^{A}±1.66	344.92^{A}±4.50	668.44^{A}±7.32	1129.76^{A}±11.28	1583.96^{A}±14.23

Each value is a mean of 50 observations

$^{A\ \&\ B}$ Means within a column with no common superscript differ significantly (p<0.01)

Table 2: Mean (± S.E.) cumulative body weight gain (g/bird) of broilers fed diet supplemented with *Eclipta alba*

Treatment	7th day	14th day	21st day	28th day	35th day
T_1	75.98^{b}±1.30	272.06^{B}±6.06	572.90^{B}±2.74	1019.44^{b}±6.00	1437.62^{b}±24.78
T_2	79.98^{b}±1.42	258.58^{B}±2.06	549.06^{B}±7.22	991.18^{b}±7.42	1398.98^{b}±20.66
T_3	91.06^{a}±1.18	300.22^{A}±4.22	623.74^{A}±2.50	1085.06^{a}±18.38	1539.26^{a}±19.26

Each value is a mean of 50 observations

$^{A \& B}$ Means within a column with no common superscript differ significantly (p<0.01)

$^{a \& b}$ Means within a column with no common superscript differ significantly (p<0.05)

Feed consumption and feed conversion ratio (FCR)

The mean cumulative feed intake and cumulative feed conversion ratio during the study period due to supplementation of *E. alba* as a growth promoter in broiler chicken are presented in Table 3 and 4, respectively.

Statistical analysis of data on cumulative feed intake revealed a highly significant difference (p<0.01) on 14th and 21st day and a significant difference (p<0.05) on 28th day of age between treatments due to the effect of *E. alba*. On day 14, the group supplemented with *E. alba* @ 0.25 g/kg diet (T_2) had lower cumulative feed intake, followed by control (T_1) than the group with 0.5g/ kg *E. alba* (T_3). On day 21st, the group supplemented with *E. alba* @ 0.25 g/kg diet (T_2) had lower cumulative feed intake, followed by the group with 0.5g *E. alba* / kg diet (T_3) than the control (T_1). On day 28th, the group supplemented with *E. alba* @ 0.25 g/kg diet (T_2) had lower cumulative feed intake than the group with 0.5 g *E. alba* / kg diet (T_3) and the control group (T_1). However, there was no significant difference between the group with 0.5 g *E. alba* / kg diet (T_3) and the control group (T_1). On 7th and 35th day, there existed no significant difference in cumulative feed intake between treatment groups.

Statistical analysis of data on cumulative feed conversion ratio revealed no significant difference on 14th day, highly significant difference (p<0.01) on 7th, 21st and 28th day and significant difference (p<0.05) on day 35th day of age between treatments due to the effect of *E. alba*. On day 7, the group supplemented with *E. alba* @ 0.50 g/kg diet (T_3) had better feed conversion ratio than the control group (T_1), whereas, T_2 did not differ either with T_3 or T_1. On day 21, 28 and 35, supplementation of *E. alba* at both levels (T_3 and T_2) had significantly improved the feed conversion ratio than control without *E. alba* supplementation (T_1). However, there was no significant difference between the two *E. alba* supplemented groups i.e. T_3 and T_2. The result concurs with earlier finding of Amitav Bhattarcharya *et al.* (2013) [2] who studied the effects of a herbal concentrate with *E. alba* as an ingredient on the growth, immunocompetence traits and nutrient retention of commercial broilers during extreme winter and reported that feed conversion ratio was significantly higher in the treatment group than control group.

The improved FCR in *E. alba* supplemented group was due to increased body weight gain of the group with optimum feed intake and it seemed that the *E. alba* supplementation increased the digestion and utilization of nutrient in broiler rather increasing the feed intake. The increased digestion and utilization might be due to better liver functions of the birds supplemented with *E. alba.* This is supported by earlier finding of many authors (Tabassum and Agarwal, 2004; Singh *et al.*, 2010; Song *et al.*, 2010; Prabu *et al.*, 2011; Akhilesh Sharma *et al.*, 2011; Khushdil *et al.*, 2012) [9, 6, 7, 4, 1, 3] who reported the hepatoprotective role of *E. alba* in improving the functions of liver in mice/ rat, animals. However, extensive literature search revealed extreme paucity of reports on the effect of *E. alba* in broilers or other poultry species.

Return over feed cost

At the end of trial, the return over feed cost was significantly (p<0.05) higher in the group supplemented with *E. alba* @ 0.50 g/kg diet (Rs. 27.27^{a}±1.12) than the group either supplemented with *E. alba* @ 0.25 g/kg diet (22.56^{b}±0.70) or unsupplemented control (20.03^{b}±0.25). However, the return over feed cost of the group supplemented with *E. alba* @ 0.25 g/kg diet did not differ with the control group. The group supplemented with *E. alba* @ 0.50 g/kg diet recorded Rs. 7.24 higher than the control group. This clearly showed that the supplementation of *E. alba* @ 0.50 g/kg diet increases the return over feed cost in broilers.

Based on the results of the experiment, it may reasonably be concluded that *E. alba* could be supplemented in broiler diet @ 0.5 g/kg for increasing the body weight gain, improving the feed conversion ratio and increasing the return over feed cost of broiler chicken.

Table 3: Mean (± S.E.) cumulative feed intake (g/bird) of broilers fed diet supplemented with *Eclipta alba*

Treatment	7th day	14th day	21st day	28th day	35th day
T_1	88.58±0.68	355.45^{B}±0.88	895.09^{C}±1.21	1621.44^{b}±12.88	2429.01±60.44
T_2	84.56±0.86	327.81^{A}±0.71	779.34^{A}±0.11	1510.90^{a}±12.55	2267.90±21.56
T_3	86.30±0.90	368.88^{C}±0.32	880.45^{B}±1.09	1626.58^{b}±1.90	2418.67±6.00

Each value is a mean of 2 observations

$^{A \& B}$ Means within a column with no common superscript differ significantly (p<0.01)

$^{a \& b}$ Means within a column with no common superscript differ significantly (p<0.05)

Table 4: Mean (± S.E.) cumulative feed conversion ratio of broilers fed diet supplemented with *Eclipta alba*

Treatment	7th day	14th day	21st day	28th day	35th day
T_1	1.17^{B}±0.01	1.31±0.03	1.56^{B}±0.01	1.66^{B}±0.01	1.69^{b}±0.01
T_2	1.06^{AB}±0.03	1.27±0.01	1.42^{A}±0.02	1.53^{A}±0.01	1.62^{a}±0.01
T_3	0.95^{A}±0.00	1.23±0.02	1.41^{A}±0.01	1.50^{A}±0.02	1.58^{a}±0.01

Each value is a mean of 2 observations

$^{A \& B}$ Means within a column with no common superscript differ significantly (p<0.01)

$^{a \& b}$ Means within a column with no common superscript differ significantly (p<0.05)

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