Journal of Animal Research: v.13 n.06, p. 977-983. December 2023

DOI: 10.30954/2277-940X.06.2023.15

Investigating the Efficacy of Herbal Preparation (*Phyllanthus emblica* and *Curcuma longa*) Powder Supplementation on Caged Broilers

Amratan Gautam[1*], Neeraj[1], Ramesh Pandey[1], Sushma[2], Ram Pal Singh[1] and Anand Kumar Singh[1]

[1]Department of Animal Husbandry and Dairying, SHUATS, Prayagraj, Uttar Pradesh, INDIA
[2]Department of Biochemistry and Biochemical Engineering, SHUATS, Prayagraj, Uttar Pradesh, INDIA

**Corresponding author: A Gautam; E-mail: amratan.gautam@gmail.com*

Received: 21 Sept., 2023 **Revised:** 06 Nov., 2023 **Accepted:** 10 Nov., 2023

ABSTRACT

Research study was conducted at the Department of A.H. and Dairying, Sam Higginbottom University of Agriculture, Technology and Sciences, Small animal Nutrition laboratory at Prayagraj, India. The aim was to evaluate the efficacy of herbal preparation (*Phyllanthus emblica* and *Curcuma longa*) powder supplementation on caged broilers. The experiment involved four sets of day-old chicks, with each set comprising four groups: T_0, T_1, T_2 and T_3. The chicks in group $Treatment_0$ were provided with a basic diet (as per FSSAI Specification), whereas chicks in $Treatment_1$, $Treatment_2$, and $Treatment_3$ were fed a Controlled diet enriched with Indian gooseberry powder and Haldi powder, each single chick of them with an amount of 0.50%, throughout a four-week study period. Quantity of feed consumed each week and weekly records of the weight growth of the birds in each group were kept, and the feed conversion ratio (FCR) was calculated. The results of the study indicated significant variations in the average weight gain and FCR among the different treatment groups. Further analysis and interpretation of the data provided valuable insights into the efficacy of (*Phyllanthus emblica* and *Curcuma longa)* powder supplementation on the expansion efficiency of caged broilers.

HIGHLIGHTS

- To evaluate the efficacy of herbal preparation supplementation on caged broilers.
- Significant variations were recorded in the average weight gain and FCR.

Keywords: Broiler, *Curcuma longa*, FCR, Feed consumption, *Phyllanthus emblica*, Weekly weight gain

In terms of minerals, amino acids, ascorbic acid (vitamin C), tannins, and phenolic compounds, one of the richest sources is Indian Gooseberry. Due to an increase in free radical production, commercial broilers with rapid growth rates accelerate metabolism and render people more susceptible to oxidative stress. In addition to ascorbic acid, the phenolic acids contained in (*Phyllanthus emblica*) contribute to the antioxidant action. These acids are gallic acid and tannic acid.

Indian Gooseberry and Haldi are two herbs that have been used successfully for many years as anti-stress agents in both human and animal medicine. These herbs can be used as medicine because they have properties that make them effective against bacteria, viruses, fungi, inflammation, and the immune system. It's known that several herbs can boost the immune system of the host and stop immunosuppression.

In addition to being utilised in medicinal formulations, these herbs may be added to chicken diets as feed additives, which will maximise their benefits. A couple of the best places to get extra vitamin C is through Indian Gooseberry, and several active tannin substances, such as emlicanin, punigluconin, and pedunculagin, have been found to be in

How to cite this article: Gautam, A., Neeraj, Pandey, R., Sushma, Singh, R.P. and Singh, A.K. (2023). Investigating the Efficacy of Herbal Preparation (*Phyllanthus emblica* and *Curcuma longa*) Powder Supplementation on Caged Broilers. *J. Anim. Res.,* **13**(06): 977-983.

Source of Support: None; **Conflict of Interest:** None

charge of the fruit's positive effects on health (Bhandari and Kamdod, 2012).

It has been shown that the yellow pigment curcumin and Haldi can protect the liver from a variety of poisons, including aflatoxin-B1, According to research (Zhang *et al.,* 2016). Among its medicinal qualities are antibacterial, antioxidant, antiprotozoal, and hypocholesteremic effects (Chattopadhyay *et al.,* 2004). Curcumin's metabolite tetrahydrocurcumin possesses anti inflammatory effects (Singh and Khar 2006), moreover to antioxidant functions (Al-Sultan 2003).

Anti-inflammatory and potent antioxidant in nature, Haldi. Anti-cancer properties exist in Haldi. The skin problem may benefit from turmeric. Brain food might include Haldi. Two of Haldi compounds, de-methoxy-curcumin and tetra-hydro-curcumin, have been shown to exhibit antifungal and antioxidant effects and are the most effective forms of Haldi.

Haldi (*Curcuma longa*) also contains other active components. Anti-inflammatory and other pharmacological effects of Curcumin have been shown. Broilers serum bio-chemical characteristics and immune responses were investigated by feeding them diets supplemented with varying amounts of dusted Indian Gooseberry, Haldi, and combinations of the two.

MATERIALS AND METHODS

Prayagraj, India, served as the location for the experiment, which was carried out in the Dept. of A.H. and Dairying Small Animal Nutrition Lab that is part of the Sam Higginbottom University of Agriculture, Technology and Sciences. The results of this study were measured in terms of outputs such broiler growth, feed use, and proportional feed changes. In total, 48 experimental birds, some just a day old, were employed for the study. They were kept in cages and given free access to commercially prepared food and water.

They were confined in cages similar to those used in batteries in a laboratory for small animals. The space allotted for the broilers on the floor was $(0.75)^2$ feet. Each was handled in the same manner under these conditions. It was recorded each week how much feed was consumed, how much body weight was gained, and how fast the FCR was. In order to analyze the data, statistics were utilized. Developing a plan for an experiment Table 1 outlines the particulars of the plan for developing an experiment.

Table 1: Details of Dietary Treatments

Groups	Dietary treatments
T_0 Control	Commercial broiler diet
T_1	Commercial broiler diet + Indian Gooseberry powder @5 g/kg feed.
T_2	Commercial broiler diet + Haldi powder @5 g/kg feed.
T_3	Commercial broiler diet + Indian Gooseberry powder + Haldi powder @5 g/kg feed.

Ingredient Gathering and Preparation

Making Haldi and Indian Gooseberry Powder

The modified underground stem of the Haldi plant also known as *Curcuma longa*, were obtained as dehydrated rhizomes and ground into a fine powder for use. We acquired the dried fruit of the Indian Gooseberry, also known as *Phyllanthus emblica*, and ground it into a powder to make a finer consistency.

In the broilers feed ration (*Curcuma longa*), a mixture of powdered Indian Gooseberry (*Phyllanthus emblica*) and powdered Haldi was utilized. The ration has to be increased in order to comply with the nutritional requirements of the treatment. In comparison, the broiler finisher ration had 19% crude protein and 3000 kcl of metabolizable energy, but the broiler starter diet had 22% crude protein and 2900 kcl of metabolizable energy.

PARAMETERS STUDIED

Weight gain

At the beginning and conclusion of the relevant period, the mean body weight and growth for each duplicate were computed.

Weekly feed intake

Each chamber's weekly observations on feed intake were recorded, and the average intake in grams per chick per

week was determined by dividing the overall quantity of meal eaten by the number of chicks housed inside that compartment. Additionally, the quantity of feed that was consumed during the experiment was noted.

FCR

FCR can refer to Feed Conversion Ratio. Feed Conversion Ratio is a measure used in animal agriculture to assess the efficiency with which animals convert feed into body weight or a desired substance, like milk, eggs, or meat.

FCR is calculated by dividing the amount of feed consumed by an animal by the weight gain or production output achieved during a specific period. The formula for FCR is as follows:

Note: - (quantity of feed consumed) in grams.

FCR = Amount of Feed Consumed / Weight Gain or Production Output

ANOVA

Analysis of variance (or ANOVA) is a statistical technique for comparing the means of many groups to identify statistically significant differences. When trying to figure out if here is a statistically significantly differentiation between the means/average of different groups or factors, ANOVA is typically used (Snedecor and Cochran, 1994). The experimental units, or individuals, were randomly assigned to one of many blocks, each of which was then assigned to one of several treatment conditions. The individuals are then assigned at random to one of several conditions or treatments within each block.

RESULTS AND DISCUSSION

In accordance with the broiler's weekly body weight statistics shown in Table 2 and 2.1, Fig. 1, the average rise in a broiler's total body weight was 280.91 g, 270.21 g, 291.03 g, and 288.07 g at 1, 2, 3, & 4 weeks of age, respectively. Significant differences in the means were observed, suggesting that the treatments had an influence on the rate of weight gain in the broiler chicks.

In regard to the evidence provided in Table 3 and 3.1, Fig. 2, we can infer that the average weekly feed intake of broilers ranged from 574.83 g to 562.78 g to 585.95 g to 582.14 g, depending on whether the broilers were 1, 2, 3, or 4 weeks old.

Conclusion Treatments had a significant effect on broiler chicks' feed consumption. Significant differences were seen between these values.

Table 2: Shows the mean weekly gaining weight (g) for a number of different Broiler treatments

Treatments	Week 4	Week 3	Week 2	Week 1	Mean
$Treatment_0$	429.60	371.07	210.02	112.97	**280.91**
$Treatment_1$	428.65	339.52	197.91	114.78	**270.21**
$Treatment_2$	474.52	360.80	214.33	114.48	**291.03**
$Treatment_3$	447.52	384.50	207.57	112.71	**288.07**
Mean	**445.07**	**363.97**	**207.45**	**113.73**	

Table 2.1: Analysis of variance for weekly gains in broiler weight

ANOVA							
Source of Variation	**SS**	**MS**	**df**	**F**	**F crit**	**P-value**	**Results**
Rows	1029.214	343.0714	3	1.952945	3.862548	0.191721	NS
Columns	268722.3	89574.1	3	509.9035	3.862548	02.31006	S
Error	1581.018	175.6687	9				
Total	**271332.5**		**15**				

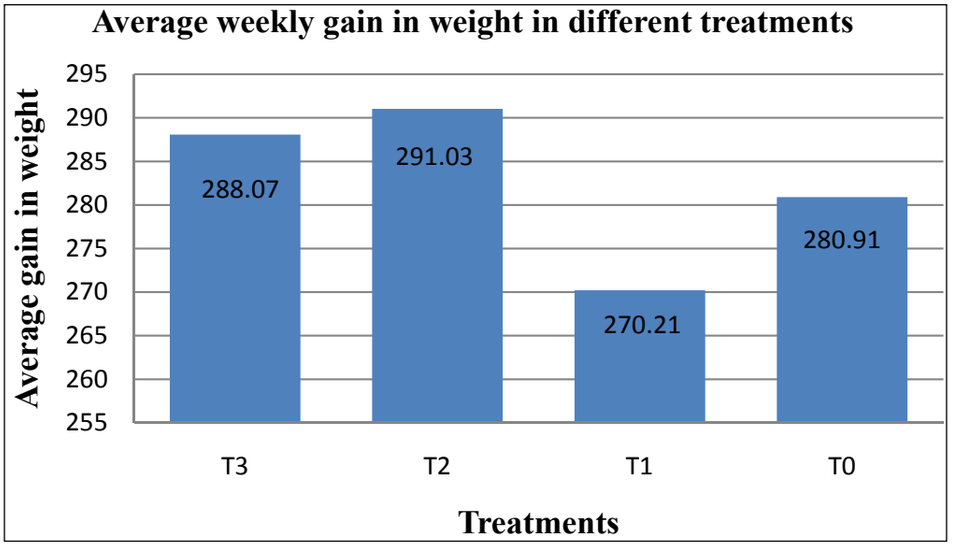

Fig. 1: Average weight gain (g) of broilers

Table 3: Weekly mean (g) feed consumption of broiler chicks across treatments

Treatments	Week $_1$	Week $_2$	Week $_3$	Week $_4$	Mean
T_o	217.83	393.66	759.08	928.75	**574.83**
T_1	219.91	393.41	740.58	897.25	**562.78**
T_2	222.74	402.49	769.33	949.25	**585.95**
T_3	221.16	403.33	775.33	928.75	**582.14**
Mean	**220.41**	**398.22**	**761.08**	**926.00**	

Table 3.1: Analysis of variance applied to broiler on a weekly basis meal consumption records

ANOVA						
Source	**S.S.**	**d. f.**	**M.S.S.**	**F. Tab. 5%**	**F. Cal.**	**Result**
Replication	1247.95	3	415.984	3.86	4.0220	S
Treatment	1259211.8	3	419737.2	3.86	4058.2	S
Error	930.84	9	103.427			
Total	**1261390.6**	**15**				

	Treatments			
Mean feed intake per broiler:	T_3	T_2	T_1	T_0
	582.14	**585.95**	**562.78**	**574.83**
	Weeks			
Weekly mean/average feed intake (g.) Per broilers	W_4	W_3	W_2	W_1
	926.00	**761.08**	**398.22**	**220.41**

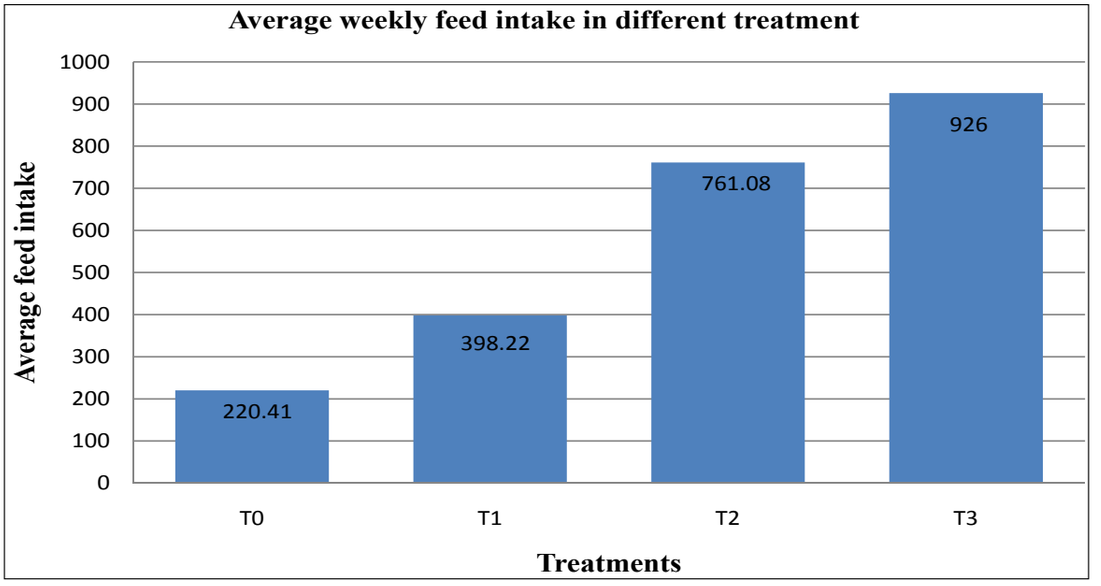

Fig. 2: Shows the typical weekly consumption of feed of broilers in grams

Table 4: FCR, or feed efficiency, on a weekly basis for each broiler under various conditions

Treatments	Week $_1$	Week $_2$	Week $_3$	Week $_4$	Mean
T_O	1.92	1.87	2.04	2.16	**1.99**
T_1	1.91	1.98	2.17	2.08	**2.03**
T_2	1.93	1.88	2.14	2.00	**1.98**
T_3	1.95	1.94	2.01	2.07	**1.99**
Mean	**1.92**	**1.91**	**2.09**	**2.07**	

Table 4.1: Analysis of variance for weekly feed conversion ratio (FCR) or broiler feed efficiency data

ANOVA						
Source	**S.S.**	**M.S.S.**	**d. f.**	**F. Calculated**	**F. Tab. 5%**	**Result**
Replication	0.0056	0.0018	3	0.4956	3.86	NS
Treatment	0.1045	0.0348	3	9.2205	3.86	S
Error	0.0340	0.0037	9			
Total	**0.1441**		**15**			

	Treatments			
Mean FCR per broiler at Four week of age	T_3	T_2	T_1	T_0
	1.99	**1.98**	**2.03**	**1.99**

	Weeks			
Mean FCR on average per Broiler	W_4	W_3	W_2	W_1
	2.07	**2.09**	**1.91**	**1.92**

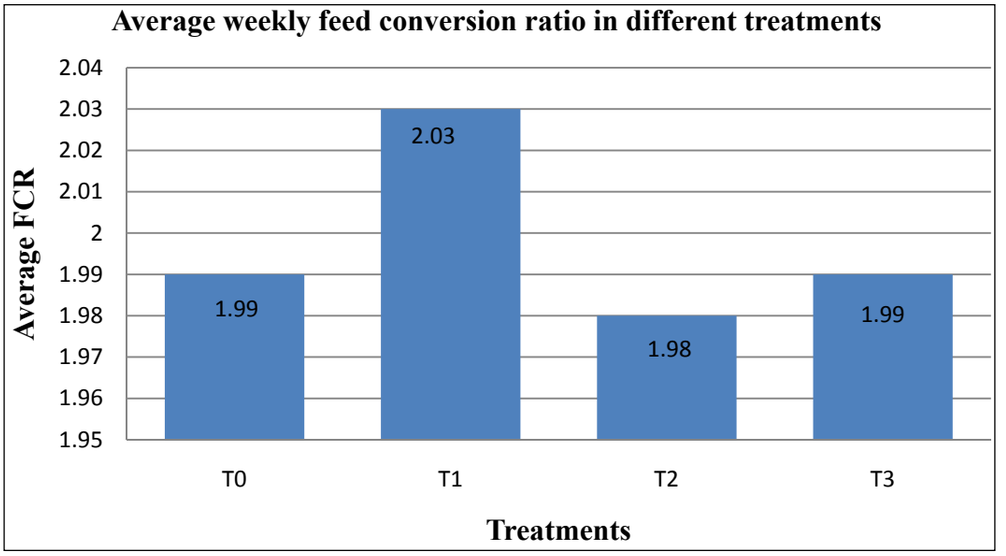

Fig. 3: Average weekly FCR (kg) of broilers

Table 4 and 4.1, as well as Fig. 3, display data on the FCR (feed conversion ratio) of broilers over the course of a week, revealing that the mean ratio was 1.99 for broilers at one week of age, 2.03 for broilers at two weeks of age, 1.98 for broilers at three weeks of age, and 1.99 for broilers at four weeks of age. Because of the huge fluctuations in these values, it was clear that the treatments had a major effect on feed conversion ratio of the broiler chicks.

The decreased feed intake in the group treated with more Indian Gooseberry powder may be attributable to better nutrient utilization. At the conclusion of the growth period, the average weight of the groups that were given Indian Gooseberry supplements ranged from 2105.8 (T_1) to 2240.4 (T_5), with the 0.75% (T_5) and 1% (T_6) Indian Gooseberry supplemented groups achieving considerably superior FCR than the organize group (Dalal *et al.,* 2018).

Similar results have also been recorded by (Naik *et al.,* 2020) they found that 0.5% Indian Gooseberry powder enhancement led to a significant increase in body weight and FCR without adverse effects, but increases of 1% and 2% led to only a minor weight gain.

Similar findings have also been reported by (Reddy *et al.,* 2012) who reported that using herbal supplements led to a similar increase in the bursa and spleen's weight (Chandra *et al*., 2019) the addition of turmeric and amla resulted in a slight but not massive rise in weight of the heart, liver, and gizzard. T_6 (0.50%) amla and turmeric in the foundation diet) had the highest dressing percentage (72.20%) and meat bone ratio (14.36%).

CONCLUSION

The average weight gain for broilers at four weeks old T_0, T_1, T_2 and T_3 was 429.60 g, 428.65 g, 474.52 g, and 447.52 g, respectively. Significant variations between the treatments were seen in the average weight increase per broiler. It may be discovered that enhancing supplements like Indian Gooseberry Powder (*Phyllanthus emblica*) and Haldi Powder (*Curcuma longa*) to the body weight, weight gain, and feed conversion ratio (FCR) of broilers were all improved by changes in their diet. T_2, a mixture of turmeric powder (*Curcuma longa*) at 5 g/kg feed, was found to be the most effective treatment for gaining weight and body mass compared to the other treatments.

REFERENCES

Al-Sultan, S.I. 2003. The effect of *Curcuma longa* (turmeric) on overall performance of broiler chickens. *Int. J. Poult. Sci.,* **2**(5): 351-353.

Bhandari, P.R. and Kamdod, M.A. 2012. *Emblica officinalis* (Amla): A review of potential therapeutic applications. *Int. J. Green Pharm.*, **6**(4).

Chandra, G., Mane, S.H., Dhage, S.A. and Rathor, A.V., 2019. Effect of feeding turmeric and amla on dressing percentage and meat bone ratio of broilers. *Indian J. Anim. Nutr.,* **36**(2): 210-214.

Chattopadhyay, I., Biswas, K., Bandyopadhyay, U. and Banerjee, R.K. 2004. Turmeric and curcumin: Biological actions and medicinal applications. *Curr. Sci.*, 44-53.

Dalal, R., Panwar, V.S., Ahlawat, P.K., Tewatia, B.S. and Sheoran, N., 2018. Effect of supplementation of amla (*Emblica officinalis*) fruit powder on growth performance during different growth phases of broiler chicken. *J. Anim. Res.*, **8**(4): 621-628.

Naik, B., Behera, K., Babu, L.K., Sethy, K., Nanda, S.M. and Pradhan, P.K. 2020. Effects of Supplementation of Amla (*Emblica officinalis*) Fruit Powder Meal on Growth Performance in Broiler Chickens. *Int. J. Curr. Microbiol. App. Sci*, **9**(2): 2805-2811.

Reddy, E.T., Reddy, P.S., Ramya, P. and Kumari, K.N. 2012. Effect of supplementation of amla, tulsi and turmeric on bio-chemical parameters and immune responses in broilers. *Indian J. Poul. Sci.*, **47**(1): 114-117.

Singh, S. and Khar, A. 2006. Biological effects of curcumin and its role in cancer chemoprevention and therapy. *Anticancer Agents Med. Chem.*, **6**(3): 259-270.

Snedecor, G.W. and Cochran, W.G. 1994. Statistical Methods. Publ. *Oxford and IBH publishing Co. New Delhi*, **4**: 445-446.

Zhang, N.Y., Qi, M., Zhao, L., Zhu, M.K., Guo, J., Liu, J., Gu, C.Q., Rajput, S.A., Krumm, C.S., Qi, D.S. and Sun, L.H. 2016. Curcumin prevents aflatoxin B1 hepatoxicity by inhibition of cytochrome P450 isozymes in chick liver. *Toxins*, **8**(11): 327.