



Broiler Chicken Supplemented *Tinospora Cordifolia* Powder

Raut et al.

Effect of Dietary Supplementation of *Tinospora cordifolia* (Giloy) Powder on Performance of Broiler Chicken

S. B. Raut, G.M. Gadegaonkar, S.M. Durge, R.C. Kulkarni, G.R. Channa and L.S. Kokate

Department of Animal Nutrition, College of Veterinary and Animal Sciences,

Udgir, Latur-413517, Maharashtra, India

*Correspondence: ganeshgadegaonkar@mafsu.in

ABSTRACT

The present research work was planned to evaluate the effect of dietary supplementation of *Tinospora cordifolia* powder on performance of broiler chicken. The study involved 240 day old Vencobb Y 430 strain broiler chicks. The experimental chicks were randomly divided into four equal groups of 60 chicks having four replicates, containing 15 chicks in each replica. Group T₀ (control) was fed with standard broiler diet (BIS, 2007). Group T₁, T₂ and T₃ were fed with standard broiler diet (BIS, 2007) supplemented with *Tinospora cordifolia* (giloy) powder @ 0.2, 0.4 and 0.6 %, respectively. The experiment was conducted for the period of six weeks. The results of the present study showed that the difference in final average live body weight, body weight gain, feed intake and feed conversion ratio of birds among various experimental groups was non-significant. The average retention percentage for DM, CP, EE and NFE was numerically higher in T₂ group than control group, however, retention percentage for CF was significantly ($P \leq 0.01$) higher in group T₂ than control group. The average dressing and eviscerated yield percentage of birds from group T₂ received diet supplemented with giloy powder @ 0.4% was significantly ($P \leq 0.01$) higher than groups T₀, T₁ and T₃. The average giblet, heart, liver, breast, drumstick and thigh weight percentages were significantly ($P \leq 0.01$) higher in group T₁ than control group except gizzard weight percentage. The economics of broiler production indicated that supplementation of giloy powder @ 0.4% of broiler feed was cost effective. Thus, it is concluded that supplementation of *Tinospora cordifolia* (giloy) powder @ 0.4% in broiler feed did not affect weight gain, feed conversion ratio, however, such supplementation resulted in improvement in nutrient metabolizability, carcass traits and found to be cost effective.

KEYWORDS: Broiler, Chicken, *Tinospora cordifolia*, Performance, Growth, Nutrient metabolizability, Carcass

Article received: 15 November 2022; Article accepted: 31 March 2023

INTRODUCTION

In recent years, herbal feed additives or phyto-genic feed additives attracted more interest of poultry farmers as an alternative strategy to growth promoters. Herbal feed additive improves the feed conversion ratio (FCR), growth rate, disease resistance due to presence of several bioactive compounds. Among herbal feed additives use of *Tinospora cordifolia* (giloy) powder is gaining importance due to its encouraging results on performance of livestock and poultry. Giloy belongs to *Menispermaceae* family. Giloy has anti-bacterial, anticancer, anti-tumour, anti-oxidant, anti-allergic, antispasmodic, antiarthritic, anti-neoplastic, anti-

inflammatory and anti-stress activities (Priti and Rani, 2017). It contains several bioactive compounds such as alkaloids, lactones, steroids, aliphatic compounds and glycosides polysaccharides with various biological actions that impart its diverse pharmacological actions (Pradhan and Pandey, 2013). Giloy showed encouraging results on the growth performance of birds in terms of body weight gain, improved FCR and nutrient metabolizability and it can be effectively replace the synthetic growth promoter in broiler ration (Singh, 2018). It was thought worth to assess effect of varying levels of giloy powder on performance of broiler birds and optimize level of supplementation which can improve performance of broiler birds and

fetch more profits. Considering these facts in mind the present research work was planned to evaluate the effect of varying levels of dietary supplementation of *Tinospora cordifolia* powder on performance of broiler chicken.

MATERIALS AND METHODS

The present research was carried out at the Department of Animal Nutrition, College of Veterinary and Animal Sciences, Udgir, after prior approval from the Institutional Animal Ethics Committee (Approval No.III/21). A total of 240 VenCobb 430y day old chicks were randomly assigned to four treatment groups viz. T0, T1, T2 and T3 with four replicates and each replicate having 15 birds. All the groups were offered standard broiler diet formulated as per BIS (2007) for pre-starter (0-7 days), starter (8-21 days) and finisher (22-42 days) period. The control group (T0) was given standard broiler diet as per BIS (2007). The remaining treatment groups T1, T2 and T3 were given same basal diet as per BIS (2007) and supplemented with giloy powder @ 0.2, 0.4 and 0.6%, respectively. Feed and water were offered *ad libitum* during study. All the diets were made iso-caloric and iso-nitrogenous. The experimental birds were reared on deep litter system with standard management practices. The experiment was conducted for the period of six weeks.

Samples of pre-starter, starter and finisher were analyzed for proximate composition as per AOAC (1996). The birds all the experimental groups were weighed individually at weekly interval till the end of experiment. Daily record of feed given to different groups was recorded. Feed refusal was weighed daily. The feed intake in different groups was calculated by subtracting the weight of left over feed from the weight of total feed offered and feed conversion ratio was calculated for each experimental group. A metabolic trial of five days duration was conducted during 6th week of experimental period to work out retention percentage for DM, EE, CP, CF and NFE. Analysis of fecal sample was done according to AOAC (1996).

On the last day of trial, four birds from each group were sacrificed for carcass evaluation. The birds were sacrificed by skilled butcher by severing the jugular vein and allowed to bleed completely following Halal method. The data obtained was subjected to analysis of variance following procedures for completely randomized designs (Snedecor and Cochran, 1989) using SPSS (2009) version 16.

RESULTS AND DISCUSSION

The per cent ingredient (%) composition and chemical composition (% DM basis) of various experimental broiler diets is presented in Table 1 and 2, respectively. The results of the present study showed that the final average live body weights and body weight gain (Table 3 and 4) of birds among various experimental groups was non-significant. The average body weights of birds from various experimental groups was comparable at the end of pre-starter, starter and finisher period, however, during second and fourth week of experimental period average live body weight was significantly ($P \leq 0.05$) higher in group T2 than group T0, T1 and T3. Further, it was also seen that average live body weights of group T0, T1 and T3 were comparable during second and fourth week of experimental period. During fifth week of experimental period body weights of birds from group T3 were significantly ($P \leq 0.05$) higher than group T0 and T1, however, difference between T2 and T3 and that among groups T0, T1 and T2 was comparable.

During the pre-starter period, average body weight gain of birds from group T1 and T3 was significantly ($P \leq 0.05$) higher than group T2, however, difference between T0 and T2 and among groups T0, T1 and T3 was comparable. During second week of trial period the average body weight gain was significantly ($P \leq 0.05$) higher in group T2 than groups T0, T1 and T3, however, difference among groups T0, T1 and T3 was non-significant. The average body weight gain at the end of starter and finisher period was comparable among various experimental groups.

Table 1. Percent ingredients and chemical composition of diet of experimental groups

Ingredients	Experimental groups											
	Broiler Pre-starter				Broiler Starter				Broiler Finisher			
	T0	T1	T2	T3	T0	T1	T2	T3	T0	T1	T2	T3
Giloy powder	0	0.20	0.40	0.60	0	0.20	0.40	0.60	0	0.20	0.40	0.60
Maize	50.33	50.33	50.33	50.33	51.40	51.40	51.40	51.40	55.20	55.20	55.20	55.20
Soybean meal	41.20	41.20	41.20	41.20	38.60	38.60	38.60	38.60	33.60	33.60	33.60	33.60
Vegetable oil	4.30	4.30	4.30	4.30	5.80	5.80	5.80	5.80	6.90	6.90	6.90	6.90
Dicalcium phosphate	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10	2.10	2.10	2.10
Limestone powder	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Salt (NaCl)	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
DL-Methionine	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.19	0.19	0.19	0.19
L-Lysine	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11
Trace mineral mixture	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Coccidiostat	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Choline chloride	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toxin binder	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Acidifier	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11
Vitamin premix	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Table 2. Nutrient composition of experimental broiler diets (DM%)

Nutrient	Pre-starter (0-7 days)	Starter (8-20 days)	Finisher (21-42 days)
DM	92.9	92.5	92.7
CP	23.0	22.0	20.1
EE	3.14	3.42	3.85
CF	5.32	5.54	5.18
TA	6.89	6.68	6.12
NFE	61.5	62.3	64.7
ME Kcal/kg	3000	3100	3200

DM: Dry matter; CP: Crude protein; EE: Ether extract; CF: Crude fibre; TA: Total ash; NFE: Nitrogen free extracts; ME: Metabolizable energy

Broiler Chicken Supplemented *Tinospora Cordifolia* Powder

Table 3. Average weekly live body weights (g) in experimental groups

Weeks	Experimental groups				Pooled SE	P value
	T0	T1	T2	T3		
	Live body weights (g)					
0	43.6	42.9	42.5	42.4	0.201	0.104
1	181.8	183.6	178.4	182.0	0.738	0.123
2	477.2 ^b	467.1 ^b	509.3 ^a	481.8 ^b	6.239	0.05
3	904.7	898.7	900.0	879.1	5.213	0.362
4	1585.0 ^b	1599 ^b	1719 ^a	1637 ^b	17.893	0.016
5	2217 ^b	2252 ^b	2318 ^b	2458 ^a	31.224	0.013
6	2747	2679	2860	2811	30.427	0.167
	Body weight gain (g)					
1	138.2 ^{ab}	140.7 ^a	135.8 ^b	139.5 ^a	0.667	0.040
2	295.3 ^b	283.3 ^b	330.7 ^a	299.1 ^b	5.793	0.009
3	427.4	431.1	390.8	397.9	8.068	0.187
4	680.3 ^c	701.1 ^{bc}	819.8 ^a	758.3 ^{ab}	17.847	0.008
5	632.0	653.3	598.1	622.5	32.192	0.956
6	530.0	426.8	542.5	530.0	38.313	0.728

Means with different superscript differ significantly

Table 4. Feed consumption (g/d) and feed conversion ratio in experimental groups

Weeks	Experimental groups				Pooled SE	P value
	T0	T1	T2	T3		
	Feed consumption					
1	164.1	156.1	160.8	157.2	1.280	0.089
2	405.3 ^a	356.6 ^b	405.3 ^a	376.3 ^{ab}	7.124	0.014
3	650.7	637.8	650.7	616.9	5.266	0.061
4	812.6	870.1	876.0	869.7	11.075	0.128
5	1009.7 ^b	1091.9 ^a	1056.3 ^{ab}	1119.4 ^a	14.984	0.035
6	1163.6	1177.7	1182.2	1266.9	19.973	0.260
	Feed conversion ratio					
1	1.19 ^a	1.11 ^b	1.18 ^a	1.13 ^b	0.012	0.021
2	1.37 ^a	1.26 ^b	1.23 ^b	1.26 ^b	0.019	0.012
3	1.52	1.48	1.66	1.55	0.033	0.266
4	1.19	1.24	1.07	1.15	0.027	0.092
5	1.60	1.67	1.77	1.80	0.095	0.606
6	2.20	2.76	2.18	2.39	0.241	0.661

Means with different superscript differ significantly

Table 5. Effect of dietary supplementation of giloy powder on nutrient metabolizability

Nutrients	Retention (%)				Pooled SE	P value
	T0	T1	T2	T3		
DM	60.2	60.5	60.5	60.2	0.044	0.069
CP	59.2 ^a	58.5 ^b	59.5 ^a	58.2 ^{ab}	0.093	0.016
EE	86.6	85.5	86.9	86.2	0.064	0.232
CF	32.4 ^b	31.4 ^b	32.6 ^a	32.5 ^b	0.073	0.006
NFE	61.5 ^{ab}	60.4 ^c	61.8 ^a	61.3 ^b	0.135	0.001

Means with different superscript differ significantly

Table 6. Effect of dietary supplementation of giloy powder on carcass traits

Carcass traits	Experimental groups				Pooled SE	P value
	T0	T1	T2	T3		
Dressing percentage	70.9 ^b	70.8 ^b	72.6 ^a	71.1 ^b	0.190	0.001
Eviscerated yield (%)	66.5 ^c	66.3 ^d	68.0 ^a	66.7 ^b	0.165	0.001
Giblet weight (%)	4.36 ^b	4.48 ^a	4.57 ^a	4.37 ^b	0.027	0.002
Heart weight (%)	0.44 ^b	0.54 ^b	0.53 ^b	0.55 ^b	0.012	0.001
Liver weight (%)	1.79 ^c	1.91 ^b	1.99 ^a	1.99 ^a	0.002	0.001
Gizzard weight (%)	2.17 ^a	1.94 ^c	2.05 ^b	1.82 ^d	0.034	0.001
Breast weight (%)	27.1 ^b	27.05 ^b	27.27 ^a	24.68 ^c	0.277	0.001
Drumstick weight (%)	4.38 ^a	4.17 ^{bc}	4.36 ^{ab}	4.04 ^c	0.045	0.007
Thigh weight (%)	9.41 ^b	8.98 ^c	9.52 ^a	9.05 ^c	0.061	0.001

Means with different superscript differ significantly

The results of present study are in agreement Kulkrani et al. (2011) who reported no significant ($P < 0.05$) difference in live body weights on dietary supplementation of giloy powder @ 0, 0.1, 0.2 and 0.3% in colored broiler birds. Uniyal (2017) also observed no significant difference in body weight gain in turkey poultts received feed containing giloy powder @ 0.1, 0.2 and 0.3%. At the end of six weeks experimental period, the feed consumption and feed conversion ratio of birds from various experimental groups revealed non-significant differences (Table 3 and 4). Although average feed consumption of birds from various experimental groups revealed non-significant differences (Table 3) during pre-starter, starter and finisher period, during second week of experimental period the

average feed consumption of group T0 and T2 was significantly ($P \leq 0.05$) higher than group T1. Further, it was also revealed that average feed consumption among groups T0, T2 and T3 and between group T1 and T3 was comparable. During fifth week of experiment, the average feed consumption of group T1 and T3 was significantly ($P \leq 0.05$) higher than group T0, however, difference between control and T2 group and among groups T1, T2 and T3 was non-significant. The average feed conversion ratio at the end of pre-starter period was significantly ($P \leq 0.05$) better in group T1 and T3 than group T0 and T2, however, difference between group T0 and T2 and that between group T1 and T3 was non-significant. During second week of experiment, the average feed conversion ratio of groups T1, T2 and

T3 was significantly ($P \leq 0.05$) better than control group, however, difference among groups T1, T2 and T3 was non-significant. The feed conversion ratio of birds from various experimental groups revealed non-significant differences during starter and finisher period. Bhardwaj et al. (2011) also observed no significant changes in body weight gain, feed consumption and feed conversion ratio on supplementation of aqueous extracts of giloy stem powder @ 1g/kg feed in broiler birds. On contrary, Singh (2018) showed significant ($P < 0.05$) improvement in body weight gain, feed consumption and FCR on dietary supplementation of giloy stem powder @ 0.50, 0.75 and 1% in broilers. Tiwari (2017) also showed improvement in body weight gain and FCR on supplementation of 1% giloy powder in broilers diet.

The effect of dietary supplementation of giloy powder on nutrient metabolizability is presented in Table 5. The average retention percentages for DM and EE among various experimental groups was comparable. The average retention percentage for CP was significantly ($P \leq 0.05$) higher in group T0 and T2 than group T1, however, difference among groups T0, T2 and T3 and that between group T1 and T3 was non-significant. The average retention percentage for NFE was significantly ($P \leq 0.01$) higher in group T2 than group T1 and T3, however, difference between group T0 and T2 and that between group T0 and T3 was comparable. Further, it was seen that retention percentage for NFE was significantly ($P \leq 0.01$) lower in group T1 than all other experimental groups. The data pertaining to effect of giloy powder on carcass traits of birds from various experimental groups are presented in Table 6. The dressing percentage and eviscerated yield percentage of birds from group T2 received diet supplemented giloy powder @ 0.4% was significantly ($P \leq 0.01$) higher than groups T0, T1 and T3, however, difference in dressing percentage among groups T0, T1 and T3 was non-significant. Whereas, eviscerated yield percentage revealed significant ($P \leq 0.01$) differences among various experimental groups. The findings of the present study resembles with Gupta

et al. (2018) who observed significant increase in dressed weight on dietary supplementation of giloy powder @ 1 and 2% in broilers. Bharambe and Garde (2020) also found significant increase in dressed weight on dietary supplementation of giloy powder at varying levels. The average giblet weight percentage of birds from group T1 and T2 was significantly ($P \leq 0.01$) higher than group T0, and T3, however, difference between group T1 and T2 and that between groups T0, and T3 was comparable. The average heart weight percentage of birds from groups T1, T2 and T3 supplemented with giloy powder at varying levels was significantly ($P \leq 0.01$) higher than control group, however difference among groups T1, T2 and T3 was comparable. The average liver weight percentage of birds from groups T1, T2 and T3 supplemented with giloy powder at varying levels was significantly ($P \leq 0.01$) higher than control group, however, difference between group T2 and T3 was comparable. Further, it was seen that liver weight percentage of birds from group T2 and T3 was significantly ($P \leq 0.01$) higher than T1 group. Findings of present study corroborated with Uniyal (2017) who observed significant increase in liver, heart and giblet yield on supplementation of giloy powder @ 0.1%, 0.2% and 0.3% in broiler birds.

The average gizzard weight percentage revealed significant ($P \leq 0.01$) differences among various experimental groups. The gizzard weight percentage was significantly ($P \leq 0.01$) higher in group T0 than all other experimental groups, whereas, gizzard weight percentage was significantly lower in group T4. The average breast weight percentage of birds from group T2 was significantly ($P \leq 0.01$) higher than groups T0, T1 and T3, however, difference between group T0 and T1 was comparable. Further, it was seen that breast weight percentage of birds from group T3 was significantly ($P \leq 0.01$) lower among all experimental groups. The average drumstick weight percentage of birds from group T0 was significantly ($P \leq 0.01$) higher than group T1 and T3, however, difference between group T0 and T2 was comparable. Further, it was seen that drumstick weight percentage of birds from group T1 and T2

and that between T1 and T3 was comparable. The average thigh weight percentage of birds from various experimental groups revealed significant differences ($P \leq 0.01$) among various experimental groups. Further, it was seen thigh weight percentage of birds from group T2 was significantly ($P \leq 0.01$) higher than groups T0, T1 and T3. The average thigh weight percentage of birds from group T3 was significantly ($P \leq 0.01$) lower among all experimental groups. Contrary to the findings of present study, Kulkarni et al. (2011) reported no significant difference in thigh, giblet, heart, liver and gizzard weight percentage on supplementation of giloy powder @ 0, 0.1, 0.2 and 0.3% of feed in coloured birds.

The cost of feed, day old chick, supplement (giloy powder) and miscellaneous cost were considered while calculating net profit. The net profit/ bird and profit/kg body weight for groups T0, T1, T2 and T3 were Rs.75.50, 64.53, 79.52, 70.73 and Rs. 27.48, 24.08, 27.80 and 25.16, respectively. Cost of feed per kg live body weight gain for groups T0, T1, T2 and T3 was Rs. 55.40, 57.88, 54.85 and 56.71, respectively. Thus, the net profit per bird and net profit/ kg live body weight was higher in group T2 followed by control, T3 and T1 group. Thus, economics of broiler production indicated that supplementation of giloy powder @ 0.4% of feed was beneficial in achieving more profit.

CONCLUSION

Supplementation of *Tinospora cordifolia* (giloy) powder @ 0.4% in broiler feed did not influence weight gain, feed conversion ratio, however, such supplementation resulted in improvement in nutrient metabolizability, carcass traits and found cost effective.

REFERENCES

- AOAC. 1996. Official Methods of Analysis of AOAC International. AOAC, Washington, DC., USA.
- Bharambe, V. Y. and Garde Y. A. 2020. Effect *Trigonella foenumgraecum* and *Tinospora cordifolia* feed additives on carcass traits of broilers in Konkan climatic conditions of India. *Journal of Animal Research*. 10(6): 953-959.
- Bhardwaj, U., Tiwari B. K., Prasad A. and Ganguly S. 2011. Use of *Tinospora cordifolia* as poultry feed supplement. *An International Journal Biomedical and Life Science Research* 1: 18-22.
- BIS. 2007. Indian Standards of Poultry feed specification, 5th revision. IS: 1374, Bureau of Indian Standards, Manak Bhavan New Delhi, India.
- Gupta, T., Singh C., Sahu M., Yadav D. K. and Bisht N. 2018. Effect of dietary Giloy and cinnamon powder incorporation on growth performance and carcass traits in broiler Chickens. *Journal of Entomology and Zoology Studies*. 6(6): 200-204.
- Kulkarni, R., Mandal A.B., Munj C.P., Dan A., Saxena A., and Tyagi P. K. 2011. Response of coloured broilers to dietary addition of geloi (*Tinospora cordifolia*) during extreme summer. *Indian Journal of Poultry Science*. 46: 70-74.
- Pradhan, D. and Pandey A. K. 2013. Estimation of starch extracted from different diameter thickness stem of giloe (*Tinospora cordifolia* Willd Miers). *Journal of Pharmacognosy and Phytochemistry*. 2(4): 162-163.
- Priti, A. and Rani. S. 2017. Phytochemical screening, antibacterial and antioxidant activity of leaves extract of *Tinospora cordifolia*. *Journal of Pharmacy Research*. 11: 991-995.
- Singh, S. 2018. Effect of dietary supplementation of giloy (*Tinospora cordifolia*) powder on the performance of broilers, Doctoral Thesis, LUVAS.
- Snedecor, G W., and Cochran W. G., 1989. *Statistical Methods*, Ames, IA: The Iowa State University Press.
- SPSS. 2009. *Statistical Packages for Social Sciences*. Version 16, SPSS Inc., Illinois, USA.

- Tiwari, G. 2017. Effect of feeding of giloy and cinnamon on growth, nutrient utilization and haemato-biochemical parameters in commercial broilers. Ph.D Thesis, GBPUAT, Pantnagar.
- Uniyal, A. 2017. Evaluation of production performance, immune response and gut health status in turkey poults fed diet supplemented with dried stem powder of *Tinospora cordifolia*. Ph.D. Thesis, IVRI, Izatnagar.