



Effect of Supplementation of Geloi (*Tinospora Cordifolia*) Stem Powder and Ascorbic Acid on Economics of Broiler Production in Arid Zone of Rajasthan

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ABSTRACT

A 42 day feeding trial was carried out to investigate the effect of dietary addition of graded levels of *Tinospora cordifolia* stem powder with or without ascorbic acid on economics of broiler production using 360 one-day-old broiler chicks in 5×2 factorial experiment within a completely randomized design and divided into ten (10) dietary treatments groups (T₁-T₁₀) in triplicate of twelve chicks per replicate. Environmental stress was observed during feeding trial as ambient temperature and THI were recorded on higher side than the threshold level during the entire experimental period. The findings of comparative economics of broiler production indicated that addition of Geloi at graded levels and ascorbic acid alone or in combinations reduced the overall cost of feed per kg gain as compared to control but maximum reduction in overall cost of feed per kg gain was obtained in T₇ treatment group containing 0.25% of Geloi supplemented with ascorbic acid *i.e.* 11.03% reduction.

Key words: Ascorbic acid, Broiler, Economics, *Tinospora cordifolia*

INTRODUCTION

Feed is a major component, affecting net return from the poultry industry, as 80% of the total expenditure in terms of cash is spent on feed purchase (Khan *et al.*, 2010). Recent trend in broiler production is to provide feed containing the feed additives to improve efficiency and get maximum returns in shortest possible time. Various types of feed additives such as antibiotics, enzymes, hormones, prebiotics, probiotics, herbal products *etc.*, are being used as growth stimulants in poultry production. *Tinospora cordifolia* (Geloi) is a herbal plant and has promising properties as plant growth promoter (Raina *et al.*, 2013), with potential benefits in poultry. *T. cordifolia* contains various phenolics, alkaloids, steroids, glycosides, diterpenoid lactones, polysaccharides and aliphatic compounds (Sharma *et al.*, 2013). Vitamin-C is a white to yellow-tinged crystalline powder. Under normal conditions, poultry can synthesize vitamin C within their body but endogenous synthesis may not be enough to

provide the full need of poultry at all times, especially the need of this vitamin may increase during heat stress (Lin *et al.*, 2006). The addition of ascorbic acid to the diet of bird improves the immune response during heat stress (Zahraa, 2008). Therefore, the present investigation was planned to evaluate the comparative economy of supplementation of graded levels *Tinospora cordifolia* with or without ascorbic acid in poultry birds in arid zone of Rajasthan (India).

MATERIALS AND METHODS

A 42-days duration feeding trial was carried out at the poultry farm of College of Veterinary and Animal Science (CVAS), Bikaner, Rajasthan. Three hundred sixty (360) experimental day-old-broiler chicks were equally and randomly divided into ten (10) dietary treatments groups (T₁-T₁₀) and each dietary group was replicated to three (3) sub-groups (R₁-R₃) to make sure uniformly in various treatment groups. *Tinospora cordifolia* (Geloi) stem powder at graded levels and ascorbic acid were supplemented in basal broiler starter

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and broiler finisher ration either alone or in combinations. The T_1 i.e. control group was fed on basal diet while T_2 , T_3 , T_4 and T_5 treatment groups were supplemented with 0.25%, 0.50%, 0.75%, and 1.0% of *Tinospora cordifolia* (Geloi) stem powder in the basal broiler starter and finisher ration, respectively. The T_6 group was supplemented with Ascorbic acid @ 0.025% in the basal broiler starter and finisher ration. The T_7 , T_8 , T_9 and T_{10} treatment group were supplemented with 0.25%, 0.50%, 0.75% and 1.0% of *Tinospora cordifolia* (Geloi) stem powder in combination with ascorbic acid at 0.025% in the basal broiler starter and finisher ration, respectively. Good quality of *Tinospora cordifolia* (Geloi) stem was procured from reputed firm of Bikaner (Rajasthan). Thereafter, it was identified and authenticated by the Department of Botany, Government Dungar College, Bikaner (Rajasthan). The commercially available ascorbic acid (99.99% pure) was used. The broiler starter and finisher feed contained 21.37% and 20.32% crude protein (CP), respectively. Broilers were maintained under standard managerial practices regarding brooding, watering, feeding and disease control throughout the research period. Weekly growth of chicks and daily feed consumption in each group were recorded up to 42 days. Feed conversion ratio was calculated as the ratio between unit feed consumed to unit body weight gain. In the present study, the feed cost of all ten treatment groups were estimated based on feed cost of starter feed, finisher feed, Geloi and ascorbic acid. The total feed cost (in ₹) per kg weight gain in broiler chicks for various treatment groups was calculated and the reduction in feed cost per kg weight

gain in terms of percentage over control was calculated. The data obtained in the research trial were analysed statistically for main effect of *Tinospora cordifolia* (Geloi) or ascorbic acid alone as well as interaction (Geloi $\times$ Ascorbic acid) in factorial design (5 $\times$ 2) as per Snedecor and Cochran (2004) and significance of mean differences was tested by Duncan's New Multiple Range Test (DNMRT) as modified by Kramer (1956).

RESULTS AND DISCUSSION

The mean values of temperature (°C), relative humidity (%) and temperature humidity index (THI) recorded during different weeks have been presented in Table 1. The result of growth performance of broilers observed in various treatment groups have been presented in Table 2 as well as in Figures 1 and 2. No mortality was observed during experimental period in any groups. Overall feed cost (₹) per unit weight gain and percentage reduction in feed cost per unit weight

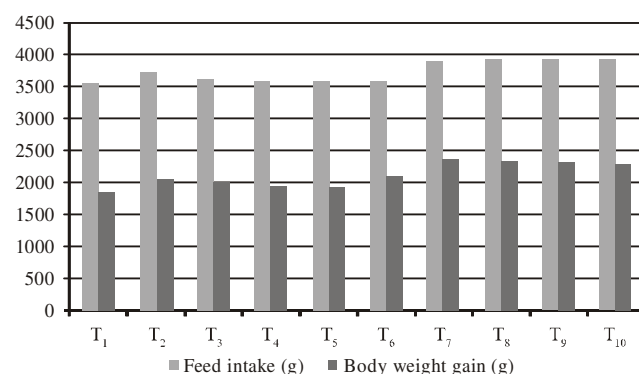


Fig. 1. Effect of Geloi and Ascorbic acid on feed intake and body weight gain of broiler chicks

Table 1. Mean temperature (°C), relative humidity (%) and THI observed during different weeks

Period (weeks)	Mean Temperature (°C)	Mean Relative humidity (%)	Mean THI
I	33.08	49.53	82.06
II	32.79	44.19	80.70
III	32.10	51.95	81.23
IV	29.99	61.95	80.01
V	29.05	43.90	76.01
VI	29.05	38.76	75.26
Mean	31.00	48.38	79.21

Table 2. Effect of Geloi and ascorbic acid on performance of broilers in various treatment groups

Treatment groups	Feed intake (g)	Body weight gain (g)	Average daily gain (g)	Feed conversion ratio
T ₁	3566.03 ^a	1861.64 ^a	44.32 ^a	1.96 ^e
T ₂	3744.22 ^c	2068.03 ^d	49.24 ^d	1.81 ^c
T ₃	3656.81 ^b	2004.22 ^c	47.72 ^c	1.82 ^{cd}
T ₄	3598.03 ^{ab}	1954.64 ^b	46.54 ^b	1.84 ^d
T ₅	3593.11 ^{ab}	1939.89 ^b	46.19 ^b	1.85 ^{de}
T ₆	3585.28 ^a	2102.00 ^e	50.05 ^e	1.71 ^b
T ₇	3906.19 ^d	2372.67 ^h	56.49 ^h	1.65 ^a
T ₈	3951.19 ^f	2352.28 ^{gh}	56.01 ^{gh}	1.68 ^b
T ₉	3950.42 ^{ef}	2338.72 ^g	55.68 ^g	1.69 ^b
T ₁₀	3931.42 ^{ef}	2299.81 ^f	54.76 ^f	1.71 ^b
SEM	6.2058	7.6910	0.1831	0.0027

Means bearing different superscripts (a, b, c, d) in a row differ significantly (P<0.01)

gain has been presented in Table 3. The overall feed cost per kg gain was calculated to be ₹ 55.54, 49.72, 50.44, 51.24, 51.89, 50.87, 49.41, 50.72, 51.31 and 52.23 in T₁, T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉ and T₁₀ treatment groups, respectively. The per cent reduction in feed cost per kg gain was observed to be 10.48, 9.17, 7.74, 6.56, 8.36, 11.03, 8.67, 7.62, 5.95 in T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉ and T₁₀ treatment groups over control, respectively. The average temperature (31°C) during the study period was higher than the recommended normothermia zone *i.e.* 22-28 °C (Donkoh, 1989) or 18-24 °C (Holik, 2009) established for poultry in the tropical regions, which indicated that birds were in chronic heat stress. The calculated THI for different

weeks ranged from 75.26 to 82.06; a value above the THI threshold of 70, established for poultry (Bouraoui *et al.*, 2002 and Karamanet *et al.*, 2007). The results obtained in the study on inclusion of Geloi are in line with the findings of earlier report (Kulkarni *et al.*, 2011 and Khobragade, 2003), who observed no mortality in Geloi supplemented group. No mortality was observed in the ascorbic acid groups are also in agreement (Ali *et al.*, 2010) who reported no mortality in ascorbic acid supplemented group. Observation of no mortality whilst Geloi (at graded levels) was fed in combination with ascorbic acid are in agreement with Biswas *et al.*, (2012) who reported no mortality in birds fed herb in combination with ascorbic acid. Optimum performance in treatment groups may be explained on the basis of antioxidant property of Geloi and ascorbic acid. Better output in the form of weight gain with minimum input is always economical as well as advantageous to get maximum economic return. The findings of the present study indicated that addition of graded levels Geloi either alone or in combination with ascorbic acid reduced the overall cost of feed per kg gain as compared to control, maximum reduction in overall cost of feed per kg gain was obtained in T₇ (Basal feed + 0.25% Geloi + 0.025% ascorbic acid) *i.e.* 11.03% reduction.

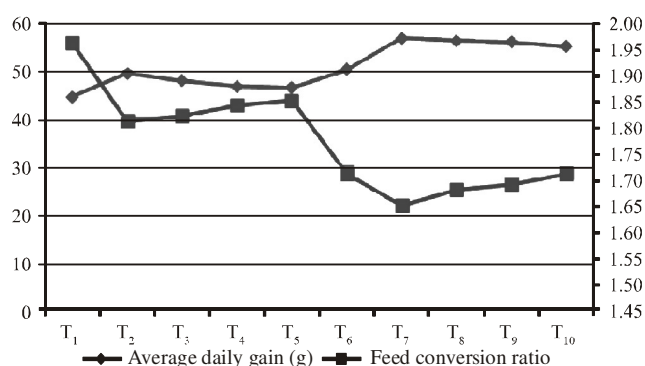


Fig. 2: Effect of Geloi and Ascorbic acid on average daily gain and feed conversion ratio of broiler chicks

Table 3. Percentage reduction in feed cost per unit weight gain in various treatment groups

Treatment groups	Total feed cost (₹)	Total gain (Kg)	Overall cost/kg gain in ₹	% Overall reduction in feed cost/kg gain
T ₁	103.39	1.86	55.54	
T ₂	102.82	2.07	49.72	10.48
T ₃	101.10	2.00	50.44	9.17
T ₄	100.15	1.95	51.24	7.74
T ₅	100.66	1.94	51.89	6.56
T ₆	106.94	2.10	50.87	8.39
T ₇	117.24	2.37	49.41	11.03
T ₈	119.31	2.35	50.72	8.67
T ₉	119.99	2.34	51.31	7.62
T ₁₀	120.13	2.30	52.23	5.95

CONCLUSIONS

Addition of *Tinospora cordifolia* (Geloi) stem powder either alone or in combination with ascorbic acid in broiler ration reduced the cost of feed per kg gain, the best response was obtained when basal diet was supplemented with 0.25% Geloi and 0.025% ascorbic acid. Thus, it would be beneficial to incorporate Geloi at 0.25% along with ascorbic acid at 0.025% in the diets of broilers reared under arid climatic condition.

REFERENCES

- Ali, M. T., Howlider, M. A. R., Azad, A. K. and Rahman, M. S. 2010. Vitamin C and electrolyte supplementation to support growth and meat yield of broilers in a hot humid environment. *J. Bangla. Agri. Uni.* 8: 57-60.
- Biswas, P., Sharma, R. K. and Biswas, A. 2012. Effect of dietary supplementation of Ashwagandha (*Withaniasomnifera*) and ascorbic acid on production performance of broiler birds. *Indian J. Poult. Sci.* 47: 403-405.
- Bouraoui, R., Lahmar, M., Majdoub, A., Djemali, M. N. and Belyea, R. 2002. The relationship of temperature-humidity index with milk production of dairy cows in a Mediterranean climate. *Anim. Res.* 51: 479-491.
- Donkoh, A. 1989. Ambient temperature: A factor affecting performance and physiological response of broiler chicken. *Int. J. Biometeorol.* 33: 259-265.
- Holik, V. 2009. Management of laying hens to minimize heat stress. *Lohmann Inf.* 44: 16-29.
- Karaman, S., Tarhan, S. and Ergunes, G. 2007. Analysis of indoor climatic data to assess the heat stress for laying hens. *Int. J. Nat. Eng. Sci.* 1: 65-68.
- Khan, R. U., Durrani, F. R., Chand, N. and Anwar, H. 2010. Influence of feed supplementation with *Cannabis sativa* on quality of broilers carcass. *Pak. Vet. J.* 30: 34-38.
- Khobragade 2003. Effect of feed supplementation of medicinal plants *Tinospora cordifolia* and *Leptadenia reticulata* on performance of broiler. M.V.Sc. Dissertation. Maharashtra Animal and Fishery Sciences University, Nagpur, India.
- Kramer, C. Y. 1956. Extension of multiple range tests to group means with unequal numbers of replications. *Biometrics.* 12: 307-310.
- Kulkarni, R. C., 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 J. Poult. Sci.* 46: 70-74.
- Lin, H., Jiao, H. C., Buyse, J. and Decuyper, E. 2006. Strategies for preventing heat stress in poultry. *World's Poult. Sci. J.* 62: 71-86.
- Raina, M. T. N., Arora, M. and Madan, S. 2013. Standardization and evaluation of formulation parameters of *Tinospora cordifolia* tablet. *J. Adv. Pharm. Edu. Res.* 3: 440-449.
- Sharma, P., Velu, V., Indrani, D. and Singh, R. P. 2013. Effect of dried guduchi (*Tinospora cordifolia*) leaf powder on rheological, organoleptic and nutritional characteristics of cookies. *Food Res. Int.* 50: 704-709.
- Snedecor, G.W. and Cochran, W.G. 2004. *Statistical Methods.* 8th ed., Oxford and IBH publishing company, Kolkata.
- Zahraa, H. 2008. Effects of commutative heat stress on immune responses in broiler chickens reared in closed system. *Int. J. Poult. Sci.* 7: 964-968.

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