DR-2116
[1-5]

RESEARCH ARTICLE Asian Journal of Dairy and Food Research

Effect of Dietary Supplementation of Tejpatta (*Cinnamomum tamala*) Leaf Powder as Feed Additive on Growth Performance and Haemato-biochemical Parameters of Broilers

S. Chaudhary[1], K.A. Shende[1], Mamta Kumari[2], M.S. Meel[1], M. Joshi[1], H. Waiz[3]

10.18805/ajdfr.DR-2116

ABSTRACT

Background: Tejpatta leaves are well known for their use as spice in food for taste and aromatic purposes. It is mainly used for flavoring food and widely used in pharmaceutical preparation because of its hypoglycemic, stimulant, carminative, antidiabetic, antibacterial, antioxidant, anti-ulcer and antimicrobial properties. Keeping the aforementioned properties in view, the present study was to evaluate the effect of dietary supplementation of Tejpatta leaf powder on growth performance and haemato-biochemical parameters of broilers for boosting poultry industry production.

Methods: Two hundred and twenty five day-old chicks were randomly assigned into five dietary treatment groups (T_1-T_5) using CRD, each consisting of 45 chicks with roughly equal average body weights. Each group of 45 chicks was subdivided into three replicates (R_1, R_2 and R_3) having 15 chicks per replicate. The T_1 group fed basal diet only, while T_2, T_3, T_4 and T5 groups were fed Tejpatta leaf powder @ 0.25%, 0.75%, 1.25% and 1.75%, respectively, along with basal diet.

Result: Significant (P<0.01) effect on growth characteristics was noticed in broiler chicks due to dietary supplementation of Tejpatta leaf powder. Significantly (P<0.01) higher body weight, weekly body weight gain, average daily body weight gain and performance index was noticed in T_4 group and lowest was observed in T_1 group. Significantly (P<0.01) higher feed intake was observed in T_5 group and lowest was in T_1 group. Lowest feed conversion ratio was observed in T_4 group and highest in T_1 group. Non-significant effect on hemoglobin, packed cell volume, red blood corpuscle count, serum glucose, total protein and cholesterol and creatinine levels was observed in various treatment groups. It was concluded that supplementing broiler diet with Tejpatta leaf powder @ 1.25% could be beneficial for improving broiler chick growth performance and hemato-biochemical parameters while having no adverse effects on broiler chicks.

Key words: Broiler, Growth parameters, Haemato-biochemical, Tejpatta leaf powder

INTRODUCTION

Among various sectors of agriculture and its allied components, poultry farming is one of the rapidly growing sectors in terms of production as well as providing job opportunities. Poultry meat, in particularly in developing countries like India, plays an important role as it serves as a source of high quality protein along with the minerals and vitamins availability. In India, in comparison to 2012, poultry population had raised by 16.8% in 2019, with aggregated population of 851.81 million as per 20th Livestock Census conducted in 2019 by Department of Animal Husbandry and Dairying, Government of India (Annual Report, 2019-20). India ranks at 6th position in total poultry meat production and at 5th position in terms of total poultry production. Numerous efforts have been applied to bridge the gap between demand and availability of consumer satisfying poultry meat. After considerable genetic exploitation of poultry, optimum nutrient utilization is the major segment for broiler production. Feed additives can be considered as an important factor to boost the economy of poultry producers.

Numerous studies revealed the close association between the use of sub therapeutic doses of antibiotics and development of antimicrobial resistance. The European Union issued a ban on the approval for antibiotics as growth promoters since 1 January, 2006 on precautionary grounds (Dibner and Richards, 2005; Castanon, 2007). So, the phytogenic feed additives have

[1]Department of Animal Nutrition, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences, Navania, Udaipur-313 601, Rajasthan, India.
[2]Department of Veterinary Pathology, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences, Navania, Udaipur-313 601, Rajasthan, India.
[3]Department of Livestock Production and Management, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences, Navania, Udaipur-313 601, Rajasthan, India.

Corresponding Author: K.A. Shende, Department of Animal Nutrition, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences, Navania, Udaipur-313 601, Rajasthan, India. Email: dr.kavitashende@gmail.com

How to cite this article: Chaudhary, S., Shende, K.A., Kumari, M., Meel, M.S., Joshi, M. and Waiz, H. (2024). Effect of Dietary Supplementation of Tejpatta (*Cinnamomum tamala*) Leaf Powder as Feed Additive on Growth Performance and Haemato-biochemical Parameters of Broilers. Asian Journal of Dairy and Food Research. DOI: 10.18805/ajdfr.DR-2116.

Submitted: 11-5-2023 **Accepted:** 29-3-2024 **Online:** 24-06-2024

been recognized as a very promising alternative as they meet the requirements of consumers in terms of food safety and solve the problem of bacterial resistance that occurs due to the use of antibiotic growth promoters (Cardoso *et al.,* 2012).

Tejpatta *(Cinnamomum tamala)* referred as Indian Bay Leaf, is a member of Lauraceae family and a close relative of cinnamon. It is mainly used for flavoring food and widely used in pharmaceutical preparation because of its hypoglycemic, stimulant, carminative, antidiabetic, antibacterial, antioxidant, anti-ulcer and antimicrobial properties (Pravin *et al*., 2013). Alpha-pinene, camphene, myrcene, limonene, eugenol, p-cymene, methyl eugenol, eugenol acetate and methyl ether of eugenol are the major chemical components found in the leaves of Tejpatta (Smith *et al*., 2002; Saino *et al*., 2003). In concern to mentioned peculiarities, a feeding experiment trial was conducted to evaluate the potential effect of Tejpatta as feed additive in broiler diet.

MATERIALS AND METHODS

Experimental birds and besign

The study was conducted on two hundred and twenty five day-old (225), unsexed, apparently healthy broiler chicks (Vencobb-400) in year 2022 for six weeks, at Poultry Unit in Livestock Farm Complex of College of Veterinary and Animal Science, Navania, Vallabhnagar, Udaipur (Rajasthan). The chicks were individually weighed and randomly divided using completely randomized block design into five dietary treatment groups (T_1-T_5) of 45 chicks each having relatively equivalent average body weight. Each group of 45 chicks was subdivided into three replicates (R_1, R_2 and R_3) having 1_5 chicks per replicate. The ISO certified (BIS, 2007) commercial basal feed in the form of broiler starter and broiler finisher was used in the experiment. Tejpatta leaf powder was obtained in dried form and ground to pass through 1mm sieve in Department of Animal Nutrition and stored in air tight plastic containers for further use. The proximate composition of broiler starter, broiler finisher and Tejpatta leaf powder (*Cinnamomum tamala*) are showed in Table 1.

The treatment groups were as follows: T_1 group fed basal diet (control), T_2, T_3, T_4 and T_5 group fed Tejpatta leaf powder @ 0.25%, 0.75%, 1.25% and 1.75%, respectively, along with basal diet. Feed and clean water were supplied *ad libitum*. Live body weight on individual basis and feed intake from each replicate were measured at weekly intervals. From the observations, body weight gain, average daily gain, feed conversion ratio and performance index were calculated.

Blood sample collection

At 42nd day of experimental trial, blood samples were collected by puncturing wing vein of the brachial area, from randomly selected birds in each replicate of treatment groups (six birds/treatment group), in two set of tubes *viz.* labeled sterile tubes containing EDTA for hematology and another tubes without anticoagulant for serology. EDTA containing tubes were analyzed for hemoglobin, red blood corpuscle count and packed cell volume with the help of an automatic hematology analyzer. Serum total protein, creatinine, cholesterol and glucose were analyzed by using commercially available kits as per mentioned protocols.

Statistical analysis

The data obtained were analyzed by subjecting them to ANOVA as per Snedecor and Cochran (1994). Mean difference was tested by Duncan's new multiple range test (DNMRT) as modified by Kramer (1956), in results having significant treatment effects. The level of statistical significance was kept at P<0.01.

RESULTS AND DISCUSSION

Growth performance

The effect of adding Tejpatta leaf powder in broiler chicks on growth performance are presented in Table 2. Significant (P<0.01) effect was observed on growth performance of broiler. The highest (P<0.01) live body weight, body weight gain, daily weight gain, performance index were observed in T_4 group. The feed conversion ratio was significantly (P<0.01) high in T_4 group. However, feed intake was significantly (P<0.01) high in T_5 group.

The aforementioned data demonstrate an improvement in growth performance that is highly significant (P<0.01) as a result of the addition of Tejpatta (*Cinnamomum tamala*) leaf powder, which is in line with the findings of Ansari *et al*. (2020), who observed a significant (P<0.05) increase in body weight, body weight gain and performance index as a result of the supplementation of Tejpatta (*Cinnamomum tamala*) leaf

Table 1: Proximate composition of broiler starter, finisher ration and tejpatta leaf powder.

Proximate principle	Starter	Finisher	Tejpatta leaf powder *(Cinnamomum tamala)*
Dry matter (%)	91.18	92.35	94.30
Crude protein (%)	22.16	20.36	09.16
Ether extract (%)	04.57	05.17	04.37
Crude fibre (%)	04.52	04.80	22.46
Total ash (%)	08.57	08.23	07.69
Nitrogen free extract (%)	51.36	53.79	50.62

powder. Moreover, Gurjar (2021) reported a highly significant (P<0.01) effect on body weight, body weight gain, daily weight gain of broilers with supplementation of Tejpatta leaf powder as compared to control group. Gurjar (2021), reported significant (P<0.05) effect on feed consumption and performance index due to supplementation of Tejpatta leaf powder. However, Ansari *et al.* (2020) found that supplementing broiler ration with Tejpatta powder had no influence on feed consumption (P>0.05) and feed conversion ratio.

The improvement in broiler live body weight may be due to Tejpatta's hypoglycemic, stimulant and carminative, antidiabetic, antibacterial, antioxidant, anti-ulcer and antibacterial, as well as antimicrobial properties related to Tejpatta derivatives. The major chemical components found in the leaves of Tejpatta are alpha-pinene, camphene, myrcene, limonene, eugenol, p-cymene, methyl eugenol, eugenol acetate and methyl ether of eugenol (Smith *et al*., 2002; Saino *et al*., 2003) this resulted in the modulation of normal intestinal microflora via competitive exclusion and antagonism, which improved nutrient digestibility in growing broilers. The anti-bacterial properties of Tejpatta leaf resulted in better absorption of nutrients present in the gut, which ultimately leads to improved body weight (Pravin *et al*., 2013).

The significant increase in body weight gain observed in the treatment group could be attributed to an increase in villus height observed in the current study, which could lead to an increase in nutrient absorption. Cinnamon essential oil contains antioxidants that protect the intestinal villi from oxidative damage by increasing the activity of catalase and superoxide enzymes, resulting in improved nutrient absorption and weight gain in broiler chicks (Windisch *et al*., 2008).

The increase in feed consumption observed in this study with supplementation of Tejpatta leaf powder could be attributed to the flavour effect of herbs, as well as evidence that herbs, spices and various plant extracts have appetite and digestive stimulating properties (Kamel, 2001). A group of bioactive compounds that have the potential to stimulate digestive secretion, increase pancreatic digestive enzyme activity and improve liver function (Al-Kassie, 2009).

Table 2: Effect of tejpatta leaf powder on growth performance traits of broiler chicks.

Parameters/ groups	T_1	T_2	T_3	T_4	T_5	SEM
Initial body weight	39.62 (n=45)	39.93 (n=45)	39.67 (n=45)	39.58 (n=45)	40.16 (n=45)	0.17
Final body weight	1988.10^{a} (n=45)	2282.04^{b} (n=45)	2434.24^{d} (n=45)	2473.02^{d} (n=45)	2358.38^{c} (n=45)	22.33
Body weight Gain	1948.31^{a} (n=45)	2242.11^{b} (n=45)	2394.58^{d} (n=45)	2433.44^{d} (n=45)	2318.22^{c} (n=45)	22.09
Average daily Gain	46.39^{a} (n=45)	53.38^{b} (n=45)	57.01^{d} (n=45)	57.94^{d} (n=45)	55.20^{c} (n=45)	0.48
Feed intake	3721.78^{a} (n=45)	3812.22^{b} (n=45)	3976.00^{cd} (n=45)	3923.11^{c} (n=45)	4007.56^{d} (n=45)	29.40
Feed conversion ratio	1.91^{d} (n=45)	1.70^{bc} (n=45)	$1.66a^{b}$ (n=45)	1.61^{a} (n=45)	1.73^{c} (n=45)	0.02
Performance index	1020.33^{a} (n=45)	1318.83^{b} (n=45)	1442.19^{c} (n=45)	1509.66^{d} (n=45)	1341.11^{b} (n=45)	17.39

a, b, c, d- means superscripted with different letters within a row differ significantly from each other (P<0.01).

Table 3: Effect of tejpatta leaf powder on haemato-biochemical parameters of broiler chicks (n=6).

	Haemato-biochemical parameters						
Treatment groups	Hb^{NS} (gm%)	PCV^{NS} (%)	RBC^{NS} (million/mm cube)	$Glucose^{NS}$ (mg/dl)	Serum $protein^{NS}$ (g/dl)	$Cholesterol^{NS}$ (mg/dl)	$Creatinine^{NS}$ (mg/dl)
T_1	9.25	29.65	2.61	218.07	2.40	126.82	0.40
T_2	9.27	29.69	2.66	217.74	2.48	124.91	0.38
T_3	9.25	29.69	2.62	217.75	2.47	124.31	0.39
T_4	9.33	29.74	2.70	216.93	2.52	122.14	0.38
T_5	9.32	29.71	2.62	217.91	2.43	125.38	0.39
SEM	0.03	0.06	0.03	0.70	0.01	0.71	0.005

NS- Not significant (P>0.01).

The improved feed conversion ratio may be attributed to the antibacterial activity of Tejpatta leaf powder in broiler diets, which inhibits the growth of harmful bacteria such as *E. coli* in the intestinal tract, allowing the birds to absorb more nutrients (Hernandez *et al*., 2004; Dickens *et al*., 2000 and Agarwal *et al*., 2012). Furthermore, the beneficial antioxidant compounds of medicinal plants may have a positive effect on nutrient uptake in terms of intestinal villi protection.

Hemato-biochemical parameters

The effect of adding Tejpatta leaf powder in broiler chicks on haemato-biochemical parameter are presented in Table 3. There was statistically non-significant effect on haemato-biochemical parameters due to Tejpatta leaf powder supplementation. Numerically highest hemoglobin level, packed cell volume and red blood corpuscle count and serum total protein were observed in T_4 group. Similarly lowest serum glucose and cholesterol values were found in T_4 group. Minimum serum creatinine level was observed in T_4 and T_2 groups.

These results were in accordance to the findings of Ansari *et al.* (2020) who reported non-significant effect on hemoglobin, packed cell volume, serum glucose, total protein and red blood corpuscle count due to addition of Tejpatta leaf powder in broilers. These data well correspond with the results of Koochaksaraie *et al.* (2011) who showed non-significant effect on serum cholesterol levels due to cinnamon addition in broilers. Our findings were in agreement with the results of Baghban *et al.* (2016) and Odutayo *et al.* (2021) with regard to creatinine levels.

CONCLUSION

In relation to the performance of broilers in terms of growth and nutrient utilization, it could be concluded that supplementation of 1.25% Tejpatta leaf powder is quite effective and could be potential feed supplement in broiler production. However, the results are definite and supportive but replication of feeding experiments with more number of broilers recommended before arriving to the final suggestion for supplementing broiler diet with the Tejpatta leaf powder as feed additive for well-being of poultry production.

Conflict of interest

There is no conflict of interest.

REFERENCES

Agarwal, R., Pant, A.K. and Prakash, O. (2012). Chemical composition and biological activities of essential oils of *Cinnamomum tamala*, *Cinnamomum zeylenicum* and *Cinnamomum camphora* growing in Uttarakhand. Chemistry of Phytopotentials: Health, Energy and Environmental Perspectives. 87-92.

Al-Kassie, G.A. (2009). Influence of two plant extracts derived from thyme and cinnamon on broiler performance. Pakistan Veterinary Journal. 29(4): 169-173.

Annual Report (2019-20). 20th Livestock Census Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi.

Ansari, M.O., Lata, M. and Mondal, B.C. (2020). Effect of dietary incorporation of Sahjan (*Moringa olifera*) and Tejpatta (*Cinnamomum tamala*) leaf powder on growth performance, nutrient utilization and carcass traits in commercial broiler chickens. Journal of Entomology and Zoology Studies. 8(6): 2090-2094.

Baghban K.P., Daneshyar, M. and Najafi, R. (2016). Effects of Cinnamon (*Cinnamomum zeylanicum)* and Turmeric (*Curcumaý* longa) powder on performance, enzyme activity and blood parameters of broiler chickens under heat stress. Poultry Science Journal. 4(1): 47-53.

BIS (2007). Poultry Feed Specification: IS: 1374 (5th revision). Bureau of Indian Standards, Manak Bhavan, 9 Bhadur Shah Zafar Marg, New Delhi-110002, India.

Cardoso, V.D.S., Lima, C.A.R.D., Lima, M.E.F.D., Dorneles, L.E.G. and Danelli, M.D.G.M. (2012). Piperine as a phytogenic additive in broiler diets. Pesquisa Agropecuária Brasileira. 47(4): 489-496.

Castanon, J.I.R. (2007). History of the use of antibiotic as growth promoters in European poultry feeds. Poultry Science. 86(11): 2466-2471.

Dibner, J.J. and Richards, J.D. (2005). Antibiotic growth promoters in agriculture: history and mode of action. Poultry Science. 84(4): 634-643.

Dickens, J.A., Berrang, M.E. and Cox, N.A. (2000). Efficacy of an herbal extract on the microbiological quality of broiler carcasses during a simulated chill. Poultry Science. 79(8): 1200-1203.

Gurjar M. (2021). Effect of Mint powder (*Mentha spicata*) and Indian bay leaf powder (*Cinnamomum tamala*) as herbal feed additives on performance of broiler chicks. M.V.Sc. Thesis RAJUVAS, Bikaner, Rajasthan, India.

Hernandez, F., Madrid, J., Garcia, V., Orengo, J. and Megias, M.D. (2004). Influence of two plant extracts on broilers performance, digestibility and digestive organ size. Poultry Science. 83(2): 169-174.

Kamel, C. (2001). Tracing modes of action and the roles of plant extracts in non-ruminants. Recent Advances in Animal Nutrition. 135-150.

Koochaksaraie, R.R., Irani, M. and Gharavysi, S. (2011). The effects of cinnamon powder feeding on some blood metabolites in broiler chicks. Brazilian Journal of Poultry Science. 13(3): 197-202.

Kramer, C.Y. (1956). Extension of multiple range tests to group means with unequal numbers of replications. Biometrics. 12: 307-310.

Odutayo, O.J., Adeyemo, A.A., Ibigbami, D.J., Sogunle, O.M., Olaifa, R.O., Akinwale, O.A., Orebiyi, V.A., Ojebisi, V.A. and Joel, A.O. (2021). Influence of cinnamon (*Cinnamomum cassia*) powder as additive on jejenal histomophometry, growth performance, haemato-biochemical indices, carcass traits and breast meat lipid profile of broiler chickens. Nigerian Journal of Animal Production. 48(6): 167-184.

Pravin, B., Krishnkant, L., Shreyas, J., Ajay, K. and Priyanka, G. (2013). Recent pharmacological review on *Cinnamomum tamala*. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 4(4): 916-921.

Saino, F., Ghizzoni, C., Gionfriddo, F., Colombo, E., Servillo, L. and Castaldo, D. (2003). Determination of estragole, safrole and eugenol methyl ether in food products. Food Chemistry. 81(3): 469-475.

Smith, R., Adams, T., Doull, J., Feron, V., Goodman, J. and Marnett, L. (2002). Safety assessment of allylalkoxybenzene derivatives used in flavoring substances-methyl eugenol and estragole. Food and Chemical Toxicology. 40(7): 851-870.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods 8th Edn. Oxford and IBH Publishing Company, New Delhi, India.

Windisch, W., Schedle, K., Plitzner, C. and Kroismayr, A. (2008). Use of phytogenic products as feed additives for swine and poultry. Journal of Animal Science. 86(14): 140-148.