



DIETARY EFFECTS OF TULSI LEAVES AND BLACK PEPPER EXTRACT ON BROILER GROWTH PERFORMANCE AND CARCASS TRAITS

*M. Kamruzzaman¹, U. Jahan¹, M. A. Haque², F. Afroz² and A. Habib³

[Citation: Kamruzzaman, M., Jahan, U., Haque, M. A. Afroz, F. and Habib, A. (2024). Dietary Effects of Tulsi Leaves and Black Pepper Extract on Broiler Growth Performance and Carcass Traits. *Int. J. Bus. Soc. Sci. Res.* 12(1): 50–54. Retrieve from <http://www.ijbssr.com/10.55706/ijbssr12110>]

Received Date: 28/09/2023

Acceptance Date: 25/04/2024

Published Date: 26/04/2024

Abstract

This study was conducted to determine the efficacy of the dietary effect of different levels of Tulsi leaves (*Ocimum sanctum*) and Black Pepper (*Piper nigrum*) Extract (TBE) on growth performance and carcass traits of commercial broiler. The study was conducted at the Poultry farm of Hajee Mohammad Danesh Science and Technology University, Dinajpur during the period from 11 April to 08 May, 2019. A total of 96 day old broiler chicks (Lohman Meat) were randomly and equally distributed to 4 groups having 3 replicates of 8 birds each. The birds were grouped as T₀, T₁, T₂ and T₃ group with normal water (control group), 1% TBE 1ml /L of drinking water, 2% TBE 2 ml/L of drinking water and 3% TBE 3ml /L of drinking water, respectively. Body weight gains, Feed Conversion Ratio (FCR), mortality (%) and meat yield traits were recorded. The collected data were analyzed by using ANOVA with SPSS version 22. Feed intake (g/bird) was almost similar ($P>0.05$) among the dietary treatment groups. Body weight gain (g) and FCR were significantly ($P<0.05$) differed among the dietary treatment groups. The highest body weight gain (g) was significantly ($P<0.05$) higher in T₂ (1659.35g±2.19), followed by T₁ (1631.05g±2.52), T₃ (1590.67g±2.73) and T₀ (1472.01g±4.58), respectively. The lowest FCR was found in T₂ (1.41±0.00) and the highest FCR in T₀ (1.52±0.01), the intermediate in T₁ (1.45±0.01) and T₃ (1.46±0.01), respectively. It was found that there was significant ($P<0.05$) difference among the dietary treatment groups in case of live weight (g), carcass weight (g), dressing percentage (%), breast weight (g), liver weight (g), but there was almost similar ($P>0.05$) among the dietary treatment groups in case of heart weight (g), spleen weight (g), gizzard weight (g), thigh weight (%), head weight (g), intestine weight (g) and shank weight (g). The carcass meat weight, Carcass yield (%), breast weight and breast meat weight (%) was significantly ($P<0.05$) higher in treatment T₂ group compared to control group T₀. Liver weight was significantly ($P<0.05$) higher in control group T₀ compared to treatment group T₂. No mortality was found among the dietary treatment groups during experimental period. Based on the result it could be concluded that 2% Tulsi leaves and Black Pepper Extract (TBE) 2 ml/L of drinking water may be used in broiler diet as growth promoter and it may also serve as an antioxidant.

Key words: Tulsi leaves, Black Pepper, Broiler performance, Meat yield, Survivability.

Introduction

The poultry industry has become an important economic activity in many countries including Bangladesh. Poultry sector is an integral part of farming systems and has become an unparalleled platform for a quick profit, the generation of local employment, and the production of cheaper animal proteins. In Bangladesh, livestock contributes 1.47 percent to the country's GDP (2018-2019). Poultry production system has triggered the discovery and widespread use of a number of "Feed additives". The main objective of adding feed additives are increasing their growth rate, better-feed conversion efficiency, greater livability and lowered mortality in poultry birds. These feed additives are termed as "growth promoters" and often called as non-nutritive feed additives (Singh *et al.*, 1992). The growth promoters have given positive responses in respect to growth improve feed efficiency and survivalist of broilers (Dash *et al.*, 2001). Constant use of antibiotic growth promoters (AGPs) at sub therapeutic level can result in the development of drug resistant bacteria (Alexander *et al.*, 2008) which possess a serious threat to the life of human being. Poultry nutritionists have exerted great efforts to find natural products that could cause an improvement in growth, feed utilization, meat quality and immune system maintenance in turkeys, broilers and laying hens (Raheema, *et al.*, 2016; Orayaga *et al.*, 2016).

The genus *Ocimum*, typically contain fragrant herbs and small herbs. Several medicinal properties have been attributed to *Ocimum sanctum* L. Different parts of Tulsi plant e.g. leaves, flowers, stem, root, seeds etc. are known to possess therapeutic potentials and have been used, by traditional medical practitioners, as expectorant, analgesic, anticancer, antiasthmatic, antiemetic, diaphoretic, antidiabetic, antifertility, hepatoprotective, hypotensive, hypolipidemic and antistress agents. Its leaves contain a bright yellow volatile oil. The oil contain

*Corresponding Author Email: mitoodvm@yahoo.com

1 Dept. of Dairy and Poultry Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

2 Dept. of Microbiology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

3 Dept. of Animal Science and Nutrition, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

Copyright © IJBSSR, Hello-Teen Society, Bangladesh and Authors,

This work is Copyright as [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

eugenol, eugenal, methyl chavicol, limatrol and Caryophylline and a number of sesquiterpenes and monoterpenes viz., barnyl acetate, B-elemense, methylenegenol, neral, B-pinene, comphene, A-pinene etc (Jansen *et al.*, 1989). Tulsi has also been used in treatment of fever, bronchitis, arthritis and convulsions (Gupta *et al.*, 2002). Black pepper (*Piper nigrum*) is known as “king of spices” due to its pungent quality (Hassan *et al.*, 2007). Black pepper is a flowering vine in the family *Piperaceae*, genus piper and species *Piper nigrum*. Black pepper improves digestibility of feed (Moorthy *et al.*, 2009). Active compounds of pepper consists cupsaesin, cupsisin and cupsantine some of them allay rheumatic aches. Piperine is one of compound of black pepper which has antiache effect. In addition the bioactive molecule, piperine, present in pepper has major pharmacological impact on the nervous and neuromuscular system which can help in digestion of feed (Safa *et al.*, 2014). Pepper has antioxidant properties and anti-carcinogenic effect, especially when compared to Chilli (Nalini *et al.*, 2006). In modern animal feed formulation many Antimicrobial Growth Promoters (AGP) is being used. But due to the prohibition of most of AGP, plant extracts have gained interest in animal feed strategies (Charis *et al.*, 2000). Therefore, it is essential to determine the effect of different medicinal plant extracts (polyherbal) in broiler diets as a possible alternative to antibiotic feed additives. Considering the indiscriminate use of antibiotics, the present study was conducted with the following objectives-

- i. To investigate the effect of tulsi leaves and black pepper extract on the growth performance of broiler
- ii. To determine carcass traits by supplementation of tulsi leaves and black pepper extract

Materials and Methods

The experiment was conducted at the poultry farm of Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur, to investigate the effect of supplementation of different levels of tulsi leaves and black pepper extract on growth performance and meat yield traits of broilers (Lohman meat) during the period from 11 April to 09 May, 2019. A total of 96 day-old broiler chicks (Lohman meat) were purchased from Nizam Feed and Hatchery Limited, Sadar, Dinajpur, Bangladesh. A total of 96 day old broiler chicks (Lohman Meat) were randomly and equally distributed to 4 groups having 3 replicates of 8 birds each. The birds were grouped as T₀, T₁, T₂ and T₃ group with normal water (control group), 1% TBE 1ml /L of drinking water, 2% TBE 2 ml/L of drinking water and 3% TBE 3ml /L of drinking water, respectively. All birds were exposed to continuous lighting of 23 hours and one hour dark period per day throughout the experimental period. The house temperature was maintained at 34°C for the first week. In the course of the trial period the temperature was gradually reduced from 34°C to 32°C during first week, 32°C to 30°C in the second week, 32°C to 28°C in the third week and there after remain almost constant until the end of the trial. Similar care and management in all treatment groups throughout the experimental period was practiced. During experimental period, Initial body weight, final body weight, live weight gains, Feed Conversion Ratio (FCR), mortality (%), carcass weight and meat yield traits were recorded.

Statistical analysis

Data on different variables were subjected to analysis of variance (ANOVA) in a Complete Randomized Design (CRD) (Steel and Torrie, 1980). The significant differences between the treatment means were calculated from analysis of variance (ANOVA) table. All analyses were performed by using “IBM SPSS statistics 22”.

Table 1: Calculated composition of experimental diets

Nutrients	Amount (kg/100kg feed)	
	Starter (1-14 days)	Grower (15-28 days)
Crude protein (%)	22	21
Crude fiber (%)	3	3
Crude fat (%)	5	5-6
Lysine (%)	1.30	1.25
Methionine (%)	0.52	0.50
Calcium (%)	1	0.90
Phosphorus (%)	.50	.48
Moisture (%)	11	11
Metabolizable Energy, ME (k Cal/kg)	3000	3100

Results and discussion

Effect of Tulsi leaves and black pepper extract (TBE) on body weight gain

The effect of Tulsi leaves and Black Pepper Extract (TBE) on body weight gain of broiler is shown in table 2. The present study revealed that there was no significant ($P>0.05$) variation of initial body weight (g/broiler) among the treatment groups. The initial body weight (g/broiler) in T₀, T₁, T₂ and T₃ group was (40.01g±0.58), (40.32g±0.88), (41.00g±1.25) and (40.67g±1.20), respectively. At 7 days of age, the body weight was almost similar in different dietary treatment groups. The body weight was significantly ($P<0.05$) varied among the treatment groups during 14th, 21th, 28th days of age. The highest body weight was found in T₂ (1699.67g±1.21) followed by T₁ (1671.35g±2.41), T₃ (1631.35g±1.86) and T₀ (1512.01g±4.73), respectively. Birds on dietary group T₀ showed the lowest ($P<0.05$) weight gain and dietary group T₂ showed the highest ($P<0.05$) weight gain among d 2% Tulsi leaves and Black Pepper Extract (TBE) 2ml /L of drinking water was done. The results of the present study are in line with the findings of Ahmad *et al.*, (2012), who reported that dietary inclusion of polyherbal in the rations was more beneficial in broiler production. Similar results have also been reported by

Ihsan *et al.*, (2003), who reported that broilers fed on rations with added turmeric, fetched more profit than those using rations without supplementation of this herbal growth promoter

Effect of Tulsi leaves and black pepper extract on feed conversion ratio

The Feed Conversion Ratio (FCR) of the experimental birds is shown in table 3. The lowest FCR was in dietary treatment group T₂ (1.41±0.01) and highest in dietary group T₀ (1.52±0.01) at 28th day (4 weeks) of age. From the table it is found that 1% TBE 2ml/L of drinking water treated group (T₂) showed better FCR and control diet treated group (T₀) showed higher FCR but administration of 1% TBE 1ml/L drinking water treated group T₁ (1.45±0.01) showed better FCR than 3% TBE 3ml/L drinking water treatment T₃ (1.46±0.01). Administration of 2% TBE 2ml/L of drinking water treated group (T₂) showed best FCR as compared to control group. The results are in well agreement with the study of Mazhar-Ilahi *et al.*, (2007) reported increase in feed efficiency in Tulsi fed groups, which is in agreement with the findings of the present study. Mollah *et al.*, (2012) reported significant increase in the live weight of broilers compared with control group. The present findings were supported by similar results of black pepper supplementations as reported by various authors (Moorthy *et al.*, 2009; Mohammed *et al.*, 2014).

Effect of Tulsi leaves and black pepper extract on meat yield traits

Carcass weight

The effect of Tulsi leaves and Black Pepper Extract on carcass weight shown in table 4. It shows that live weight (g), carcass weight (g), dressing percentage, breast weight, breast weight percentage were significantly (P<0.05) differed among the dietary treatment groups. The highest live weight found in treatment group T₂ was (1699.67g±1.20) followed by T₁ (1671.34g±2.40), T₃ (11628.58g±1.86) and T₀ (1512.01g±4.73), respectively which are significantly (P<0.05) varied. T₂ (1128.05g±8.14) group had significantly (P<0.05) higher carcass weight compared to T₀ (932.67 ±6.36) whereas T₁ and T₃ had (1051.03 ±6.67) and (1042.35g±7.54). Dressing percentage also highest found in treatment group T₂ was (66.36 ±0.45) % followed by T₁ (62.88±0.34), T₃ (66.36±0.45) and T₀ (61.68±0.29), respectively which are significantly (P<0.05) varied.

Breast meat weight

Breast meat weight differed significantly (P<0.05) among the dietary treatment groups shown in table 4. The highest breast meat weight in T₂ was (512.68g±2.34) and lowest in T₀ was (412.67g±2.19) whereas T₁ (479.67g ±4.61) and T₃ (475.03g ±3.06) respectively. Breast meat weight % also differed significantly (P<0.05) among the dietary treatment groups shown in table 4.4. The highest breast meat weight % in T₂ was (30.17±0.112) and lowest in T₀ was (27.02±0.14) whereas T₁ (28.71±0.25) and T₃ (29.12 ±0.15) respectively.

Thigh meat weight

Thigh meat weight had non-significant (P>0.05) among the dietary treatment group shown in table 4. The thigh meat weight% in all treated groups and control group are almost similar in control group T₀ was (19.46±0.14) whereas T₁ (19.28±0.12), T₂ was (19.55±0.13) and T₃ (19.43±0.16).

Inedible meat weight

It is observed from the Table 4 that shank weight (g), Head weight (g), gizzard weight (g), intestine weight (g), heart weight (g) and spleen weight (g) did not significantly (P>0.05) varied among different treatment groups. Liver weight differ significantly (P<0.05). The highest liver weight in T₀ (42.67g±1.20) and lowest in T₂ (38.01g±0.42) whereas T₁ and T₃ had (39.05 ±0.58) and (41.11g±0.58), respectively.

Table 2: Effect of Tulsi leaves and Black Pepper Extract (TBE) on body weight gain

Parameters	Supplementation of Tulsi leaves and Black Pepper Extract (TBE)				Level of Significance
	T ₀ (control)	T ₁ (1% TEB)	T ₂ (2% TEB)	T ₃ (3% TEB)	
Initial body weight(g)	40.01±0.58	40.35±0.88	40.32±1.45	40.67±1.21	NS
Body weight(g) at 7 th days	230.32±1.45	230.01±0.58	231.00±2.08	231.34±0.87	NS
Body weight(g) at 14 th days	443.32±20.82a	470.67±10.07b	502.67±11.01c	459.01±13.53b	*
Body weight(g) at 21 st days	970.01±20.82a	1094.34±5.36bc	1164.01±36.46c	1056.67±8.82b	*
Body weight(g) at 28 th days	1512.01±4.73a	1671.34±2.40c	1699.67±1.21d	1631.34±1.86b	*
Body weight gain (g) at (1-28) days	1472.01±4.58	1631.03±2.52	1659.35±2.19	1590.67±2.73	*
Mortality (%)	00.00	00.00	00.00	00.00	NS

Values are expressed as mean ± standard error of means. NS= Non significant (P>0.05). * Statistically significant (P<0.05). abcd means having different superscript in the same row differed significantly (P<0.05).



Table 3: Feed Conversion Ratio of different dietary treatment groups

Parameters	Supplementation of Tulsi leaves and Black Pepper Extract (TBE)				Level of significance
	T ₀ (control)	T ₁ (1% TEB)	T ₂ (2% TEB)	T ₃ (3% TEB)	
Weight gain (1 st -28 th) days	1472.01±4.58	1631.00±2.52	1659.34±2.19	1590.67±2.73	*
Feed intake (1 st -28 th) days	2230.67±12.73a	2354.01±9.71b	2332.67±1.34b	2328.01±5.29b	*
Feed Conversion Ratio (FCR)	1.52±01b	1.45±00a	1.41±01a	1.46±0.01a	*

Values are expressed as mean ± standard error of means. NS= Non significant ($P>0.05$). * Statistically significant ($P<0.05$). abcd means having different superscript in the same row differed significantly ($P<0.05$).

Table 4: Meat yield traits of different dietary treatment groups

Parameters	Supplementation of Tulsi leaves and Black Pepper Extract (TBE)				Level of Significance
	T ₀ (control)	T ₁ (1% TEB)	T ₂ (2% TEB)	T ₃ (3% TEB)	
Live weight (g)	1512.01±4.73a	1671.34±2.40b	1699.67±1.20c	1628.58±1.86b	*
Carcass weight(g)	932.67±6.36a	1051.03±6.67b	1128.05±8.14c	1042.35±7.54b	*
Dressing percentage (%)	61.68±0.29a	62.88±0.34ab	66.36±0.45c	63.89±0.49b	*
Breast Meat weight(g)	412.67±2.19a	479.67±4.61b	512.68±2.34c	475.03±3.06b	*
Breast Meat (%)	27.02±0.14a	28.71±0.25b	30.17±0.12c	29.12±0.15b	*
Thigh meat weight(g)	294.34±1.76	322.34±2.40	317.01±2.41	316.51±2.31	*
Thigh meat (%)	19.46±0.14	19.28±0.12	19.55±0.13	19.43±0.16	NS
Head weight(g)	39.26±0.54a	40.04±0.12a	45.03±0.79b	44.86±0.69b	NS
Shank weight(g)	49.50±0.76a	53.02±1.15b	56.01±0.58c	56.57±0.29c	NS
Gizzard weight(g)	41.02±0.58a	44.67±0.87b	47.03±0.34c	47.67±0.35c	NS
Liver weight(g)	42.67±1.20b	39.05±0.58a	38.01±0.42a	41.11±0.57b	*
Heart weight(g)	6.31±0.01a	6.84±0.03b	7.17±0.09c	6.69±0.10b	NS
Spleen weight(g)	2.29±0.10a	2.72±0.02b	2.99±0.05c	2.65±0.03b	NS
Intestine weight(g)	119.34±1.20	153.01±33.35	120.67±0.87	119.67±0.89	NS

Values are expressed as mean ± standard error of means. NS= Non significant ($P>0.05$). * Statistically significant ($P<0.05$). abcd means having different superscript in the same row differed significantly ($P<0.05$).

Conclusions

The present study revealed that the supplementation of 2% Tulsi and Black Pepper Extract 2ml /L of drinking water had positive significant effect on live weight gain, dressing percentage, carcass yield and Feed Conversion Ratio (FCR) with no detrimental effect. Therefore, 2% Tulsi and Black Pepper Extract @2ml may be used in broiler diet as growth promoter as well as antioxidant.

References

- Ahmad N., Fazal H., Abbasi B. H., Farooq S., Ali M., Khan M. A. (2012). Biological role of *Piper nigrum* L. (Black pepper): A review. *Asian Pac J Trop Biomed.* 2(3):1945–1953.
- Alexander, T. W., Olson, M. E., Read, R. R., Morck, D. W. and Mcallister, T. A. (2008). Effect of sub therapeutic administration of antibiotics on the prevalence of antibiotic resistant *Escherichia coli* bacteria in foot lot cattle. *Applied Env. Micro.* 74: 4406–4416.
- Charis, K., 2000. A novel look at a classical approach of plant extracts. *Feed Mix* (special issue on Nutraceuticals), 19–21.
- Dash, M. and Panda, S. K. (2001). Salt stress induced changes in growth and enzyme activities in germinating phaseolus mungo seeds. *Biol Plantarum.* 44: 587–589.
- Gupta, S. K., Prakash J. and Srivastava S. (2002). Validation of traditional claim of Tulsi, *Ocimum sanctum* Linn. as a medicinal plant. *Indian J Exp Biol.* 5:765–773.
- Hassan M. S. H., Abo T. A. M., Wakwak M. and Yousef B.A. (2007) Productive, physiological and immunological effects of using some natural feed additives in Japanese quail diets. *Egypt. Poul. Sci. J.* 27(11): 557–588.
- Ihsan K (2003). Effect of different levels of kalongi (*N. sativa*) seeds on the erformance of broiler M.Sc. (Hons.) Thesis, Department of Poultry Sciences, University of Agriculture, Faisalabad, Pakistan, Ingredient, Improves the Hepatic Increase in Free Fatty Acids Caused by 2,3,7,8-6 Tetrachlorodibenzo-p-dioxin. *J. Health Sci.* 545: 551–558.
- Janssen A. M., Scheffer J. J., Ntezurubanza L. and Baerheim Svendsen (1989). Antimicrobial activities of some *Ocimums* pecies grown in Rwanda. *J. Ethnopharmacol.* 26: 57–63.
- Mazhar I, Jangde C. R, Arun H., Waghmare S. P., Ajit H. (2007). Some pharmacological and phytochemical investigations on aqueous extract of *Ocimum sanctum* Linn. leaves. *Royal Vet. J. of. Ind.* 3(2):137–139
- Mohammad R.V., R. Yaser, M., Yasamin, A., Fatemeh and Ali R. (2014). Effect of ginger (*zingiber officinale*)

- and black pepper (*piper nigrum l.*) powder on performance, haematological parameters and antibody titre in broiler chicks. *roavs*. 4 (3): 128–132.
- Moorthy M., Ravi S. M., Ravikumar K., Vishwanathan and Edwin S.C. (2009). Ginger, pepper and curry leaf powder as feed additives in broiler diet. *Inter. J. of. poul. sci.* 8 (8): 779–782.
- Nalini, N., Manju Y. and Menon V. (2006). Effect of spices on lipid metabolism in 1, 2-dimethylhydrazine-induced rat colon carcinogenesis. *J. of Medicinal Food*. 9: 237–45.
- Orayaga K. T., Oluremi O. I. A., Adenkola A. Y. (2016). Effect of water soaking of sweet orange (*Citrus sinensis*) fruit peels on haematology, carcass yield and internal organs of finisher broiler chickens. *J. Anim. Health Prod.* 4(3): 65–71.
- Raheema RH (2016). Effect of pomegranate peel extract on some biochemical and histopathological parameters in experimental induced mice with *Staphylococcus aureus*. *J. Anim. Health Prod.* 4(2): 42–49.
- Safa M. A., El Tazi, Mukhtar A. M., Mohamed K.A. and Mohamed H.T. (2014). Effect of using black pepper as natural feed additive on performance and carcass quality of broiler chicks. *I.J.P. R. A.* 4 (2): 108–113.
- Singh K. S and Panda B (1992). Feed additives. In: *Poultry nutrition*. 2nd edn. Kalyani. Delhi, 134–143.

