



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2026; 11(1): 104-108

© 2026 VET

www.veterinarypaper.com

Received: 12-11-2025

Accepted: 21-10-2025

Devansh J. Solanki

M.V.Sc. Scholar, Department of
Veterinary Pharmacology and
Toxicology, College of Veterinary
Science and A. H., Kamdhenu
University, Anand, Gujarat, India

Kamlesh A Sadariya

Associate Professor & Head,
Department of Veterinary
Pharmacology and Toxicology,
College of Veterinary Science and
A. H., Kamdhenu University,
Junagadh, Gujarat, India

Aksh B Patel

M.V.Sc. Scholar, Department of
Veterinary Pharmacology and
Toxicology, College of Veterinary
Science and A. H., Kamdhenu
University, Anand, Gujarat, India

Tanaya M. Ponkshe

M.V.Sc. Scholar, Department of
Veterinary Pharmacology and
Toxicology, College of Veterinary
Science and A. H., Kamdhenu
University, Anand, Gujarat, India

Vaidehi N. Sarvaiya

Assistant Professor, Department of
Veterinary Pharmacology and
Toxicology, College of Veterinary
Science and A. H., Kamdhenu
University, Anand, Gujarat, India

Shailesh K. Bhavsar

Professor & Head, Department of
Pharmacology and Toxicology,
College of Veterinary Science and
A. H., Kamdhenu University,
Anand, Gujarat, India

Corresponding Author:

Kamlesh A Sadariya

Associate Professor & Head,
Department of Veterinary
Pharmacology and Toxicology,
College of Veterinary Science and
A. H., Kamdhenu University,
Junagadh, Gujarat, India

Growth promoting effects of clove powder and eugenol in broilers

**Devansh J Solanki, Kamlesh A Sadariya, Aksh B Patel, Tanaya M
Ponkshe, Vaidehi N Sarvaiya and Shailesh K Bhavsar**

DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i1b.2931>

Abstract

The present study was planned to evaluate the *in vivo* growth-promoting effects of clove powder and eugenol in broiler chickens. A total of 144 broiler chicks were randomly allocated to six experimental groups, each consisted of four replicates and each replicate consisted of six chicks. The experimental groups were (I) Basal diet, (II) Standard antibiotic avilamycin treated group, (III) clove powder @ 5 g/kg in feed, (IV) clove powder @ 10 g/kg in feed, (V) eugenol @ 150 mg/kg in feed and (VI) eugenol @ 300 mg/kg in feed. The study was conducted for 42 days. Various growth performance parameters like weekly body weight, body weight gain, feed consumption, feed conversion ratio and mortality were observed and at the end of experiment carcass traits were also assessed. Broilers supplemented with diet containing clove powder and eugenol showed significantly higher body weight and body weight gain as compared to control group and which was comparable to the standard antibiotic supplemented group. Feed conversion ratio (FCR) was significantly improved in clove powder and eugenol supplemented group as compared to control group. Dressing and giblet percentage showed no significant alteration in clove powder and eugenol supplemented birds as compared to control birds. Results revealed that the supplementation of broiler diet with clove powder or eugenol at given dosage significantly improved body weight gain and feed conversion ratio in broiler birds.

Keywords: Growth promoters, broilers, clove powder, eugenol, carcass traits

Introduction

The poultry industry plays a vital role in global food security by providing affordable and high quality animal protein through its meat and eggs ^[1]. In India, poultry production has rapidly evolved from a backyard sector to an organized commercial sector, contributing primarily to the national economy ^[2]. According to FAOSTAT 2024, egg production of poultry in India has increased at an annual rate of 8.9%, with per capita poultry meat consumption rising from 3.23 to 7.10 kg between 2020 and 2022.

For many years, low-dose antibiotics have been used as antibiotic growth promoters (AGPs) to improve feed efficiency, disease resistance and growth performance in poultry ^[3]. However, their extensive and indiscriminate use has accelerated the emergence of antimicrobial resistance (AMR), now a serious danger to public health and food safety ^[4]. It is estimated that by the year 2050, AMR related deaths may reach 10 million annually if preventive measures are not taken ^[5]. Consequently, there is a shift toward identifying natural, safe and viable alternatives to AGPs ^[6].

Phytogenic feed additives like herbs, spices, essential oils and plant extracts, have gained significant attention as promising alternatives to antibiotics in poultry nutrition ^[7]. These plant-derived compounds possess antimicrobial, antioxidant and immunomodulatory properties that can enhance feed utilization, gut health and overall performance ^[8].

Among various phytogenics, clove (*Syzygium aromaticum*), a spice from the Myrtaceae family, is known for its bioactive components like eugenol. Eugenol constitutes up to 95% of its essential oil ^[9]. Clove and eugenol exhibit potent antimicrobial, antioxidant, anti-inflammatory and digestive stimulant activities ^[10]. Several studies suggest that eugenol

improves digestive activity, nutrient absorption, promotes growth and feed efficiency in broilers^[11].

Therefore, the present study was designed to evaluate the growth promoting effects of clove powder and eugenol in broiler chickens to identify potential natural alternatives to antibiotic growth promoters for sustainable poultry production.

Materials and Methods

Experimental Birds, Feeding, Housing and Management

The experimental design was reviewed and approved by the Institutional Animal Ethics Committee of the College of Veterinary Science and Animal Husbandry, KU, Anand (India) and was undertaken as per the guidelines of the CCSEA, Government of India, New Delhi. The experiment was carried out at Poultry research station of the college at Anand. The experiment was conducted on day-old Ven-cobb broiler chicks from a single hatch. A deep litter system was used for the rearing of chicks with a well-ventilated brooder house using standard management and health care practices and monitored daily for any abnormal clinical signs and mortality if any. According to the age of the birds, all the birds received broiler feed according to the age of birds *i.e.*, 1-7 days (pre-starter), 8-21 days (starter) and 22-42 days (finisher) during the entire experimental period. Clove powder and eugenol at the different doses mixed with basal feed to make different treatment feeds. Throughout the experiment, all birds had *ad libitum* access to clean, fresh, cool drinking water to keep the bird stress free. The birds were protected against various diseases by vaccination.

Experimental Design

The experiment was conducted on 144, day-old ven-cobb broiler chicks. The chicks were randomly allocated to six experimental groups, each consisting of four replicates and each replicate consisting of six chicks. The chicks of group-I served as a control group and was given basal diet without administration of any treatments. Chicks of group-II were given standard antibiotic avilamycin @ 15 ppm in feed. Chicks of group-III were given clove powder @ 5 g/kg in feed. Chicks of group-IV were given clove powder @ 10 g/kg in feed. Chicks of group-V and VI were given eugenol @ 150 and 300 mg/kg in feed, respectively. The study was conducted for 42 days. The treatment details for growth promoting effects are given in Table 1.

Growth Performance Parameters

Various parameters were taken like weekly body weight, body weight gain, feed consumption and feed conversion ratio (FCR). Mortality was recorded daily and expressed as a percentage. At day 42, eight birds from each treatment were randomly selected, fasted for 6 h (with water *ad libitum*) before slaughter and slaughtered for carcass trait evaluation. Carcass characteristics, including pre-slaughter weight, dressed weight and weight of organs like liver, heart and gizzard (giblet) were recorded. Dressing and Giblet percentage were calculated.

Statistical Analysis

One-way analysis of variance (ANOVA) and completely randomized design was used to compare the means of various parameters by using IBM SPSS software (version 25.0). Significant differences ($p < 0.05$) between different experimental groups were analysed by Duncan's multiple range test. All the data were presented as Mean $\pm$ S.E.

Results and Discussion

Body Weight and Body Weight Gain

The weekly Body Weight (BW) and Body Weight Gain (BWG) values as Mean $\pm$ S.E. are given in Table 2 and 3, respectively. During the initial weeks, body weights did not differ significantly among birds supplemented with different treatments and the control group (Group I). At the 4th week, body weight of all treatment groups was non-significant as compared to control group I. During the 5th week, birds supplemented with clove powder at 5 g/kg (Group III) and the antibiotic growth promoter (Group II) showed significantly high body weights as compared to the control group, whereas birds in Groups IV and VI had intermediate but non-significant increases. At 6th week, the birds of Groups II, III, V and VI were showed significantly higher body weights as compared to the control group. Overall body weight gain at the 6th week of age was significantly higher in birds supplemented with clove powder at both 5 g/kg feed (Groups III), eugenol at 150 and 300 mg/kg feed (Groups V and VI) and the standard antibiotic growth promoter (Group II) compared to the control group (Group I). Additionally, the total body weight gain over the 6-week period in birds supplemented with clove powder and eugenol (Groups III, V and VI) was comparable to that of the standard antibiotic avilamycin treated group II. These results suggest that both clove powder at lower dose and eugenol at both doses effectively promote growth performance in broilers, similar to conventional antibiotic growth promoters. Body weight and body weight gain recorded in the of present study were in accordance with the findings of Marcincak *et al.* (2011)^[12] who reported improved body weight of broiler by inclusion of clove (1%) in the feed and agrimony extracts (0.2%) into water as compared to birds of control group^[12]. Similarly, Al-Mufarrej *et al.* (2019)^[13] reported improvement in body weight and body weight gain in 1% and 2% clove powder supplemented group of birds as compared to birds of control group^[13]. Olayemi *et al.* (2020)^[14] determined the final body weight and weight gain at finisher phase was significantly higher in birds fed with clove powder (1%) in feed as compared to birds of control group^[14]. Elbaz *et al.* (2022)^[15] observed that broilers fed 100 mg/kg and 200 mg/kg clove essential oil had significantly higher weight gain ($P < 0.05$) than control birds^[15].

Feed Consumption and Feed Conversion Ratio

The Mean $\pm$ S.E. values of FC and FCR for all the experimental groups are depicted in Table 4 and 5, respectively. Birds supplemented with clove powder at 5 g/kg feed (Group III), eugenol at both 150 mg/kg (Group V) and 300 mg/kg feed (Group VI) and the standard antibiotic treated birds (Group II) showed no significant alteration in feed consumption as compared to the control group I at 6th week of age. Total feed consumption at the 6th week period was significantly lower in birds supplemented with clove powder at 10 g/kg feed (Group IV) as compared to the control group (Group I). These results indicate that supplementation with higher doses of clove powder may reduce feed intake without adversely affecting growth performance. The feed conversion ratio (FCR) did not differ significantly among the experimental groups up to the 4th week of age. However, at the 5th week, FCR was significantly reduced in birds supplemented with clove powder at both 5 and 10 g/kg feed (Groups III and IV) and eugenol at 150 mg/kg feed (Group V), as well as in birds given the standard antibiotic growth promoter (Group II) as compared to the control group (Group I). At the sixth week, FCR was significantly decreased in

birds supplemented with clove powder (5 and 10 g/kg feed), eugenol (150 and 300 mg/kg feed) and the standard antibiotic treated group II as compared to the control group I. Moreover, the FCR values in all supplemented groups (III, IV, V and VI) were comparable to that of the antibiotic treated group (II). These findings suggest that both clove powder and eugenol effectively improve feed efficiency in broilers, comparable to antibiotic growth promoters. The results of present study were in agreement with the findings of Othman *et al.* (2022) [16] who reported a significant reduction in daily feed consumption in broilers supplemented with clove bud powder at higher inclusion levels compared with the control group [16]. Hussein *et al.* (2023) [17] observed significantly lower feed intake in broilers receiving an essential-oil mixture containing clove (measured values were lower than control), indicating that clove-containing blends can depress voluntary intake at certain levels [17]. Parmar *et al.* (2024) [18] reported significantly improved feed conversion ratio in birds supplemented with clove oil (400 and 800 mg/kg feed) as compared to birds of control group [18]. Kholy *et al.* (2021) reported the feed conversion ratio was significantly lower in post hatch birds treated (*In-ovo* injection of clove extract 0.1 ml/egg) as compared to birds of control group [19]. Arif *et al.* (2022) [20] who observed that significantly improved in feed conversion ratio in birds treated with clove powder (0.5%) in feed as compared to birds of control group [20].

Carcass Characteristics and Mortality

The Mean $\pm$ S.E. values of various Carcass Characteristics in all experimental groups are given in Table 6. Pre-slaughter weight was significantly higher in birds supplemented with eugenol (150 mg/kg feed) as compared to the control group I. Additionally, the pre-slaughter weight of birds receiving clove powder and eugenol (groups III, IV, V and VI) was comparable to that of birds supplemented with the antibiotic

(group II). Dressed weight increased significantly in birds supplemented with eugenol (150 mg/kg feed) as compared to the control group I. The dressed weights in low and high dose of clove and eugenol at high dose supplemented groups were similar to those of birds supplemented with the standard antibiotic treated group II. Dressing percentage and giblet percentage of birds treated with clove powder and eugenol at low and high doses (group III, IV, V and VI) exhibits no significant alteration as compared to control group I. Heart weight was significantly increased in birds supplemented with eugenol at 150 mg/kg feed as compared to the control group. However, liver weight of birds supplemented with clove powder and eugenol at both doses did not differ significantly among the various experimental groups. Findings of the present study were in accordance with the results of Essien *et al.* (2024) [21] reported that clove powder at several inclusion levels (0, 100, 200, 300 g) and found a progressive increase in dressing percentage from ~85.29% at control to ~87.64% at the highest clove powder level, but internal organ weights (heart, liver, gizzard) remained relatively stable (heart% ~0.43-0.45) across treatments [21]. Marcincak *et al.* (2011) [12] who reported improved dressing percentage in broiler birds supplemented with clove (1%) in the feed and agrimony extract (0.2%) into water as compared to birds of control group [12]. Arif *et al.* (2022) [20] observed no significant difference in liver heart and gizzard weight in birds supplemented with clove powder (0.5%) in feed as compared to birds of control group [20].

The livability (%) of birds in all experimental groups (Groups I to VI) was 100%. No mortality was observed in birds supplemented with clove powder (5 and 10 g/kg feed) and eugenol (150 and 300 mg/kg feed), indicating that dietary inclusion of clove powder and eugenol at the given doses had no any adverse effects in broiler birds.

Table 1: Protocol to study growth promoting effects of clove powder and eugenol in broilers

Groups	Treatment details (Oral administration)	Number of birds/replications				Total number of birds/treatments
		R1	R2	R3	R4	
I	Control group (Basal diet only)	6	6	6	6	24
II	Standard group (Basal diet + Antibiotic Growth Promoter)	6	6	6	6	24
III	Basal diet + clove powder (@ 5 g/kg feed)	6	6	6	6	24
IV	Basal diet + clove powder (@ 10 g/kg feed)	6	6	6	6	24
V	Basal diet + Eugenol (@ 150 mg/kg feed)	6	6	6	6	24
VI	Basal diet + Eugenol (@ 300 mg/kg feed)	6	6	6	6	24
Total number of birds = 144						

Table 2: Mean $\pm$ SE values of clove powder and eugenol on body weight (BW) of broilers

Groups	Weekly body weight (g)						
	BW ₀	BW ₁	BW ₂	BW ₃	BW ₄	BW ₅	BW ₆
Group I	41.82 $\pm$ 0.69	126.09 $\pm$ 2.69	301.89 $\pm$ 7.17	528.75 $\pm$ 12.42 ^{ab}	889.59 $\pm$ 23.98	1305.16 $\pm$ 40.46 ^a	1931.51 $\pm$ 41.08 ^a
Group II	43.40 $\pm$ 0.65	129.73 $\pm$ 3.02	290.52 $\pm$ 8.02	533.56 $\pm$ 17.04 ^{ab}	907.97 $\pm$ 26.25	1497.58 $\pm$ 37.40 ^b	2208.78 $\pm$ 38.32 ^c
Group III	42.54 $\pm$ 0.55	131.46 $\pm$ 3.12	299.88 $\pm$ 9.19	525.25 $\pm$ 17.99 ^a	957.08 $\pm$ 31.79	1509.42 $\pm$ 37.70 ^b	2109.92 $\pm$ 42.55 ^{bc}
Group IV	41.91 $\pm$ 0.40	129.20 $\pm$ 2.55	294.79 $\pm$ 6.27	533.32 $\pm$ 12.75 ^{ab}	895.19 $\pm$ 19.88	1381.57 $\pm$ 38.52 ^a	2050.51 $\pm$ 54.28 ^{ab}
Group V	43.89 $\pm$ 0.65	131.10 $\pm$ 3.32	311.79 $\pm$ 7.31	573.56 $\pm$ 13.61 ^b	933.91 $\pm$ 22.58	1407.08 $\pm$ 39.38 ^{ab}	2106.27 $\pm$ 53.07 ^{bc}
Group VI	42.54 $\pm$ 0.86	124.56 $\pm$ 3.81	295.55 $\pm$ 8.98	550.50 $\pm$ 16.60 ^{ab}	886.96 $\pm$ 26.48	1372.02 $\pm$ 35.01 ^a	2100.31 $\pm$ 47.66 ^{bc}

[Mean values within the column with different superscript (a,b,c) differ significantly ($p < 0.05$)]

Table 3: Mean $\pm$ SE values of clove powder and eugenol on body weight gain (BWG)

Groups	Weekly body weight gain (g)						
	BWG ₀₋₁	BWG ₁₋₂	BWG ₂₋₃	BWG ₃₋₄	BWG ₄₋₅	BWG ₅₋₆	BWG ₀₋₆
Group I	84.27 $\pm$ 2.86	175.80 $\pm$ 5.39 ^{ab}	226.87 $\pm$ 9.50 ^a	360.83 $\pm$ 16.91 ^a	415.57 $\pm$ 22.81 ^a	626.35 $\pm$ 12.16 ^{ab}	1889.69 $\pm$ 41.09 ^a
Group II	86.33 $\pm$ 2.87	160.80 $\pm$ 6.55 ^a	243.04 $\pm$ 1060 ^{ab}	374.41 $\pm$ 22.14 ^a	589.61 $\pm$ 17.73 ^c	711.20 $\pm$ 13.16 ^{bc}	2165.38 $\pm$ 38.31 ^c
Group III	88.92 $\pm$ 3.10	168.42 $\pm$ 6.76 ^{ab}	225.38 $\pm$ 11.66 ^a	431.83 $\pm$ 19.99 ^b	552.33 $\pm$ 25.77 ^c	600.50 $\pm$ 30.99 ^a	2067.38 $\pm$ 42.46 ^{bc}
Group IV	87.29 $\pm$ 2.46	165.59 $\pm$ 5.24 ^{ab}	238.53 $\pm$ 8.46 ^{ab}	361.88 $\pm$ 9.53 ^a	486.38 $\pm$ 23.55 ^b	668.94 $\pm$ 50.50 ^{abc}	2008.60 $\pm$ 54.32 ^{ab}
Group V	87.21 $\pm$ 3.05	180.69 $\pm$ 5.34 ^b	261.78 $\pm$ 10.86 ^b	360.35 $\pm$ 13.75 ^a	473.18 $\pm$ 24.27 ^{ab}	699.18 $\pm$ 26.58 ^{bc}	2062.38 $\pm$ 52.84 ^{bc}
Group VI	81.98 $\pm$ 3.33	171.04 $\pm$ 6.18 ^{ab}	254.95 $\pm$ 9.39 ^{ab}	336.46 $\pm$ 14.53 ^a	485.06 $\pm$ 18.95 ^b	728.29 $\pm$ 26.78 ^c	2057.77 $\pm$ 47.55 ^{bc}

[Mean values within the column with different superscript (a,b,c) differ significantly ($p < 0.05$)]

Table 4: Mean $\pm$ SE values of clove powder and eugenol on Feed Consumption (FC) of broilers

Groups	Weekly feed consumption (g)						
	FC ₁	FC ₂	FC ₃	FC ₄	FC ₅	FC ₆	TFC ₀₋₆
Group I	199.96 $\pm$ 2.03 ^{ab}	374.58 $\pm$ 8.85 ^{ab}	593.13 $\pm$ 6.91 ^b	962.46 $\pm$ 2.54 ^b	909.33 $\pm$ 28.46	1072.92 $\pm$ 5.71	4112.38 $\pm$ 33.04 ^b
Group II	204.00 $\pm$ 2.49 ^{bc}	367.88 $\pm$ 8.45 ^{ab}	577.80 $\pm$ 6.18 ^{ab}	951.50 $\pm$ 12.84 ^b	886.42 $\pm$ 45.67	1075.00 $\pm$ 85.43	4062.58 $\pm$ 112.47 ^{ab}
Group III	198.75 $\pm$ 3.32 ^{ab}	373.13 $\pm$ 4.72 ^{ab}	575.54 $\pm$ 18.97 ^{ab}	935.04 $\pm$ 9.20 ^{ab}	815.58 $\pm$ 18.46	1021.67 $\pm$ 57.51	3919.71 $\pm$ 68.65 ^{ab}
Group IV	196.33 $\pm$ 1.22 ^a	341.67 $\pm$ 22.24 ^a	545.17 $\pm$ 18.27 ^a	898.25 $\pm$ 22.60 ^a	801.42 $\pm$ 72.54	927.08 $\pm$ 98.71	3709.92 $\pm$ 163.16 ^a
Group V	197.29 $\pm$ 2.02 ^{ab}	387.63 $\pm$ 4.50 ^b	584.46 $\pm$ 5.46 ^{ab}	939.25 $\pm$ 16.55 ^{ab}	817.25 $\pm$ 49.72	1015.00 $\pm$ 61.59	3940.88 $\pm$ 104.70 ^{ab}
Group VI	207.88 $\pm$ 1.60 ^c	391.92 $\pm$ 8.47 ^b	588.13 $\pm$ 15.82 ^{ab}	947.08 $\pm$ 17.92 ^b	839.33 $\pm$ 54.07	973.75 $\pm$ 59.77	3948.08 $\pm$ 138.31 ^{ab}

[Mean values within the column with different superscript (a, b, c) differ significantly ($p < 0.05$)]

Table 5: Mean $\pm$ SE values of clove powder and eugenol on Feed Conversion Ratio (FCR) of broilers

Groups	Feed conversion ratio					
	FCR ₀₋₁	FCR ₀₋₂	FCR ₀₋₃	FCR ₀₋₄	FCR ₀₋₅	FCR ₀₋₆
Group I	1.58 $\pm$ 0.02 ^{ab}	1.90 $\pm$ 0.04 ^{ab}	2.21 $\pm$ 0.05	2.40 $\pm$ 0.08 ^b	2.34 $\pm$ 0.11 ^c	2.13 $\pm$ 0.05 ^b
Group II	1.58 $\pm$ 0.06 ^{ab}	1.97 $\pm$ 0.04 ^{ab}	2.16 $\pm$ 0.02	2.32 $\pm$ 0.07 ^{ab}	2.00 $\pm$ 0.06 ^{ab}	1.84 $\pm$ 0.05 ^a
Group III	1.51 $\pm$ 0.03 ^a	1.91 $\pm$ 0.07 ^{ab}	2.18 $\pm$ 0.07	2.18 $\pm$ 0.03 ^a	1.92 $\pm$ 0.02 ^a	1.86 $\pm$ 0.02 ^a
Group IV	1.52 $\pm$ 0.01 ^a	1.83 $\pm$ 0.09 ^a	2.03 $\pm$ 0.09	2.22 $\pm$ 0.09 ^{ab}	2.02 $\pm$ 0.09 ^{ab}	1.81 $\pm$ 0.07 ^a
Group V	1.51 $\pm$ 0.03 ^a	1.88 $\pm$ 0.03 ^{ab}	2.04 $\pm$ 0.05	2.26 $\pm$ 0.05 ^{ab}	2.09 $\pm$ 0.06 ^{ab}	1.88 $\pm$ 0.06 ^a
Group VI	1.67 $\pm$ 0.02 ^b	2.03 $\pm$ 0.01 ^b	2.16 $\pm$ 0.03	2.41 $\pm$ 0.06 ^b	2.17 $\pm$ 0.07 ^{bc}	1.89 $\pm$ 0.09 ^a

[Mean values within the column with different superscript (a,b,c) differ significantly ($p < 0.05$)]

Table 6: Mean $\pm$ SE values of clove powder and eugenol on Carcass Characteristics of broilers

Groups	Pre-slaughter weight (g)	Dressed weight (g)	Liver (g)	Heart (g)	Gizzard (g)	Giblet weight (g)	Dressing%	Giblet%
Group I	2079.75 $\pm$ 76.73 ^a	1324.08 $\pm$ 46.60 ^a	49.90 $\pm$ 1.25	9.52 $\pm$ 0.32 ^a	58.81 $\pm$ 1.69 ^a	118.23 $\pm$ 2.80 ^a	63.69 $\pm$ 0.15	8.97 $\pm$ 0.18 ^{ab}
Group II	2146.62 $\pm$ 44.37 ^{ab}	1365.30 $\pm$ 28.18 ^{ab}	52.18 $\pm$ 0.92	9.80 $\pm$ 0.18 ^{ab}	60.36 $\pm$ 0.82 ^{ab}	122.33 $\pm$ 1.59 ^{ab}	63.60 $\pm$ 0.18	8.97 $\pm$ 0.10 ^{ab}
Group III	2223.08 $\pm$ 37.37 ^{ab}	1424.16 $\pm$ 23.85 ^{ab}	53.01 $\pm$ 0.60	10.12 $\pm$ 0.15 ^{ab}	63.09 $\pm$ 0.59 ^{bcd}	126.21 $\pm$ 1.22 ^b	64.07 $\pm$ 0.13	8.87 $\pm$ 0.09 ^a
Group IV	2067.77 $\pm$ 48.68 ^a	1326.07 $\pm$ 32.04 ^a	49.83 $\pm$ 1.10	9.49 $\pm$ 0.19 ^a	63.95 $\pm$ 0.76 ^{cd}	123.27 $\pm$ 1.20 ^{ab}	64.13 $\pm$ 0.22	9.33 $\pm$ 0.19 ^b
Group V	2299.73 $\pm$ 86.51 ^b	1474.58 $\pm$ 51.76 ^b	53.03 $\pm$ 1.66	10.42 $\pm$ 0.36 ^b	65.84 $\pm$ 1.16 ^d	129.28 $\pm$ 2.98 ^b	64.24 $\pm$ 0.44	8.81 $\pm$ 0.17 ^a
Group VI	2158.13 $\pm$ 71.93 ^{ab}	1379.39 $\pm$ 45.22 ^{ab}	50.38 $\pm$ 1.95	9.89 $\pm$ 0.29 ^{ab}	61.57 $\pm$ 1.47 ^{abc}	121.84 $\pm$ 3.50 ^{ab}	63.93 $\pm$ 0.11	8.85 $\pm$ 0.10 ^a

[Mean values within the column with different superscript (a,b,c) differ significantly ($p < 0.05$)]

Conclusion

Results of present study revealed that the supplementation of broiler diet with clove powder at 5 g/kg or eugenol at 150 mg/kg daily once for 42 days significantly improved body weight gain and feed conversion ratio in broiler birds. No mortality or adverse effects were recorded in any treatment groups at given dosage, confirming the safety of these feed additives.

Acknowledgements

The authors are grateful to the Principal, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Anand, and Research Scientist and Head and all the staff members of Poultry Research Station, Anand for provided the facilities for this research work.

Conflict of Interest

All authors state that they have no conflicts of interest.

References

1. The Editors of Encyclopaedia Britannica. Argon. Encyclopaedia Britannica. 2020 Jul. Available from: <https://www.britannica.com/science/argon>
2. Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India. Poultry products. 2021. https://apeda.gov.in/apedawebsite/SubHead_Products/Poultry_Products.htm
3. Aarestrup FM. The livestock reservoir for antimicrobial resistance: a personal view on changing patterns of risks, effects of interventions and the way forward. Philosophical Transactions of the Royal Society B: Biological Sciences. 2015;370(1670):20140085.
4. Liu YY, Wang Y, Walsh TR, Yi LX, Zhang R, Spencer J, Doi Y, Tian G, Dong B, Huang X, Yu LF. Emergence of plasmid-mediated colistin resistance mechanism MCR-1 in animals and human beings in China: a microbiological and molecular biological study. The Lancet Infectious Diseases. 2016;16(2):161-168.
5. World Health Organization. Antimicrobial resistance: global report on surveillance. Geneva: World Health Organization; 2014.
6. Nguyen NT, Nguyen HM, Nguyen CV, Nguyen TV, Nguyen MT, Thai HQ, Ho MH, Thwaites G, Ngo HT, Baker S, Carrique-Mas J. Use of colistin and other critical antimicrobials on pig and chicken farms in southern Vietnam and its association with resistance in commensal Escherichia coli bacteria. Applied and Environmental Microbiology. 2016;82(13):3727-3735.
7. Toghyani M, Mosavi SK, Modaresi M, Landy N. Evaluation of kefir as a potential probiotic on growth performance, serum biochemistry and immune responses in broiler chicks. Animal Nutrition. 2015;1(4):305-309.
8. Mohammadi Gheisar M, Kim IH. Phytobiotics in poultry and swine nutrition: a review. Italian Journal of Animal Science. 2018;17(1):92-99.
9. Tsagareli MG, Merrill AW, Tsiklauri N, Carstens MI, Nozadze I, Gurtikaia G, Abzianidze E, Carstens EE. Some effects of mustard oil and cinnamaldehyde on spinal neuronal responses to cutaneous stimuli in male rats. Bulletin of the Georgian National Academy of Sciences. 2012;6(3):12-20.
10. Marchese A, Arciola CR, Barbieri R, Silva AS, Nabavi SF, Tsetegho Sokeng AJ, Izadi M, Jafari NJ, Sutar I, Daglia M, Nabavi SM. Update on monoterpenes as antimicrobial agents: a particular focus on p-cymene. Materials. 2017;10(8):947.

11. Borazjanizadeh M, Eslami M, Bojarpour M, Chaji M, Fayazi J. The effect of clove and oregano on economic value of broiler. *Journal of Animal and Veterinary Advances*. 2011;10(2):169-173.
12. Marcincak S, Cabadaj R, Popelka P. The effect of clove and agrimony extracts on broiler performance and meat quality. *Acta Veterinaria Brno*. 2011;80(1):61-67.
13. Al-Mufarrej SI, Al-Baadani HH, Fazea EH. Effect of level of inclusion of clove (*Syzygium aromaticum*) powder in the diet on growth and histological changes in the intestines and livers of broiler chickens. *South African Journal of Animal Science*. 2019;49(1):166-175.
14. Olayemi WA, Adeyemi KD, Sola-Ojo FE, Akanji AM. Growth performance, carcass characteristics, and oxidative stability of broiler chickens fed diets supplemented with clove powder (*Syzygium aromaticum*). *Poultry Science Journal*. 2020;8(2):159-168.
15. Elbaz AM, Ashmawy ES, Farahat MA, Ali SA, Amin SA, Thabet HA, Gad GG. Effect of different levels of clove essential oil on the growth performance, lipid metabolism, immunity, and intestinal microbial structure of broiler chickens. *Egyptian Journal of Nutrition and Feeds*. 2022;25(3):361-368.
16. Othman SM, Naser KM, Kanoun AH, Salim AA, Sherif BM, Asheg AA. Effect of adding clove buds powder in feed on performance and jejunum morphology in broiler chickens. *Open Veterinary Journal*. 2022;12(6):995-999.
17. Hussein MA, El-Tarabany MS, Al-Shammari KI, Abdelnour SA. Effect of dietary supplementation with essential oil mixtures containing clove on performance, nutrient digestibility, and feed intake of broilers. *Animal Bioscience*. 2023;36(2):183-191.
18. Parmar BB, Patel KM, Sadariya KA, Bhavsar SK. Evaluation of immunomodulatory activities of clove powder in broiler. *Journal of Phytopharmacology*. 2024;13(3):242-248.
19. Oladokun S, MacIsaac J, Rathgeber B, Adewole D. Essential oil delivery route: effect on broiler chicken's growth performance, blood biochemistry, intestinal morphology, immune, and antioxidant status. *Animals*. 2021;11(12):3386.
20. Arif A, Hussain J, Khan SA, Ullah S. Dietary inclusion of clove (*Syzygium aromaticum*) powder enhances growth performance and feed efficiency in broiler chickens. *Pakistan Journal of Zoology*. 2022;54(3):1411-1418.
21. Essien CA, Sam IM, Okon UM, Ebong MO. Evaluation of clove powder as a feed additive on the performance, carcass traits, and internal organ weights of broiler chickens. *AKSU Journal of Agriculture and Food Sciences*. 2024;8(1):85-95.

How to Cite This Article

Solanki DJ, Sadariya KA, Patel AB, Ponkshe TM, Sarvaiya VN, Bhavsar SK. Growth promoting effects of clove powder and eugenol in broilers. *International Journal of Veterinary Sciences and Animal Husbandry*. 2026; 11(1): 104-108.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.