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PERFORMANCE AND NUTRIENTS UTILIZATION PARAMETERS OF BROILER CHICKENS ADMINISTERED VARIED DOSAGES OF *Ocimum gratissimum* LEAF EXTRACT

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ABSTRACT

Ocimum gratissimum leaf extract has potential as a natural growth promoter due to its rich phytochemical composition. The study evaluated the performance of broiler chickens administered varied dosages of *O. gratissimum* leaf extract (OGLE). The study was conducted at Teaching and Research Farm, Babcock University, Ilishan-Remo, Ogun State, Nigeria. Four treatments with four replicates were designed with varying dosages of OGLE (0, 0.2, 0.4 and 0.6 Ml/ liter of water). A total of 160 Arbor Acre broiler chicks were randomly assigned in a completely randomized design. The study assessed growth and nutrient utilization parameters. The results showed that the administration of OGLE significantly affected ($p<0.05$) final body weight, weight gain, total feed intake/bird and feed conversion ratio with birds in the 0.4 ml OGLE group having the best values for these parameters. Digestibility of lipid and crude fibre also followed a significantly positive trend ($p<0.05$) in T3. There was no significant variations ($p>0.05$) in relative weights of the liver, gizzard, heart, spleen, and intestinal length among the treatment groups. Birds administered 0.4 ml OGLE (T3) recorded significantly higher ($p<0.05$) proventricular temperatures (28.25 ± 0.05°C) than those in T4 (22.25 ± 1.45°C), jejunal and crop pH decreased significantly ($p<0.05$) with increasing OGLE levels. Birds in T4 (0.6 ml OGLE) recorded the lowest jejunal pH (3.20 ± 0.90). It is concluded that the oral administration of *O. gratissimum* leaf extract at 0.4 ml per bird/day positively influenced feed efficiency, and intestinal environment in broiler chickens without adverse effects on organ development.

Keywords: Administration, Digestibility, Gut Morphology, *Ocimum gratissimum* Leaf Extract

INTRODUCTION

The global demand for poultry meat, particularly broiler chicken, continues to rise due to its affordability, palatability, and nutritional value, including high-quality protein and low fat content (FAO, 2020). To meet this growing demand, poultry producers often rely on synthetic growth promoters and antibiotics to enhance feed efficiency, growth performance, and disease resistance. However, the indiscriminate use of antibiotics in animal production has raised significant public health concerns due to the emergence of antimicrobial-resistant pathogens and residual drug accumulation in poultry products (Van Boeckel et al., 2015; Laxminarayan et al., 2016). This has prompted researchers and policymakers to advocate for the use of safe, natural alternatives that can support animal health and productivity without compromising consumer safety.

In recent years, medicinal plants and their phytogenic extracts have garnered attention as promising alternatives to synthetic additives in animal nutrition. Among these, *Ocimum gratissimum*—commonly known as scent leaf—is widely used in traditional medicine across tropical regions for its antimicrobial, antioxidant, anti-inflammatory, and immunomodulatory properties (Matasyoh et al., 2007; Ugbogu et al., 2021). The plant is rich in bioactive compounds such as eugenol, thymol, phenols and flavonoids, which are known to influence gut health, improve nutrient digestion, and enhance immune response (Prakash & Gupta, 2005; Akintunde et al., 2025). Despite these known medicinal properties, there remains a paucity of data on the effects of varied dosages of *O. gratissimum* leaf extract on the performance, nutrient utilization, and physiological responses of broiler chickens.

This study is justified by the urgent need to develop sustainable, cost-effective, and health-promoting feed additives that can substitute for synthetic antibiotic growth promoters. *O. gratissimum* is abundant, accessible, and economically viable, especially in tropical and subtropical regions like Nigeria where broiler production plays a significant role in food security and rural livelihoods. Previous studies have investigated the use of *O. gratissimum* in poultry diets; however, most have focused on general performance outcomes without assessing the specific mechanisms by which its phytochemicals affect nutrient absorption and metabolic activity (Makama et al., 2022). Olumide et al. (2022) investigated the effects of oral administration of aqueous *Ocimum gratissimum* extract on broiler chickens. The study found that administering up to 0.6 ml of the extract improved growth performance without adverse effects on carcass traits. In another study, Olumide and Akintola (2018) examined the supplementation of broiler diets with *Ocimum gratissimum* leaf meal, reporting enhancements in performance, carcass characteristics, and meat quality. Olumide et al. (2019) reported that the leaves of *Ocimum gratissimum* contained 10.44% phytate, 1.10% saponin, 25.30% flavonoid, 0.03% tannin and 2.18% alkaloid. Moreover, optimal dosage levels for maximum efficacy and minimal adverse effects have not been clearly established.

The novelty of this research lies in its comprehensive approach to evaluating the performance and nutrient utilization parameters of broiler chickens administered varying dosages of *O. gratissimum* leaf extract. By systematically assessing growth performance indices, nutrient digestibility, and feed conversion ratios in response to different inclusion levels, this study aims to determine the functional threshold of *O. gratissimum* as a phytogenic feed additive. The findings are expected to contribute to the growing body of knowledge on the use of ethnobotanical resources in sustainable poultry production, offering evidence-based recommendations for optimizing broiler performance through natural dietary supplementation.

MATERIALS AND METHODS

Plant Collection

Fresh *Ocimum gratissimum* leaves were harvested within Babcock University Community, Ilishan-Remo, Ogun State, Nigeria. The plant was identified by a botanist from the Department of Basic Sciences, Babcock University, Ilishan-Remo, Ogun State, Nigeria.

The fresh leaves of *Ocimum gratissimum* were harvested around 6:00hrs and 6:30 hrs; thereafter, they were washed. 50 g of the fresh leaves harvested were blended with 100 mL of distilled water using a blender. The blending was done for about 3 minutes, after which the blended samples were filtered using filter papers (Whatman paper No.1). The filtrate was then administered to the experimental birds.

Experimental Site

The research was carried out at the Poultry Section of the Teaching and Research Farm, Babcock University, Ilishan-Remo, Ogun State, Nigeria. Ilishan Remo is located in Nigeria's rainforest zone, with a yearly rainfall of roughly 1500mm and a mean temperature of 270 degrees Celsius.

Ilishan-Remo is a town located within Irepodun district in Ikenne Local Government Area of Ogun State, South Western Nigeria. Its ZIP code is 121103. It is located within Latitude: 6.8932 East and Longitude: 3.7105 North in the Rainforest climatic region of the country. Babcock University is situated in this town.

Experimental Birds, Management and Design

The house was cleaned, disinfected, and dried for two weeks before the chicks arrived. Before the arrival of day-old chicks, drinkers and feeders were properly cleaned and disinfected. A total of 160-day-old Arbor Acre broiler chicks were obtained from a commercial hatchery. The birds' initial weights were taken before they were randomly assigned to one of five treatments (T1, T2, T3 and T4.) with four (4) replicates of 10 birds each in a completely randomized design. Throughout the 42-day experiment, the birds were given feed and water ad-libitum. Treatment 1 (T1) was the control and administered 0ml of *Ocimum gratissimum* leaf extract while treatments 2, 3 and 4 (T2, T3 and T4) had 0.2, 0.4 and 0.6 mL of *Ocimum gratissimum* leaf extract per 1 Litre of water per 10 birds respectively.

Vaccination and Medication

For all treatments, vitamins were given from day one through day six. The birds were vaccinated against Newcastle diseases and Infectious Bronchitis disease.

Table 1: Gross Composition of Broiler Starter and Finisher Diets

Ingredients	Starter (%)	Finisher (%)
Maize	56.80	54.00
Palm Oil	3.84	5.00
Soya Bean Meal	31.68	31.00
Fish Meal (72%)	2.88	2.50
Bone Meal	1.92	2.00
Salt	0.29	0.30
Lysine	0.29	0.30
Methionine	0.29	0.30
Limestone	0.96	1.10
Dicalcium Phosphate	0.48	0.30
Primix	0.24	0.30
Toxin binders	0.34	0.20
Total	100	100
Determined Analysis		
Moisture (%)	8.11±0.01	9.85±0.02
Ash (%)	15.22±0.33	8.79±0.02
Crude Fat (%)	7.32±0.03	6.70±0.02
Crude Protein (%)	27.30±0.02	13.66±0.03
Crude Fibre (%)	6.2±0.00	2.37±0.02
Carbohydrate (%)	42.1±0.34	61.00±0.04

Data Collection

Performance Parameters

Feed Intake

Feed intake was calculated daily. This was done by deducting the amount of feed left in the feeders from the feed given on the previous day as feed intake for the day.

Feed intake (g) = feed given (8) - feed left (g)

Water intake

Water Intake = Vol. of water given (ml) - Vol. of water left (ml)

Body Weight

The weight of all the birds in each replicate was taken and divided by the number of birds in each replicate to get the average weight. This was done on the day of arrival and was subsequently done weekly until the end of the experiment.

Feed conversion ratio

Feed Conversion Ratio (FCR) = feed intake (g) + body weight (g)

Mortality

Mortalities were recorded against the respective replicates as and when they occurred throughout the experimental period.

Ileal Digestibility Study

Ferric oxide was added to the feed as an indigestible dietary marker at 5 g/kg of feed. On day 35, two birds per replicate were randomly and transferred to the digestibility cage. The birds were weighed on day 42 and slaughtered. The digestive tracts were carefully excised and the terminal two-thirds of the section between the Meckel diverticulum and 2cm anterior to the ileo-caeca-colonic junction were severed and ileal digesta contents were gently flushed out with distilled water into

containers on a replicate basis and was frozen at -20°C and freeze-dried. The freeze-dried samples was milled and stored for chemical analysis.

Apparent Digestibility Coefficient and Total Digestible Nutrient

A digestibility trial was conducted where feed intake and fecal output were recorded for 3 days. Samples of feces were oven-dried and analyzed for proximate composition for the determination of apparent digestibility coefficients (ADC) using the appropriate formula (MeDonald et al., 1999).

Visceral Organ Evaluation

Four birds were randomly selected from each treatment for visceral organ evaluation. The selected birds were starved overnight and their live weights were recorded. The birds were de-feathered after scalding and their plucked weights were taken. The birds were eviscerated and the eviscerated weight was recorded. The following parameters were observed and measurements were recorded: Gizzard, Liver, Heart, Crop, Proventriculus, Spleen, Small intestine. Large intestine, and Caccum.

Statistical Analysis

Data collected on performance, relative organ weight, and immunological response was subjected to analysis of variance (ANOVA) (SAS Institute, 1999 and the treatment means were separated using Duncan Multiple Range tests were significant (Steel and Torries, 1990).

RESULTS AND DISCUSSION

Results

The administration of *Ocimum gratissimum* leaf extract (OGLE) had a significant effect ($p<0.05$) on the growth performance and feed efficiency of broiler chickens (Table 1). While initial body weights (BW0) were statistically similar ($P > 0.05$) across all treatment groups, final body weight (BW), weight gain (WG), total feed intake (TFI), and feed conversion ratio (FCR) exhibited significant differences ($P < 0.05$). Birds in the T2 (0.2 ml OGLE) and T3 (0.4 ml OGLE) groups recorded significantly higher final body weights (1831.25 ± 25.53 g and 1806.25 ± 6.25 g, respectively) and weight gains compared to the control (T1) and T4 (0.6 ml OGLE) groups. Notably, the T3 group had the most efficient feed conversion ratio (FCR = 1.63 ± 0.01), significantly better than the control and T2 groups, suggesting enhanced nutrient utilization at this dosage. Conversely, birds in the control (T1) and T4 groups exhibited lower weight gains and poorer FCRs, indicating that both the absence of OGLE and excessive dosages may limit growth performance. The results indicate a dose-dependent response, with optimal performance observed at moderate OGLE inclusion levels, particularly at 0.4 ml per bird.

Table 2: Growth Performance and Feed Efficiency of Broiler Chickens to Administration of *Ocimum gratissimum* Leaf extract (OGLE)

	BW0	BW	WG	TFI/Bid	FCR
T1	36.55 ± 0.45	1523.75 ± 20.14a	1487.2 ± 20.15a	2578.83 ± 35.26a	1.73 ± 0c
T2	35.78 ± 0.36	1831.25 ± 25.53b	1795.48 ± 25.52b	3022.52 ± 43.53b	1.68 ± 0b
T3	36.55 ± 0.45	1806.25 ± 6.25b	1769.7 ± 6.11b	2891.78 ± 15.99b	1.63 ± 0.01a
T4	35.78 ± 0.36	1561.25 ± 49.68a	1525.48 ± 49.65a	2578.81 ± 86.42a	1.69 ± 0b

*Values are presented as mean ± standard error of mean, a,b: Means within the same row with different superscripts are significantly different ($P < 0.05$)

BW0 – Initial Body Weight, BW – Final Body Weight, WG – Weight Gain, TFI – Total Feed Intake, FCR – Feed Conversion Ratio

The administration of *Ocimum gratissimum* leaf extract (OGLE) as presented in Table 2, did not significant influence ($p>0.05$) ileal amino acid digestibility in broiler chickens except for arginine, with notable variations across different dosage levels. Significant ($P < 0.05$) improvements in arginine digestibility were observed in T2 and T3 (15.35% and 17.57%, respectively) compared to T1 and T4, suggesting a dose-dependent effect up to the 0.4 ml level.

Table 3: Ileal Amino Acid Digestibility of Broiler Chickens in Response to the Administration of *Ocimum gratissimum* Leaf Extract (OGLE)

Digestible Amino Acid (%)	T1	T2	T3	T4
Asparagine	16.40±11.68	16.68±10.28	25.89±0.06	17.30±9.44
Glutamic acid	9.80±4.85	2.85±1.86	19.80±14.85	2.97±1.98
Isoleucine	5.00±0.71	23.99±16.00	29.28±27.86	25.71±12.86
Serine	1.19±0.00	1.49±0.29	13.92±10.63	1.19±0.00
Valine	3.70±3.70	7.41±0.00	41.67±25.00	0.00±0.00
Glycine	2.58±0.65	2.90±0.32	26.94±24.68	4.03±2.42
Histidine	9.09±0.00	6.82±6.82	9.09±0.00	11.36±6.82
Threonine	1.39±0.59	1.59±0.39	21.83±18.65	18.65±17.86
Cystine	9.63±1.29	12.55±1.44	7.96±2.96	12.55±1.44
Alanine	17.50±17.50	35.23±3.41	11.36±11.36	36.36±4.55
Arginine	3.88±3.71a	15.35±1.16b	17.57±1.07b	2.97±2.97a
Proline	8.68±7.92	15.55±3.34	26.43±5.63	6.01±5.25
Phenylalanine	2.27±2.27	17.27±12.73	17.73±13.18	15.90±11.36
Tyrosine	40.23±40.23	38.28±25.78	38.67±26.17	36.72±28.12
Methionine	20.15±1.97	18.64±4.39	33.79±22.58	18.94±7.73
Lysine	32.45±0.88	32.98±1.73	44.94±10.61	34.97±1.63
Leucine	2.33±0.14	7.00±4.25	35.05±32.86	7.08±4.18

*Values are presented as mean ± standard error of mean, a,b: Means within the same row with different superscripts are significantly different ($P < 0.05$)

The apparent fecal digestibility coefficients of broiler chickens administered varying doses of *Ocimum gratissimum* leaf extract (OGLE) as presented in Table 3 revealed significant ($p < 0.05$) differences across treatment groups for crude lipid and crude fibre, while crude protein and ash digestibility were not significantly affected ($p > 0.05$). Crude lipid digestibility showed a decreasing trend from T1 ($84.04 \pm 12.13\%$) to T3 ($16.46 \pm 2.37\%$), with T1 significantly higher than T2 and T3, suggesting that higher doses of OGLE may impair lipid digestion. However, T4 ($73.89 \pm 10.66\%$) demonstrated partial recovery, indicating a possible nonlinear response. For crude fibre, T1 and T3 exhibited significantly higher digestibility ($56.96 \pm 8.22\%$ and $61.18 \pm 8.83\%$, respectively) compared to T2 and T4, reflecting improved fibre degradation at control and 0.4 ml OGLE dosage. These findings suggest dose-dependent interactions between OGLE bioactive compounds and digestive efficiency for specific nutrients, particularly lipids and fibre.

Table 4: Apparent Feacal Digestibility Coefficients of Broiler Chickens in Response to the Administration of *Ocimum gratissimum* Leaf Extract (OGLE)

Digestibility Coefficients (%)	T1	T2	T3	T4
Crude Protein	44.57±6.43	30.80±4.45	46.98±6.78	48.52±7.00
Crude Lipid	84.04±12.13c	49.28±7.11b	16.46±2.37a	73.89±10.66bc
Crude Fibre	56.96±8.22b	25.32±3.65a	61.18±8.83b	24.47±3.53a
Ash	32.90±4.75	24.94±3.60	35.18±5.08	22.67±3.27

*Values are presented as mean ± standard error of mean, a,b,c: Means within the same row with different superscripts are significantly different ($P < 0.05$)

The administration of *Ocimum gratissimum* leaf extract (OGLE) elicited notable, though largely non-significant, variations in organ morphology among the broiler chickens across the treatment groups as presented in Table 5. No significant difference ($p>0.05$) was observed in relative organ weights and intestinal lengths. Significant differences ($P < 0.05$) were observed in proventricular temperature, where birds administered 0.4 ml OGLE (28.25 ± 0.05oC) had significantly higher ($p<0.05$) values than birds administered 0.6 ml OGLE (22.25 ± 1.45 oC), and in jejunal and crop pH. Jejunal pH was significantly lower in T4 (0.6 ml OGLE) (3.20 ± 0.90) compared to T1 (0 ml OGLE) and T2 (0.2 ml OGLE) (6.25 ± 0.05 and 5.35 ± 0.05, respectively), indicating increased gut acidity at higher OGLE levels. Similarly, crop pH significantly decreased ($p<0.05$) in T3 (5.30 ± 0.00) and T4 (5.50 ± 0.20) compared to T1 (6.25 ± 0.15), suggesting an acidifying effect of the extract. These findings suggest that OGLE supplementation can influence organ development, temperature regulation, and gut acidity.

Table 5: Organ Morphology of Broiler Chickens in Response to the Administration of *Ocimum gratissimum* Leaf Extract (OGLE)

Organ	T1 (0 ml OGLE)	T2 (0.2 ml OGLE)	T3 (0.4 ml OGLE)	T4 (0.6 ml OGLE)
Relative Organ Weights				
Crop (Relative)	0.31±0.09	0.05±0.05	0.15±0.03	0.18±0.07
Gizzard (Relative)	2.96±0.10	2.68±0.20	3.89±0.83	2.94±0.00
Duodenum (Relative)	0.87±0.13	1.01±0.25	1.41±0.41	1.03±0.03
Jejunum (Relative)	0.78±0.37	0.94±0.05	1.30±0.43	1.13±0.18
Ileum (Relative)	0.24±0.11	0.25±0.04	0.34±0.02	0.18±0.01
Caecum (Relative)	1.43±0.49	1.42=0.58	1.93±0.62	1.26±0.01
Intestinal Length (cm)				
Duodenum	36.60±7.40	32.20±3.80	32.85±7.15	40.75±6.25
Jejunum	36.60±7.40	32.20±3.80	32.85±7.15	40.75±6.25
Ileum	15.15±1.15	19.00±4.50	13.65±0.35	13.80±0.20
Caecum	47.55±6.55	59.50±23.50	43.75±2.25	38.25±4.75
Temperature (°C)				
Crop	28.20±0.10	27.35±1.15	28.40±0.00	27.15±0.95
Proventriculus	25.70±2.40ab	28.00±0.90ab	28.25±0.05b	22.25±1.45a
Gizzard	27.30±1.00	27.25±1.55	28.40±0.30	29.90±1.20
Duodenum	27.95±0.15	27.90±0.40	28.60±0.10	27.60±1.00
Jejunum	27.95±1.15	28.15±0.05	29.25±5.25	31.45±3.15
Ileum	27.25±0.15	26.75±0.35	27.10±0.40	26.50±2.20
Caecum	27.15±0.25	26.80±1.98	28.85±1.45	26.25±0.55
pH Levels				
Crop	6.25±0.15b	5.90±0.20ab	5.30±0.00a	5.50±0.20a
Proventriculus	3.55±2.55	2.40±0.60	5.10±0.00	4.95±1.25
Duodenum	5.90±0.10	4.35±1.05	5.85±0.05	4.45±0.25
Jejunum	6.25±0.05b	5.35±0.05b	5.15±0.45	3.20±0.90a
Ileum	6.35±0.05	3.40±2.90	5.30±0.00	2.15±0.35
Caecum	6.30±0.10	3.85±1.75	5.80±0.00	3.70±0.50

*Values are presented as mean ± standard error of mean, a,b,c: Means within the same row with different superscripts are significantly different ($P < 0.05$)

Discussion

The observed improvements in growth performance and feed efficiency following *Ocimum gratissimum* leaf extract (OGLE) administration align with previous studies demonstrating the efficacy of phytogenic feed additives in poultry nutrition. The significant increase in body weight and weight gain at moderate OGLE dosages (0.2–0.4 ml) may be attributed to the presence of bioactive compounds such as eugenol, thymol, and flavonoids, which have been shown to enhance digestive enzyme activity, improve gut health, and promote nutrient absorption (Prakash & Gupta, 2005; Matasyoh et al., 2007; Ali et al., 2023; Khan et al., 2023). Similar findings were reported by Olumide et al. (2022), who observed improved growth indices in broilers supplemented with *O. gratissimum* extract, highlighting its potential as a natural growth promoter. The improved feed conversion ratio (FCR) in the T3 group also suggests enhanced feed efficiency, likely due to better metabolic utilization of nutrients facilitated by the phytochemical constituents.

These results are consistent with findings from studies involving other phytogenics. Dietary supplementation with Moringa oleifera leaf extract and its seed has been shown to improve growth performance and FCR in broilers through its rich antioxidant and antimicrobial profile (Onu, 2010; Akintunde and Toye, 2014). However, the reduced performance at the highest OGLE dosage (0.6 ml) in this study indicates a threshold beyond which the bioactive compounds may exert adverse or inhibitory effects, possibly due to toxicity or reduced palatability. This underscores the importance of dose optimization in phytogenic feed additive applications (Windisch et al., 2008). The findings thus support the integration of *O. gratissimum* at moderate levels in broiler diets as a natural alternative to antibiotic growth promoters, contributing to sustainable poultry production and public health safety.

The findings from this study reveal that *Ocimum gratissimum* leaf extract (OGLE) did not significantly ($p>0.05$) influence the ileal digestibility coefficients of most amino acids in broiler chickens, with the exception of arginine. This limited effect aligns with reports by Hernandez et al. (2004), Windisch et al. (2008) and Akintunde et al. (2024), who noted that the efficacy of phytogenics on nutrient digestibility can vary depending on the plant species, bioactive compound concentration, and dosage. The observed significant improvement in arginine digestibility in birds treated with 0.2 ml and 0.4 ml OGLE is noteworthy, as arginine plays a crucial role in nitric oxide synthesis, immune modulation, and growth performance in poultry (Castro et al., 2020). The increased arginine digestibility at moderate OGLE dosages suggests a potential enhancement of gut function and nutrient transport mechanisms, likely due to the antimicrobial, anti-inflammatory, and antioxidant properties of phenolic compounds in *O. gratissimum* (Alfifi et al., 2025; Akintunde et al., 2025).

The study further substantiated the claim of Hafeez et al. (2016) who observed enhanced ileal digestibility of amino acids in broilers' diets supplemented with phytogenic feed additives, and this was attributed to increased intestinal enzymatic activity. The relatively muted response to OGLE in this study could be due to the presence of bioactive compounds like eugenol and thymol at sub-therapeutic concentrations or antagonistic interactions at higher doses. These findings emphasize the importance of determining optimal inclusion levels to maximize the benefits of phytogenics without compromising nutrient absorption.

The observed alterations in apparent fecal digestibility coefficients, particularly in crude lipid and crude fibre, following *Ocimum gratissimum* leaf extract (OGLE) administration suggest a nuanced influence of phytochemicals on nutrient utilization. The significant reduction in lipid digestibility at 0.2 ml and 0.4 ml OGLE may be attributed to the presence of antinutritional factors such as tannins and saponins, known to interfere with lipid emulsification and micelle formation, thereby reducing fat absorption (Salim et al., 2023). However, the partial recovery at 0.6 ml OGLE (T4) implies a potential adaptive or modulatory effect of higher bioactive doses, possibly through stimulation of bile secretion or enzymatic activity.

Crude fibre digestibility followed a similar nonlinear trend, with peak performance at 0.4 ml OGLE, possibly due to enhanced microbial activity in the hindgut or improved secretion of fiber-degrading enzymes—effects attributed to essential oils and polyphenols in *O. gratissimum*. These findings align with previous research on other botanicals, such as thyme, oregano, marjoram, rosemary or yarrow, which enhanced fibre degradation by modulating gut microflora (Cross et al., 2007; Hashemi & Davoodi, 2011). The lack of significant changes in protein and ash digestibility across treatments indicates that OGLE may have limited or inconsistent effects on protein hydrolysis and mineral absorption.

The observed alterations in organ morphology and gastrointestinal parameters following the administration of *Ocimum gratissimum* leaf extract (OGLE) are consistent with prior studies that support the efficacy of phytogenic feed additives in poultry nutrition. Although relative organ weights and intestinal lengths did not differ significantly, the trend toward increased gut segment weights and lengths—especially at moderate doses—suggests enhanced gut development and function. This aligns with the findings of Akintunde et al. (2025), who reported improved intestinal morphology in broilers supplemented with medicinal plant extracts (Parquetina nigrescens leaf extract). The significant reduction in jejunal and crop pH observed at higher OGLE concentrations suggests increased gastrointestinal acidity, which may improve digestive efficiency and pathogen control. This outcome is comparable to findings by Akintunde et al. (2025), who reported that phytogenics like Parquetina nigrescens leaf extracts have acidifying effects in the gut, enhancing digestive enzyme activity and inhibiting pathogenic microbes. The observed proventricular temperature modulation, particularly the significant drop at 0.6 ml OGLE administration, may indicate altered metabolic or digestive responses to high OGLE doses. Temperature changes in the gut have been associated with shifts in microbial activity and nutrient metabolism (Hylander and Repasky, 2019), suggesting a physiological response to the phytochemicals present in OGLE.

These results underscore the functional benefits of OGLE in modulating gut environment and potentially improving broiler performance. The acidifying effect of OGLE, especially in the jejunum and crop, may support better nutrient assimilation and microbial control. Given the global movement toward reducing antibiotic growth promoters in poultry, OGLE additives represent promising natural alternatives.

CONCLUSION

The administration of varied dosages of *Ocimum gratissimum* leaf extract (OGLE) demonstrated dose-dependent effects on broiler chickens' performance, nutrient utilization, organ morphology, gastrointestinal temperature, and pH parameters. Moderate supplementation, particularly at 0.4 ml (T3), appeared to optimize feed conversion ratio and crude

protein digestibility without adversely affecting organ development or internal organ temperatures. Additionally, significant reductions in intestinal pH, especially in the jejunum and crop at higher dosages, suggest improved gut acidity, which may enhance nutrient absorption and microbial balance. However, excessive dosages (0.6 ml) may compromise thermal regulation and gut homeostasis. It is therefore recommended that OGLE be incorporated at 0.4 ml per bird to improve performance and nutrient utilization while maintaining physiological balance. Further studies are encouraged to evaluate long-term safety, mechanisms of action, and potential synergistic effects with other phytogenic additives.

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