Contents lists available at openscie.com
E-ISSN: 2961-7952
Open Global Scientific Journal
DOI: 10.70110/ogsj.v4i1.42
Journal homepage: https://openglobalsci.com

The Effect of Turmeric Powder Supplementation in Feed on Broiler Chicken Performance

Dwi Subakti Prastiyo[1]*, Rohmatul Anwar[1], Diah Reni Asih[1], Miftahudin Ahmad[1]

[1] Study Program of Animal Husbandry, Universitas Nahdlatul Ulama Lampung, Lampung Timur, Indonesia

*Correspondence E-mail: subaktiprastiyo@gmail.com

ARTICLE INFO

Article History:
Received 19 May 2025
Revised 21 June 2025
Accepted 27 June 2025
Published 14 July 2025

Keywords:
Body Weight,
Broiler Chicken,
Feed Conversion Ratio,
Feed Intake,
Performance,
Turmeric Powder.

ABSTRACT

Aims: This study aimed to evaluate the effect of turmeric (Curcuma longa) powder supplementation in the diet on the production performance of broiler chickens, including feed intake, body weight gain, and feed conversion ratio (FCR).
Methods: The experiment was arranged in a Completely Randomized Design (CRD) with four treatments: P0 (no turmeric powder), P1 (1% turmeric powder), P2 (2% turmeric powder), and P3 (3% turmeric powder), each with three replications.
Results: Statistical analysis showed that turmeric powder supplementation had no significant effect on feed intake ($P > 0.05$), with average intake ranging from 1262.67 to 1266.33 g/bird. However, turmeric supplementation had a significant effect ($P < 0.05$) on body weight gain and FCR. The P1 treatment (1% turmeric powder) resulted in the highest final body weight (1172.33 ± 2.01 g/bird) and the lowest FCR (1.0777 ± 0.02), indicating improved growth efficiency and feed utilization. Based on these findings, it can be concluded that turmeric powder supplementation up to 3% in the diet can enhance the growth performance of broiler chickens, with 1% being the most optimal level of supplementation, as there were no significant differences observed among the 1%, 2%, and 3% treatments.

To cite this article: Prastiyo, D. S., Anwar, R., Asih, D. R., Ahmad, M. (2025). The effect of turmeric powder supplementation in feed on broiler chicken performance. *Open Global Scientific Journal*, 4(1), 18–24.

1. Introduction

Indonesia's broiler chicken farming industry continues to grow rapidly in line with the increasing public demand for quality animal protein sources. However, the main challenges faced are production efficiency and livestock quality, amid concerns about using antibiotics as feed additives, which can leave

residues in the final product and contribute to antimicrobial resistance. Therefore, searching for safe and effective natural alternatives to improve broiler chicken performance is crucial (Nuningtyas *et al.,* 2022).

Feed additives are additional ingredients added in small amounts to livestock rations to improve livestock growth, health, and performance, including broiler chickens. Although not the primary source of nutrition, feed additives are crucial in improving feed quality and supporting the balance of beneficial microbes in the chicken's digestive tract, thereby increasing feed efficiency and livestock productivity. Generally, feed additives are divided into several types based on their function, including antibiotics, probiotics, prebiotics, enzymes, organic acids, antioxidants, and phytobiotics (Kurniawan *et al.,* 2021).

One widely researched alternative is using phytobiotics, such as turmeric powder (*Curcuma domestica*), in broiler chicken feed. Turmeric contains active compounds such as curcumin, which has antioxidant, antimicrobial, and anti-inflammatory properties, potentially improving digestive health, increasing feed efficiency, and supporting broiler growth and performance. Adding turmeric powder to feed and drinking water has increased body weight gain, feed consumption, and feed conversion efficiency in broiler chickens (Hendriana *et al.,* 2018).

The use of turmeric flour as a feed additive in broiler chicken rations has significant potential to improve livestock performance and health. Benefits include an enhanced immune system, antimicrobial effects, antioxidant properties, and increased growth rate. Furthermore, turmeric flour has significant antioxidant effects. These antioxidants protect chicken cells from oxidative damage caused by free radicals. Recent research has shown that adding turmeric flour does not increase feed intake and conversion but significantly increases body weight gain (Rahmat & Kusnadi, 2008).

This study aimed to examine the effect of adding turmeric flour to feed on broiler chicken performance, including growth, feed consumption, feed conversion efficiency, and carcass quality. This research is expected to provide an effective and safe natural feed additive alternative to synthetic antibiotics to increase broiler chicken productivity.

2. Methods

This research was conducted from February to March 2025 in Tanjung Kesuma Village, Purbolinggo District, East Lampung Regency. 60 one-day-old, unsexed broiler chicks (Cobb strain) were used. The chicks were raised for 35 days and fed a basal ration. The basal ration used was a commercial BR1 feed designed to meet the nutritional needs of broiler chicks during the starter phase. In addition to the basal ration, the chicks were also given a turmeric (*Curcuma longa*) flour mixture according to treatment and drinking water ad libitum. The nutrient composition of the commercial BR1 ration used in this study is presented in Table 1.

Table 1. Nutrient content of commercial ration BR1

Nutrient Content	Percentage (%)
Water	13
Protein	21-23
Fiber	5
Fat	5
Ash	7
Calcium	0.9
Phosphorus	0.6
Aflatoxin	50 PBB
Metabolic energy	2820-2920 Kcal/kg

Source: Packaging Label (2025)

This study used a completely randomized design (CRD) with four treatments and three replications, where each replication consisted of five broiler chickens. Hence, the number of DOC cobb used in this

study was 60 chickens. The treatment in this study was feeding with the addition of turmeric without changing the ration formulation with the following composition:

P0 = basal ration (BR1)
P1 = basal ration + 1% turmeric powder
P2 = basal ration + 2% turmeric powder
P3 = basal ration + 3% turmeric powder

The variables observed in this study are as follows:

Feed Consumption (kg/head/day)
Feed consumption (g/head/day) was calculated by subtracting the remaining feed from the amount of feed given, using the following formula (Jahejo et al., 2016):

Feed Consumption = Total Feed Given (g/head) – Feed Leftover (g/head)

Body Weight Gain (BWG) (kg/head/day)
Body weight gain (g/head/day) is the difference between the final body weight and the initial body weight, calculated using the formula (Jahejo et al., 2016):

BWG (g/head/day) = BWt – BWt-1

Description:
- BWG: Body Weight Gain (g/head)
- BWt: Final daily body weight (g/head)
- BWt-1: Initial daily body weight (g/head)

Feed Conversion Ratio (FCR)
The ratio between the amount of feed consumed by the livestock and the body weight gained over a certain period (Jahejo et al., 2016):

FCR = Feed Consumption / BWG

Description:
- BWG: Body Weight Gain (g/head)

Data Analysis
This study used a Completely Randomized Design (CRD), with four treatments and three replications. Analysis of Variance (ANOVA) was used to analyze the results. If there was a significant difference between treatments ($P < 0.05$), a further test, the Duncan test, was used.

3. Results and Discussion
3.1 Feed Intake
Based on the results presented in Figure 1, feed intake in the control group (P0) showed an average of 1262.67 grams. Treatment P1 recorded a feed intake of 1264.00 grams, P2 had 1263.33 grams, and P3 reached 1266.33 grams. These findings indicate that adding turmeric powder to broiler diets at various concentration levels had no significant effect on feed intake ($P > 0.05$). However, there was a tendency for increased feed intake in the group receiving the highest level of turmeric powder supplementation.

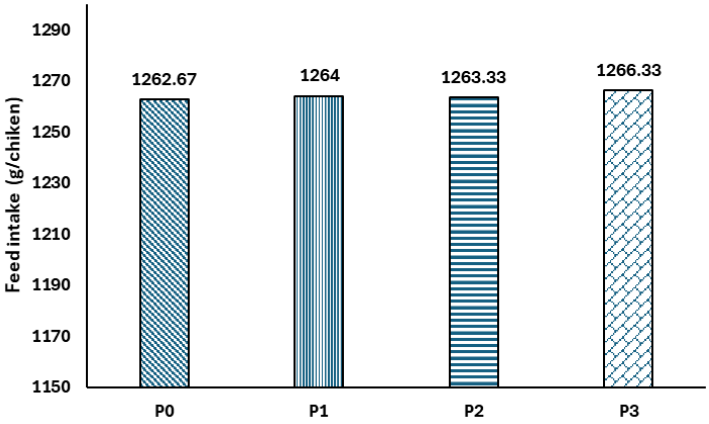

Figure 1. Feed intake of broiler chicken

Among the treatments, P3 (3%) exhibited the highest feed intake, although the increase was minimal and not statistically significant compared to the other groups. This relatively stable trend in feed intake suggests that turmeric powder supplementation up to 3% does not reduce the palatability or appetite of broiler chickens. Feed intake may also be influenced by the high nutrient content of the basal diet used in this study. According to Sinurat et al. (2021), turmeric powder supplementation up to 2% in broiler diets did not significantly affect slaughter weight or feed intake. Although there were effects on digestive organ weights, feed intake remained statistically unchanged between the turmeric-supplemented and control groups. Physiologically, feed intake in poultry is influenced by multiple factors such as palatability, energy content of the feed, and digestive health. Curcumin in turmeric is known to help stabilize gut microflora and reduce gastrointestinal infections, thereby contributing to stable feed intake (Hamid *et al.,* 2022).

This finding is consistent with Rasyid *et al.* (2021), who reported that up to 3% turmeric powder supplementation had no significant impact on broiler feed intake. Similarly, Abdullah *et al.* (2022) stated that turmeric inclusion in feed does not disrupt feed acceptance in chickens, provided it is administered within reasonable limits. Curcumin is recognized for its anti-inflammatory and antibacterial properties, which support gastrointestinal health and thereby indirectly help maintain stable feed intake (Hamid *et al.,* 2022).

The consistency in feed intake also suggests that broilers can adapt to the bioactive compounds in turmeric. The absence of a decrease in intake, even at the 3% level, indicates that turmeric powder remains within the sensory tolerance threshold for broilers. The slight variations in feed intake among treatments further suggest that turmeric supplementation, up to a certain level, does not reduce feed palatability. This implies that turmeric does not significantly alter feed preference, making it a viable additive that does not negatively impact feed intake behavior in poultry (Widodo *et al.,* 2018).

3.2 Body Weight Gain

The analysis results indicated that the addition of turmeric (*Curcuma longa*) powder to broiler chicken feed had a significant effect on body weight gain ($P < 0.05$). Based on the average data, broilers in the treatment groups receiving turmeric powder exhibited higher body weight gains compared to the control group (without turmeric) (Figure 2). The P0 treatment resulted in a body weight gain of 1164.18 grams, P1 produced 1172.33 grams, P2 reached 1171.40 grams, and P3 achieved 1171.63 grams. Treatments P1, P2, and P3 significantly increased the final body weight compared to the control group (P0), although there were no significant differences among the three turmeric-supplemented groups ($P > 0.05$).

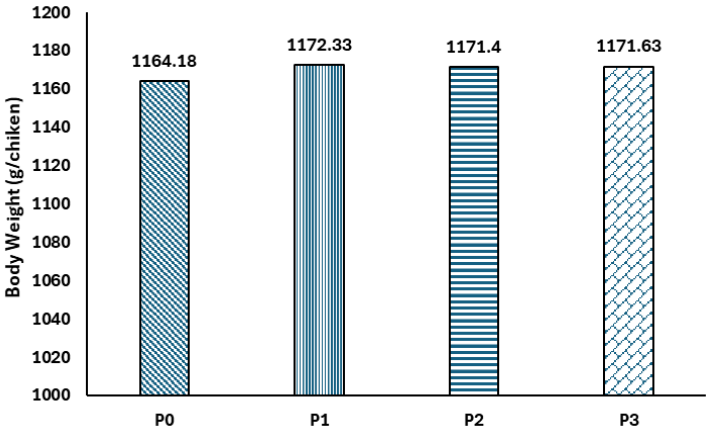

Figure 2. Body weight of broiler chicken

This improvement in body weight is likely due to enhanced metabolic rates, suggesting that turmeric supplementation improves feed utilization efficiency. Although feed intake was not significantly different, chickens receiving turmeric supplementation gained greater weight. The significant increase in body weight observed in the treatment groups is firmly attributed to the curcumin content in turmeric, which possesses antibacterial, anti-inflammatory, and gut performance-enhancing properties. Curcumin helps suppress the growth of pathogenic bacteria in the intestines, maintains microflora balance, and stimulates the secretion of digestive enzymes, leading to more efficient nutrient absorption (Hamid *et al.,* 2022). The weight gain observed in the treatment groups indicates that turmeric inclusion in the feed enhances nutrient utilization efficiency. This is likely due to the bioactive compounds in turmeric, especially curcumin, which have antimicrobial and anti-inflammatory effects that support digestive tract health, thereby optimizing nutrient absorption (Hamid *et al.,* 2022). The findings support Abdullah *et al.* (2022), who reported that turmeric, as a natural feed additive, can improve broiler growth performance. Curcumin has been shown to inhibit the growth of pathogenic microorganisms in the intestines and stimulate digestive enzyme secretion, thereby improving digestion and metabolism. Interestingly, although all turmeric-treated groups showed significant increases in body weight compared to control, the highest gain was observed at the 1% level (P1). Body weight gain tended to plateau at the 2% and 3% levels, suggesting that 1% is the optimal supplementation level in this study. Higher doses did not provide additional significant improvements in growth performance.

3.3 Feed Conversion Ratio

Based on statistical analysis, the addition of turmeric (Curcuma longa) powder to broiler diets had a significant effect on feed conversion ratio (FCR) ($P < 0.05$). The average FCR data showed that the treatment groups supplemented with turmeric had lower FCR values compared to the control group (Figure 3). The FCR values were 1.0843 for P0 (control), 1.0777 for P1, 1.0780 for P2, and 1.0803 for P3.

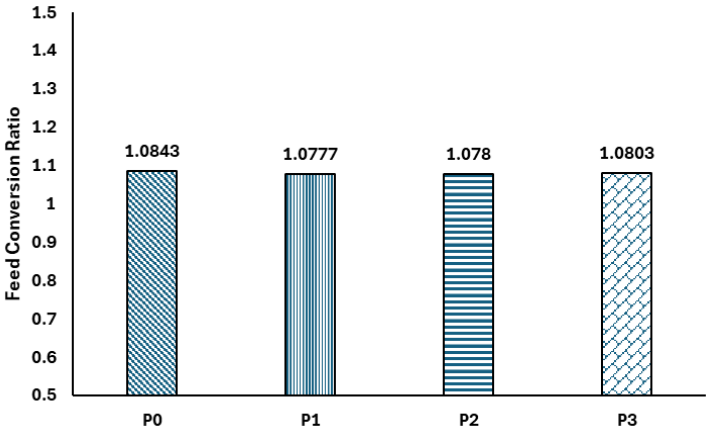

Figure 3. Feed Conversion Ratio of broiler chicken

A lower FCR value indicates that broiler chickens could convert feed into body weight more efficiently. The reduction in FCR observed in the turmeric-supplemented groups is likely due to the bioactive properties of curcumin, which enhance digestive function and metabolic efficiency (Hamid *et al.,* 2022). Curcumin possesses antimicrobial activity that helps suppress the growth of pathogenic bacteria in the gut, thereby improving digestion and nutrient absorption. These findings are consistent with studies by Sari *et al.* (2023) and Putra *et al.* (2021), which reported that turmeric supplementation at levels of 1–2% significantly reduced FCR in broilers. This supports the potential of turmeric as a natural feed additive to replace antibiotics, as it promotes feed efficiency without adverse effects. The lowest FCR in this study was recorded in treatment P1 (1% turmeric) at 1.0777, with slight increases observed at the 2% and 3% levels. This suggests that the 1% inclusion rate is the most efficient dosage for improving feed conversion, while higher levels of turmeric supplementation do not provide additional improvements in feed efficiency.

4. Conclusions

Adding turmeric (*Curcuma longa*) powder to broiler diets up to the 3% level did not significantly affect feed intake. However, it significantly impacted body weight gain, as treatments P1, P2, and P3 resulted in significantly higher final body weights than the control group (P0). The feed conversion ratio (FCR) also decreased significantly ($P < 0.05$) in the turmeric-supplemented groups compared to the control, with the best FCR observed in the 1% treatment group. These findings indicate that turmeric supplementation enhances feed utilization efficiency in broiler chickens.

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