Bantara Journal of Animal Science **p-ISSN: 2656-9701**
Vol. 7, No. 1, April 2025 **e-ISSN: 2657-1587**
DOI: https://dx.doi.org/10.32585/bjas.v7i1.6449 Journal homepage: https://journal.univetbantara.ac.id/index.php/bjas/index

Evaluation of Addition Tumeric Flour (*Curcuma domestica*) and Acidifier in Feed on Production Performance of Broiler During Starter Phase

Nur Maulida Wahyuni[1], Fatmawati Mustofa[1], Teysar Adi Sarjana[1], Hanna Dzawish Shihah1, Rina Muryani[1], Binti Ma'rifah[1], Edjeng Suprijatna[1], Dwi Sunarti[1], Lutfi Djauhari Mahfud [1], Sri Kismiati[1], Eko Widodo[2], Rositawati Indrati[2], Edhy Sudjarwo[2]

[1]Faculty of Animal and Agriculture Sciences, Universitas Diponegoro, Semarang, Indonesia
[2]Faculty of Animal Science, Universitas Brawijaya, Malang, Indonesia

[*]Corresponding author : nurmaulidawahyuni@lecturer.undip.ac.id

* *Received for review March 29, 2025 Accepted for publication April 10, 2025*

Abstract: This study evaluated the addition of turmeric flour (*Curcuma domestica*) and acidifier in feed on the production Performance of broilers during the starter phase. The materials used in this study were 240 unsexed DOC with an average weight of 40.55±1.69 g/bird. The research method was an experimental trial using a completely randomized design (CRD). There were six treatments and four replications, divided into T0 (commercial feed/basal feed + 0% acidifier + 0% turmeric powder), T1 (basal feed + 0% acidifier + 2.0% turmeric powder), T2 (basal feed + 0.5% acidifier + 1.5% turmeric powder), T3 (basal feed + 1.0% acidifier + 1.0% turmeric powder), T4 (basal feed + 1.5% acidifier + 0.5% turmeric powder), and T5 (basal feed + 2.0% acidifier + 0% turmeric powder). The results showed that the addition of turmeric flour and acidifier in broiler feed during both the starter and finisher phases had a significant effect ($p<0.05$) on mortality and no significant impact ($p>0.05$) on feed consumption, weight gain, starter body weight, and FCR. Adding turmeric flour and an acidifier could not increase feed consumption, weight gain, or starter body weight and reduce FCR. However, the addition of turmeric flour and acidifier was able to reduce mortality rates. Further testing related to dosage is needed to achieve the desired results.

Keywords: *Starter Phase; Broiler; Curcuma domestica; Acidifier; Production Performance.*

Copyright © 2025 The Author(s)
This is an open access article under the CC NC-BY-SA license

Introduction

The broiler industry has recently experienced rapid growth to meet the global demand for protein. As the demand for poultry products increases, the poultry industry continues to optimize production efficiency. During broiler rearing, there are two distinct phases: the starter and finisher phases, each requiring specific management strategies. The starter phase is a critical period that necessitates intensive attention to ensure optimal broiler growth. Broilers in the starter phase are highly susceptible to mortality due to the transitional and adaptive processes occurring in their bodies. Adequate nutrition is essential in the starter phase to support productivity in the subsequent finisher phase *(Istiyanto et al., 2024)*. The strategies for optimizing broiler productivity during the starter phase is improving feed management. Feed as crucial role in the poultry industry, 70-75% of total production costs (*Oladejo et al., 2024*). Feed has a significant impact on body weight as it determines the nutrient intake required for growth.

Optimizing feed management in the starter phase is essential for supporting optimal growth and improving feed efficiency without compromising broiler health. Farmers commonly supplement broiler diets with feed additives such as antibiotics to promote growth. However, antibiotic use has been banned due to concerns over residues in poultry meat, which, when consumed continuously, may pose health risks, including antimicrobial resistance, human health hazards, and adverse effects on poultry *(Li et al., 2022)*. Additionally, antibiotic usage has been associated with increased abdominal fat deposition in broilers, which may affect meat quality and consumer health. One of the alternative approaches to improving feed efficiency while ensuring safety is the incorporation of non-residual feed additives, such as phytobiotics and acidifiers.

Phytobiotics and acidifiers are feed additives that enhance health and feed efficiency without leaving harmful residues. Phytobiotics are derived from natural plant-based compounds that exhibit antioxidant, anti-inflammatory, and antimicrobial properties. Acidifiers, on the other hand, are organic acids that improve feed digestibility and gut health. Phytobiotics such as turmeric (*Curcuma domestica*) possess antioxidant, anti-inflammatory, and antimicrobial properties that support digestive health. The curcuminoid content in turmeric enhances appetite, suppresses pathogenic microbes, and improves feed efficiency, contributing to broiler growth and overall health. Turmeric, as a feed additive, contains curcuminoid compounds, including 71.5% curcumin, 19.4% demethoxycurcumin, and 9.1% bisdemethoxycurcumin *(Suprihatin et al., 2020)*. Curcumin, the primary active compound in turmeric, exhibits strong antioxidant activity by scavenging free radicals, protecting cells from oxidative damage, and supporting broiler digestive health (*Cozmin et al., 2024*). The supplementation of turmeric rhizome powder in broiler feed has been shown to significantly improve growth performance while effectively suppressing pathogenic microbes, particularly reducing the total Salmonella spp. count in the digestive tract (*Sultana et al., 2024*). Additionally, a decoction of turmeric and betel leaves in drinking water reduced mortality rates to 0% in specific treatment groups, compared to 3.125% in the control group *(Suryati et al., 2022*).

In addition to phytobiotics, acidifiers role in improving nutrient digestibility. Acidifiers enhance nutrient absorption by lowering the pH of the digestive tract. The supplementation of acidifiers in feed significantly reduces intestinal pH across various segments, increasing mineral solubility and utilization. This reduction in pH restricts the ability of phytates to form insoluble complexes with dietary minerals, thereby enhancing total gastrointestinal mineral retention and minimizing nutrient waste in feces. Consequently, this leads to improved nutrient absorption in broilers *(Idachaba et al., 2020)*. The use of acidifiers, such as citric acid and lime juice, has been reported to significantly enhance broiler productivity by improving digestibility and nutrient absorption *(Mahfudz et al., 2020)*. Other studies have shown that acidifiers significantly increase live body weight and reduce the feed conversion ratio (FCR) in broilers compared to control groups *(Khalil et al., 2020)*. The incorporation of acidifiers in feed has demonstrated positive effects on broiler growth performance by enhancing weight gain and feed efficiency. The application of acidifiers in broiler feed contributes to improved digestibility, nutrient absorption, and mineral retention, ultimately supporting optimal growth and enhanced broiler productivity.

Research on addition turmeric and acidifiers in broiler feed remains limited, particularly during the starter phase. This combination is hypothesized to have synergistic effects on broiler performance, phytobiotics enhance gut health and immune function, while acidifiers create an optimal environment for nutrient absorption. The supplementation of turmeric and acidifiers has the potential to improve feed efficiency, growth, and overall broiler health. Therefore, this study aims to evaluate the effects of addition *Curcuma domestica* and acidifiers in feed on broiler production performance during the starter phase, with a focus on optimizing production parameters, including feed intake, body weight gain, 14-days broiler weight, FCR, and broiler mortality.

Materials and Methods

The study used 240 Cobb strain broilers, divided into 24 flocks with 10 birds per flock, with an average DOC weight of 40.55±1.69 g/tail. The materials used in this study included *Curcuma domestica*, which contains 4.49% curcumin, and the acidifier PROS ACID G, with components listed in Table 1. Additionally, commercial feed was provided, consisting of starter phase feed and finisher phase feed. The nutritional composition of the commercial feed can be seen in Table 2.

Table 1. Components of Acidifier

Composition in 1.0 kg contains	Total
Formic acid	350.00 gm

Lactic acid	58.00 gm
Propionic acid	78.00 gm
Citric acid	99.50 gm
Silicon dioxide	19.50 gm
Carrier q.s to	1.00 kg

Produced by PROS ACID G

Table 2. Pakan komersil fase starter

Composition	Total
Water content	Maks. 12.00%
Ash	Maks. 7.00%
Crude protein	Min. 21.00%
Crude fat	Min. 5.00%
Crude fiber	Maks. 5.00%
Calcium	0.80-1.10%
Phosphor	Min. 0.50%

Produced by PT. Japfa Comfeed Indonesia Tbk.

The research method was experimental with 6 treatments. The treatments consisted of T0: Basal feed + 0% acidifier + 0% turmeric flour, T1: Basal feed + 0% acidifier + 2.0% turmeric flour, T2: Basal feed + 0.5% acidifier + 1.5% turmeric flour, T3: Basal feed + 1.0% acidifier + 1.0% turmeric flour, T4: Basal feed + 1.5% acidifier + 0.5% turmeric flour, and T5: Basal feed + 2.0% acidifier + 0% turmeric flour. Data collection was carried out during the maintenance process from day 1 to day 14. The data collected included daily feed consumption, weight gain (calculated by subtracting the first week's weight from the second week's weight), starter phase weight at 14 days, FCR (Feed Conversion Ratio), mortality, and performance index. The study was designed using a Completely Randomized Design (CRD). The data obtained were tabulated using Excel and analyzed with Analysis of Variance (ANOVA). If the treatments showed significant or highly significant effects, the analysis was continued with Duncan's Multiple Range Test.

Results and Discussion

The results of the study evaluating the addition of *Curcuma domestica* and acidifiers in feed on the production performance of broilers during the starter phase are presented in Table 3.

Table 3. The average production performance during the starter phase

Treatment	Feed Consumption (g/bird)	Weight gain (g/bird)	Starter weight body (g/bird)	FCR	Mortality (%)
T0	644,53±18,66	326,02±12,06	538,07±12,81	1,20±0,02	0,08±0,04^{ab}
T1	644,73±41,63	310,33±5,72	528,63±5,98	1,22±0,06	0,00±0,00^{a}
T2	629,56±25,52	305,28±8,68	528,93±10,83	1,19±0,04	0,03±0,04^{a}
T3	619,93±5,35	302,95±19,98	524,05±17,92	1,18±0,04	0,00±0,00^{a}
T4	617,59±7,65	309,00±16,43	525,58±20,96	1,18±0,03	0,00±0,00^{a}
T5	611,34±10,70	296,03±14,19	514,40±17,20	1,19±0,05	0,00±0,00^{a}

Different superscripts in the same row indicate significant differences ($p<0.05$)

The results of the study showed that the addition of *Curcuma domestica* and acidifiers in the feed did not significantly affect feed consumption ($p>0.05$) during the starter phase of broilers. The highest feed consumption in this study occurred in broilers given a combination of 0% acidifier and 2% turmeric flour. Previous research has indicated that the addition of turmeric flour in the feed can influence broiler feed consumption. Feed additives can affect feed consumption as they contain certain substances that can either decrease or increase the palatability of the feed for poultry (*Utama*

et al., 2024). Turmeric, as a feed additive, contains curcuminoid compounds known to enhance appetite. The rhizome of turmeric contains 71.5% curcumin, 19.4% demethoxycurcumin, and 9.1% bisdemethoxycurcumin (*Suprihatin et al., 2020)*. Additionally, the study results showed that feed consumption decreased, even lower than the T0 treatment, when acidifiers were added. The lowest feed consumption occurred in broilers given 2% acidifier (T5). Acidifiers role in lowering the pH in the digestive tract, which enhances the activity of digestive enzymes such as amylase, lipase, and trypsin *(Gao et al., 2021*). The increased activity of these enzymes enhances nutrient absorption efficiency, meaning that chickens can obtain more nutrients from less feed. However, the acidic nature of acidifiers can affect palatability. The level of palatability can influence feed consumption rates. Feed with low palatability makes poultry reluctant to consume it, resulting in lower feed consumption levels. Similarly, (*Gaol & Ida Ketut Mudhita, 2024)* reported that taste and odor of the feed can affect feed consumption

The analysis results showed that the addition of a combination of *Curcuma domestica* and acidifiers in the feed did not have a significant effect ($p>0.05$) on weight gain during the starter phase of broilers. *Sugiharto et al. (2020)* stated that the effect of adding acidified turmeric and/or black pepper on the growth performance and meat quality of broilers showed that the addition of acidified turmeric did not result in a significant increase in body weight gain. *Nova et al. (2015)* also noted that carcass weight, which can serve as an indicator of broiler body weight, was not significantly affected in broilers fed with turmeric flour in their diet. This suggests that the dosage used may not have been sufficient to achieve optimal results.

The study results showed that the FCR (Feed Conversion Ratio) of broilers in the starter phase given a combination of *Curcuma domestica* and acidifiers in the feed did not have a significant effect ($p>0.05$). The FCR value was not significantly affected ($p>0.05$). FCR is calculated by comparing feed consumption with the weight gained; higher feed consumption without corresponding weight gain leads to a higher FCR. The study indicated that both feed consumption and body weight of broilers were not significantly affected. While the combination of turmeric flour and acidifiers shows promise in reducing FCR and improving feed efficiency, it is important to consider the optimal dosage and formulation to avoid potential negative effects on growth and survival (*Mulyadi et al., 2022).* Another study found that higher levels of turmeric flour (4.0 or 6.0 g/kg) did not significantly affect the FCR (Feed Conversion Ratio). *(EL-Gogary et al., 2025)* Another study found no significant differences in FCR when different acidity levels of Garcinia acid (asam kandis) were used as an acidifier. *(Prasmanasari et al., 2022)*. The administration of acidifiers such as citric acid has been shown to improve growth performance and nutrient digestibility in broilers, but it does not impact the FCR (Feed Conversion Ratio). This is due to the effectiveness and variability of different types of acidifiers and their dosages *(Ali et al., 2020).*

The study results showed that the mortality rate of broilers in the starter phase given a combination of *Curcuma domestica* and acidifiers in the feed was significantly affected ($p<0.05$). The starter phase is a critical period in the life of broilers, as they are highly vulnerable due to their developing immune systems and the adaptation to a new environment. Mortality is associated with both dead and culled chickens. Factors contributing to mortality include diseases, poor management, and environmental stress *(Li et al., 2022)*. The highest mortality rate was observed in broilers that were not given any acidifier or turmeric flour (T0), at 0.08±0.04%. The antioxidant properties of turmeric, particularly through the Nrf2 signaling pathway, help reduce oxidative damage in the liver and intestines, further supporting the health of broilers (*Zhang et al., 2024)*.

The average mortality rate in the treatment group receiving 2g/kg turmeric flour was significantly lower at 1.40% compared to 2.17% in the control group (*Ali et al., 2020)*. The findings indicate that the inclusion of turmeric in broiler feed effectively reduces the burden of *Clostridium*

perfringens, which is associated with necrotic enteritis, thereby contributing to lower mortality rates in broilers. Additionally, the inclusion of acidifiers in the broiler diet has been linked to a reduction in harmful bacterial populations in the ileum and improved gut health *(Sedghi et al., 2024)*. Gut health is crucial for optimal nutrient absorption and immune function, which directly impacts the performance and survival rates of broiler chickens. Poor gut health can lead to increased mortality due to diseases such as necrotic enteritis and coccidiosis, which are common in commercial poultry production.

Conclusion

Based on the research results, it can be concluded that the addition of tumeric flour (Curcuma domestica) and acidifier in feed during starter phase has not been able to increase feed consumption, body weight growth, and starter weight, nor reduce FCR. However, the addition of the Curcuma domestica and acidifier has been able to reduce mortality rates. Further testing is needed regarding the dosage to achieve the desired results.

References

Ali, M., Islam, M., & Zaman, S. (2020). Effects of Turmeric Powder on Clostridium Perfringens Load in Broiler Chickens. *SAARC Journal of Agriculture*, *18*(1), 209–218. https://doi.org/10.3329/sja.v18i1.48394

Cozmin, M., Lungu, I. I., Gutu, C., Stefanache, A., Duceac, L. D., Șoltuzu, B. D., Damir, D., Calin, G., Bogdan Goroftei, E. R., Grierosu, C., & Boev, M. (2024). Turmeric: from spice to cure. A review of the anti-cancer, radioprotective and anti-inflammatory effects of turmeric sourced compounds. *Frontiers in Nutrition*, *11*(May), 1–12. https://doi.org/10.3389/fnut.2024.1399888

EL-Gogary, M. R., Dorra, T. M., & El-Sayed, I. A. (2025). Impact of dietary supplementation levels of turmeric powder (curcuma longa) on performance, carcass characteristics, blood biochemical, jejunum histological and gut microflora in broiler chickens. *Journal of Animal and Poultry Production*, *16*(1), 7–13. https://doi.org/10.21608/jappmu.2025.339434.1138

Gao, C. Q., Shi, H. Q., Xie, W. Y., Zhao, L. H., Zhang, J. Y., Ji, C., & Ma, Q. G. (2021). Dietary supplementation with acidifiers improves the growth performance, meat quality and intestinal health of broiler chickens. *Animal Nutrition*, *7*(3), 762–769. https://doi.org/10.1016/j.aninu.2021.01.005

Gaol, S. L., & Ida Ketut Mudhita. (2024). Broiler Chicken Performance with The Addition of Moringa Leaf Flour (Moringa oleifera) and Garlic Flour (Allium sativum L). *Bantara Journal of Animal Science*, *6*(2), 18–24. https://doi.org/10.32585/bjas.v6i2.5917

Idachaba, C. U., Abdullahi, I., & Kurtong, D. A. (2020). Effect of feed grade acidifiers on total tract mineral retention, intestinal pH and phytate utilization by broiler finisher chickens. *Nigerian Journal of Animal Production*, *44*(1), 282–289. https://doi.org/10.51791/njap.v44i1.941

Istiyanto, R. A., Hartati, L., & Sihite, M. (2024). Effect of Mengkudu Leaves (Morinda citrifolia) Extract in Drinking Water to Improve The Performance of Broiler Starter Phase. *Agrinimal Jurnal Ilmu Ternak Dan Tanaman*, *12*(2), 51–57. https://doi.org/10.30598/ajitt.2024.12.2.51-57

Khalil, K. K. I., Islam, M. A., Sujan, K. M., Mustari, A., Ahmad, N., & Miah, M. A. (2020). Dietary acidifier and lysozyme improve growth performances and hemato-biochemical profile in broiler chicken. *Journal of Advanced Biotechnology and Experimental Therapeutics*, *3*(3), 241–247. https://doi.org/10.5455/jabet.2020.d130

Li, G., Chesser, G. D., Purswell, J. L., Magee, C., Gates, R. S., Xiong, Y., Li, G., Chesser, G. D., Purswell, J. L., Magee, C., Gates, R. S., & Xiong, Y. (2022). Design and Development of a

Broiler Mortality Removal Robot. *Applied Engineering in Agriculture*, *38*(6), 853–863. https://doi.org/10.13031/aea.15013

Mahfudz, L. D., Sarjana, T. A., Suprijatna, E., Ma'rifah, B., & Suthama, N. (2020). Dietary Step-Down Protein with Addition of Acidifier to Improve Productive Effciency of Broiler Chickens. *Scholars Journal of Agriculture and Veterinary Sciences*, *7*(7), 170–176. https://doi.org/10.36347/sjavs.2020.v07i07.005

Mulyadi, A., Djunaidah, I. S., Rahardjo, S., & Batubara, A. S. (2022). The combination of Lactobacillus sp. and turmeric flour (Curcuma longa) in feed on growth, feed conversion and survival ratio of Litopenaeus vannamei Boone, 1931. *Depik*, *11*(2), 206–211. https://doi.org/10.13170/depik.11.2.25837

Nova, T. D., Sabrina, S., & Trianawati, T. (2015). The Effect of Various Amount of Turmeric Powder (Curcuma domestica Val) In Ration Toward the Carcass of Local (Pitalah ± West Sumatra) Duck. *Jurnal Peternakan Indonesia (Indonesian Journal of Animal Science)*, *17*(3), 200. https://doi.org/10.25077/jpi.17.3.200-209.2015

Oladejo, O. A., Akintaro, O., Ayoola, M. O., Kolawole, P. E., Oguntunji, A. O., & Alabi, O. M. (2024). Production of Insect-based Protein Meal as an Alternative to Conventional Sources in Livestock Enterprises. *Nigerian Journal of Animal Production*, 1362–1365. https://doi.org/10.51791/njap.vi.7032

Prasmanasari, M. B. W., Hermana, W., & Mutia, R. (2022). Evaluation of Kandis Acid (Garcinia xanthocymus) as Acidifier on Broiler Performance . *Proceedings of the 6th International Seminar of Animal Nutrition and Feed Science (ISANFS 2021)*, *21*(November 2019), 106–111. https://doi.org/10.2991/absr.k.220401.023

Sedghi, M., Azghadi, M., Mohammadi, I., Ghasemi, R., Sarrami, Z., & Abbasi, M. (2024). The Effects of Acidifier Inclusion in the Diet on Growth Performance, Gastrointestinal Health, Ileal Microbial Population, and Gene Expression in Broilers. *Brazilian Journal of Poultry Science*, *26*(2). https://doi.org/10.1590/1806-9061-2023-1847

Sugiharto, S., Pratama, A. R., Yudiarti, T., Wahyuni, H. I., Widiastuti, E., & Sartono, T. A. (2020). Effect of acidified turmeric and/or black pepper on growth performance and meat quality of broiler chickens. *International Journal of Veterinary Science and Medicine*, *8*(1), 85–92. https://doi.org/10.1080/23144599.2020.1830691

Sultana, R., Sohag, A. A. M., Hossain, M. T., & Hannan, M. A. (2024). Dietary Supplementation of Turmeric Rhizome Promotes the Growth Performance, Serum Lipid Profile and Intestinal Microflora of Broilers. *Journal of Science and Technology Research*, *6*(1), 117–124. https://doi.org/10.3329/jscitr.v6i1.77383

Suprihatin, T., Rahayu, S., Rifa'i, M., & Widyarti, S. (2020). Compounds in Turmeric Rhizome Powder (Curcuma longa L.) which have Potential as Antioxidants. *Buletin Anatomi Dan Fisiologi*, *5*(1), 35–42. https://doi.org/10.14710/baf.5.1.2020.35-42

Suryati, Y., Santoso, U., & Fenita, Y. (2022). The influence of turmeric and betel leaf decoction at different concentration as drinking water on broiler chicken performance). *Buletin Peternakan Tropis*, *3*(1), 1–7. https://doi.org/10.31186/bpt.3.1.1-7

Utama, A. P., Mayasari, N., Yuniarti, E., & Ramdani, D. (2024). The effect of green tea dust as a feed additive on performance ewes infected by strongyles. *Jurnal Agripet*, *24*(1), 95–105. https://doi.org/10.17969/agripet.v24i1.30182

Zhang, J., Sun, X., Chai, X., Jiao, Y., Sun, J., Wang, S., Yu, H., & Feng, X. (2024). Curcumin

Mitigates Oxidative Damage in Broiler Liver and Ileum Caused by Aflatoxin B1-Contaminated Feed through Nrf2 Signaling Pathway. *Animals*, *14*(3). https://doi.org/10.3390/ani14030409