



The Potential of *Centella asiatica* as a Feed Additive: Effects on Performance in Poultry

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Abstract

Livestock productivity in poultry production largely depends on feed efficiency and animal health, particularly in broiler chickens, where rapid growth and efficient feed utilization are essential production targets. The use of Antibiotic Growth Promoters (AGPs) has been strictly limited due to concerns regarding antimicrobial resistance. Therefore, natural compounds have emerged as promising alternatives in the modern poultry industry. *Centella asiatica*, a medicinal plant widely recognized for its bioactive compounds such as triterpenoids, saponins, and flavonoids, possesses antioxidant, anti-inflammatory, and antimicrobial properties that may positively influence poultry metabolism and growth performance. This study aims to evaluate the potential and effectiveness of *C. asiatica* as a feed additive in improving feed intake and growth performance in poultry, especially broiler chickens. A systematic review was conducted using scientific publications from 2016 to 2026 obtained through online databases, including Google Scholar, PubMed, and ScienceDirect. The results of this review indicate that the addition of *C. asiatica* in poultry diets can improve feed intake, enhance nutrient utilization, and promote better growth performance. Several studies reported that the addition of *C. asiatica* at optimal levels results in increased body weight gain and improved feed efficiency among poultry. In conclusion, *C. asiatica* represents an effective natural approach to enhancing growth performance and feed efficiency, making it a highly relevant application in sustainable and antibiotic-free poultry production systems.

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INTRODUCTION

Poultry productivity is one of the important indicators in poultry production systems (Dewi et al., 2025). Feed efficiency directly contributes to increased body weight gain, improved feed conversion ratio, and reduced production costs in poultry production (Gaillard et al., 2020). The increasing human population has led to a continuous rise in demand for poultry-derived food

products such as meat and eggs (Yunita et al., 2025). Therefore, modern poultry production systems must prioritize improvements in feed quality and efficiency to ensure that production can meet this growing demand.

Antibiotic Growth Promoters (AGPs) have long been used in poultry production systems to enhance animal performance, including accelerating growth, improving feed efficiency, and maintaining gastrointestinal health. In the digestive tract, AGPs suppress the growth of pathogenic microorganisms, thereby allowing more optimal and efficient nutrient absorption (Salim et al., 2018). However, the long-term use of AGPs in poultry production raises several serious concerns, particularly the increased risk of antimicrobial resistance, which can affect both animal and human health (Sachdeva et al., 2025). Antibiotic residues in poultry-derived products also raise concerns regarding food safety and product quality for consumption (Umam et al., 2023). As a result, the use of AGPs in poultry production systems has been restricted and even banned in many regions as a response to these negative impacts (Salim et al., 2018). This situation has encouraged researchers and industry stakeholders to develop various feed additive alternatives that are safer, more sustainable, and still effective in improving poultry productivity.

Natural feed additives have been developed as an alternative to AGPs in poultry production systems to maintain and enhance poultry performance, including promoting growth, improving feed efficiency, and supporting gastrointestinal health. Herbal plants contain antioxidant compounds with diverse biological activities that contribute to physiological functions as antimicrobial and immunomodulatory agents (Fahlevi et al., 2025). When included in poultry feed, these compounds can improve production performance, enhance gut health, stabilize intestinal microflora, and strengthen the immune system of poultry species. Feed additives based on natural ingredients provide a positive impact on overall poultry management efficiency (Honan et al., 2021). This approach serves as a strategic solution to support sustainable and environmentally friendly poultry production systems that do not rely on synthetic antibiotics.

Herbal plants with strong potential to be developed as feed additives include *Centella asiatica*, commonly known as gotu kola (Ajayi et al., 2020). This plant has long been used in traditional medicine and is known to contain a relatively complete range of bioactive compounds, such as triterpenoids, flavonoids, and saponins (Dewi & Yuniati, 2025). These compounds exhibit antioxidant, anti-inflammatory, and antimicrobial activities that can contribute to improving poultry health, particularly in the gastrointestinal tract. In addition, the bioactive constituents of *C. asiatica* may enhance nutrient utilization efficiency and improve immune responses, thereby increasing poultry resistance to stress and diseases (Herwintono et al., 2023). These effects can indirectly enhance feed intake and poultry growth performance, making this plant a promising candidate for the development of natural feed additives. According to Tribudi & Nurfianti (2017), the inclusion of *C. asiatica* leaves in the diet resulted in the best feed utilization efficiency compared to the control diet, indicating that this treatment was more effective in improving feed utilization efficiency in quail egg production.

Based on the above background, this literature review aims to evaluate the potential and effectiveness of *C. asiatica* as a feed additive in improving feed intake and poultry growth performance across various poultry species. This study is conducted through a systematic review approach of relevant scientific literature in order to provide a more comprehensive overview of the effectiveness of this plant when included in poultry diets. The novelty of this review lies in its specific focus on the poultry sector, integrating and comparing findings from different poultry

species, namely broilers, laying hens, and quails. In addition, the findings of this review are expected to serve as a scientific basis for the development of innovative natural feed ingredients that not only enhance poultry productivity but also support a sustainable, safe, and environmentally friendly poultry production system in the future.

MATERIAL AND METHOD

This study employed a systematic literature search across Google Scholar, PubMed, and ScienceDirect, covering publications from 2016 to 2026. The primary keyword “*Centella asiatica*” was explicitly used and combined with related terms (“feed additive,” “poultry,” “feed intake,” and “poultry growth performance”). Eligible studies were original research articles evaluating *C. asiatica* as a feed additive in poultry and reporting feed intake and/or growth performance. Only peer-reviewed articles published in English or Indonesian were included, while duplicates, review papers, non-poultry studies. A total of 829 articles were initially identified through the database search, and after applying the inclusion and exclusion criteria, 3 articles remained eligible for title and abstract screening. of 829 were identified. Data extracted included animal species, experimental design, dosage, feeding duration, feed intake, and growth performance parameters. Additional studies were identified through screening of reference lists and citation tracking, resulting in 10 studies included in the qualitative synthesis. Risk of bias was assessed using a modified version of the SYRCLE Risk of Bias Tool (Yunita & Rahayu, 2025), and the study selection process is presented in Figure 1.

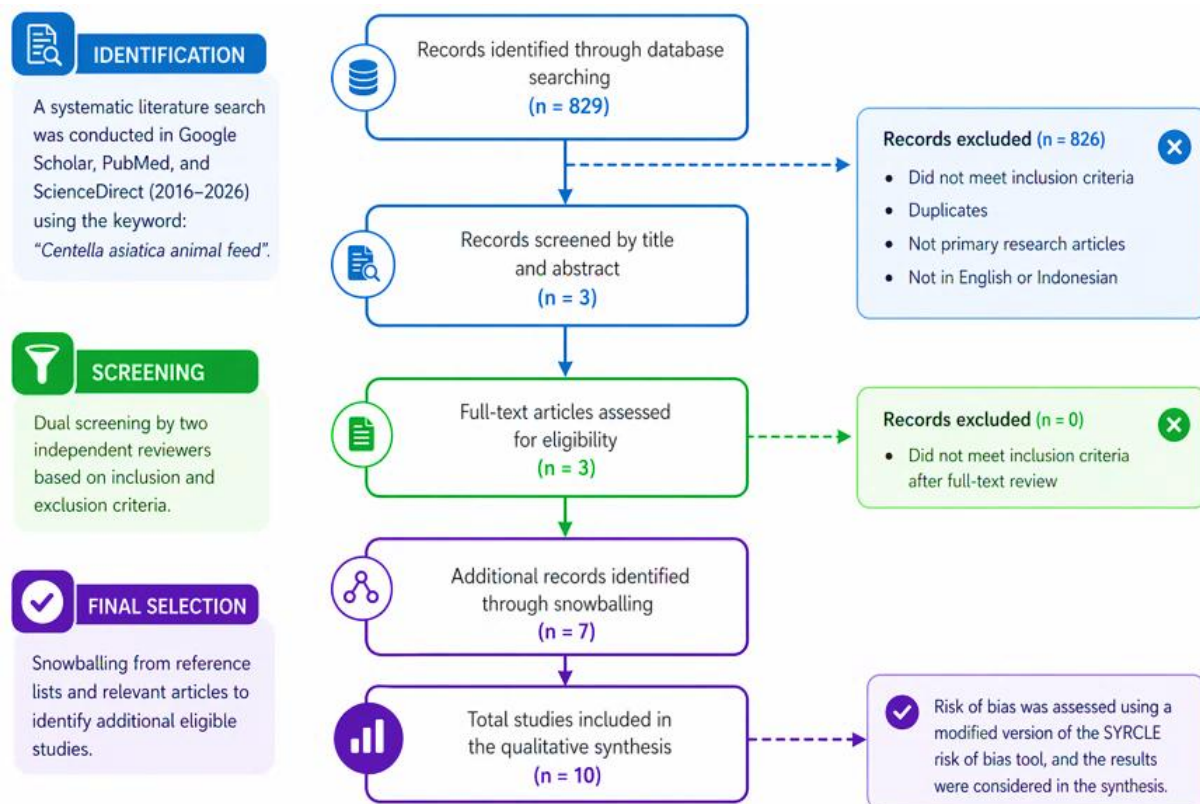


Figure 1. Flow diagram illustrating the article screening and selection process

RESULT AND DISCUSSION

Bioactive Compounds of *Centella asiatica*

Centella asiatica is known as a medicinal plant with a highly diverse composition of bioactive compounds and strong potential for application in natural poultry nutrition. Its chemical constituents include various secondary metabolites such as triterpenoids, flavonoids, phenolic compounds, and essential oils that contribute to its biological activity, with the triterpenoid fraction, particularly in the form of saponins, being the most dominant and widely studied due to its broad physiological effects (Dewi & Yuniati, 2025). The diverse bioactive compounds in *C. asiatica* enable this plant to function not only as a feed additive but also as a functional agent capable of modulating various multiple metabolic pathways in poultry. These pathways include antioxidant defense mechanisms through enhanced activities of superoxide dismutase (SOD) and catalase enzymes, immunomodulatory responses via stimulation of cytokine production and immune cell activity, as well as protein and energy metabolism associated with improved nutrient utilization efficiency. Collectively, these biological mechanisms may enhance immune function and improve the adaptive capacity of poultry under various stress conditions, including environmental and metabolic stress (Rusli et al., 2025).

The major triterpenoid compounds found in *C. asiatica* include asiaticoside, madecassoside, asiatic acid, and madecassic acid, which are known to possess strong antioxidant and anti-inflammatory activities (Tan et al., 2021). The physiological condition of poultry is often challenged by oxidative stress, which can limit optimal performance due to cellular damage and disruption of metabolic processes. These triterpenoid compounds play a role in neutralizing free radicals while strengthening the endogenous antioxidant defense system, thereby reducing cellular damage (Tumilaar et al., 2024). This mechanism contributes to improved tissue condition, optimized physiological functions, and enhanced efficiency in nutrient utilization. The downstream effects of these processes are reflected in improved poultry production performance and feed conversion ratio.

Flavonoids and phenolic compounds in *C. asiatica* contribute significantly as effective natural antioxidants through mechanisms involving free radical scavenging and inhibition of lipid peroxidation, which can otherwise damage cell membranes (Sabaragamuwa & Perera, 2023). Maintenance of membrane integrity is essential to support optimal tissue function, particularly in the gastrointestinal tract, which plays a central role in digestion and nutrient absorption. A healthy digestive system enhances enzymatic activity and improves nutrient transport efficiency, resulting in better feed intake and improved feed conversion efficiency in poultry (Bedford & Apajalahti, 2022). Furthermore, bioactive compounds in *C. asiatica* are able to modulate gut microbiota through selective antimicrobial activity, where saponins and phenolics suppress pathogenic microorganisms while supporting the growth of beneficial bacteria (Bala et al., 2023). A balanced microbial ecosystem is crucial for maintaining digestive stability in both ruminant and monogastric animals, improving gut health and nutrient absorption efficiency, which ultimately contributes to enhanced overall growth performance in poultry.

Anti-inflammatory activity of bioactive compounds in *C. asiatica* plays an important role in maintaining poultry health, as subclinical inflammation often arises due to environmental stress, mild infections, or nutritional imbalances that can disrupt metabolic efficiency (Kwon et al., 2025). The overall bioactive compound profile of *C. asiatica* provides a strong scientific basis for its potential as a functional natural feed additive, where the synergistic interaction among

triterpenoids, flavonoids, and phenolic compounds supports multiple physiological mechanisms, including enhancement of the antioxidant defense system, maintenance of gut health, and regulation of microbial balance (Rusli et al., 2025). These combined effects contribute to improved metabolic efficiency and more effective nutrient utilization, making the use of *C. asiatica* as a feed additive a promising alternative for improving feed intake and growth performance in a sustainable manner while reducing dependence on synthetic additives. However, its effectiveness is still influenced by the application dosage, duration of supplementation, and the stability of its bioactive compounds during feed storage and mixing processes (Alagbe et al., 2018).

Effects of *Centella asiatica* on Feed Intake and Growth Performance in Poultry

Centella asiatica exhibits multifunctional potential in poultry nutrition systems, particularly in improving feed intake and growth performance, due to its bioactive compounds such as triterpenoids, flavonoids, and polyphenols, which contribute to improved feed palatability, digestive efficiency, and gastrointestinal health. Its antioxidant and anti-inflammatory properties help reduce oxidative stress, which can limit optimal growth performance in poultry (Dewi & Yuniati, 2025). These bioactive compounds also support better nutrient utilization by enhancing metabolic activity and gut microbiota balance, thereby improving feed intake, feed conversion efficiency, and weight gain in poultry (Bala et al., 2023). In broiler chickens, supplementation with *C. asiatica* has been associated with increased growth rate, higher body weight gain, and better feed conversion ratio due to improved nutrient absorption and gut health. In laying hens, it may contribute to improved health status and production performance through its antioxidant activity. Several studies in quail have also reported positive effects on feed intake and growth efficiency after the addition of *C. asiatica* to the diet. Therefore, the use of *C. asiatica* as a natural feed additive is a promising strategy to support sustainable and antibiotic-free poultry production systems, and Table 1 summarizes the findings from various studies evaluating the effects of *C. asiatica* supplementation on feed intake and growth performance in poultry species.

A wide range of studies has demonstrated that supplementation of *Centella asiatica* in poultry feed improves production performance, particularly by increasing feed intake, body weight gain, and feed conversion ratio in broiler, laying hens, and quail. The addition of *C. asiatica* in the form of powder, extract, or in combination with other herbal ingredients generally improved poultry growth performance compared to the non-supplemented group, although the magnitude of the response may vary among poultry species due to differences in digestive physiology, metabolic rate, supplementation dosage, and the form of preparation used. This variation is influenced by differences in poultry type, dosage levels, and processing methods of bioactive compounds. Findings from broiler chickens and quail show relatively stable improvements in productivity, further supporting the potential of *C. asiatica* as a phytogenic feed additive that can be utilized in poultry production systems to promote more efficient, natural, and environmentally friendly growth performance (Ajayi et al., 2020). These findings are increasingly relevant in the context of the ongoing shift in modern poultry production systems away from the use of antibiotic growth promoters.

Table 1. Summary of Studies on the Effects of *Centella asiatica* as a Feed Additive on Feed Intake and Poultry Growth Performance in Broiler, Laying Hens, and Quail

Author	Treatment	Result
Tribudi & Nurfianti (2017)	Addition of <i>Centella asiatica</i> leaf flour to quail feed with concentrations of 0.5% (P1), 1% (P2), and 1.5% (P3).	This study showed that the best feed intake, hen-day egg production, feed conversion, and quail egg weight were obtained at P3 (1.5% addition <i>Centella asiatica</i> leaf flour).
Falasifah, et al. (2018)	The addition of cinnamon bark flour and <i>Centella asiatica</i> leaf flour to quail feed in eight treatments with four replications, namely control feed, feed added with 5% and 10% cinnamon bark flour, 5% and 10% <i>C. asiatica</i> leaf flour, and a combination of cinnamon bark flour and <i>C. asiatica</i> leaf flour with a ratio of 5%:5%, 5%:10%, and 10%:5%.	The combination of cinnamon bark meal and <i>Centella asiatica</i> in the diet improved feed intake, body weight gain, and growth rate of quail, with the best results observed at ratios of 5%:10% and 10%:5%, making it a recommended strategy to enhance productivity.
Dewi, et al. (2018)	The addition of <i>Centella asiatica</i> powder feed additive to the percentage of carcass and abdominal fat of broiler chickens with treatment A = without <i>C. asiatica</i> powder; B = 1.5% <i>C. asiatica</i> powder; C = 3% <i>C. asiatica</i> powder and D = 4.5% <i>C. asiatica</i> powder.	Broiler chicken body weight was higher at level D = 4.5% <i>Centella asiatica</i> powder. The additive compounds in <i>C. asiatica</i> , used as a feed additive, can stimulate the immunity of broiler chickens, resulting in better body weight but does not affect carcass and abdominal fat percentage.
Amir, et al. (2019)	The addition of <i>Centella asiatica</i> leaf flour as a feed additive in broiler chicken rations on feed consumption and physiological organ weight with 100% basic ration (A), basic ration with 1.5% <i>C. asiatica</i> leaf flour (B), basic ration with 3% <i>C. asiatica</i> leaf flour (C), basic ration with 4.5% <i>C. asiatica</i> leaf flour (D)	Higher inclusion levels of <i>Centella asiatica</i> leaf meal tended to produce a more optimal response, although the differences were not statistically significant. Inclusion of up to 4.5% in broiler diets did not significantly affect feed intake or physiological organ weights, likely because the supplementation level was relatively low and did not substantially alter the overall nutrient composition of the diet.
Ariqoh, et al. (2019)	The addition of <i>Centella asiatica</i> leaf juice and carrot waste in quail drinking water was applied under the following treatments: P1 (control), P2 (commercial vitamin supplement), P3 (carrot waste + 5%	Supplementation of <i>Centella asiatica</i> leaf juice and carrot waste in the drinking water of male quail did not significantly affect performance parameters, including feed intake, body weight gain, feed conversion ratio, initial body weight, final

	<p><i>C. asiatica</i> leaf juice), P4 (carrot waste + 10% <i>C. asiatica</i> leaf juice), and P5 (carrot waste + 15% <i>C. asiatica</i> leaf juice), with comparisons made against the control and commercial vitamin supplementation.</p>	<p>body weight, and carcass weight. However, a 5% inclusion level increased meat MDA content by 55.652% compared to the control.</p>
Sunarno, et al. (2019)	<p>The addition of cinnamon bark and <i>Centella asiatica</i> leaf meal in quail diets at a single level of 5% and in combined levels of 5–10%, using a control and several ratio combinations in a completely randomized design.</p>	<p>Supplementation of cinnamon bark and <i>Centella asiatica</i> in quail diets increased body weight and antioxidant content while reducing cholesterol levels in breast meat, with the best results observed at 5% cinnamon or a 5%:10% combination of cinnamon and <i>C. asiatica</i>.</p>
Nurmalia, et al. (2020)	<p>Addition of <i>Centella asiatica</i> extract to laying hen feed at the following concentrations: (P0: no <i>C. asiatica</i> extract), (P1: 0.04% <i>C. asiatica</i> extract), (P2: 0.08% <i>C. asiatica</i> extract), and (P3: 0.12% <i>C. asiatica</i> extract).</p>	<p>Supplementation of 0.04% <i>Centella asiatica</i> extract is effective in reducing glucose and triglyceride levels in laying hens. The use of <i>C. asiatica</i> extract in rations should not exceed 0.04% to prevent glucose and triglyceride levels from dropping below the normal range.</p>
Ajayi, et al. (2020)	<p>Supplementation broiler diets with <i>Centella asiatica</i> leaf meal at different levels, namely a basal diet + 0% <i>C. asiatica</i> leaf meal (T1), a basal diet + antibiotic (T2), and basal diets supplemented with 3%, 4%, 5%, and 6% <i>C. asiatica</i> leaf meal for T3, T4, T5, and T6, respectively.</p>	<p>The basal diet supplemented with 4% <i>Centella asiatica</i> leaf meal (T4) resulted in the best performance, with increased body weight gain, feed intake, and improved feed conversion efficiency, without adverse effects on carcass characteristics, indicating its potential as an effective phytogetic feed additive for broiler chickens.</p>
Herwintono, et al. (2023)	<p>The addition of <i>Centella asiatica</i> powder to broiler chicken feed at levels of 0%, 0.5%, 1%, 1.5%, and 2%, which was given ad libitum.</p>	<p>Supplementation of <i>Centella asiatica</i> powder in broiler diets up to a 2% level increased hemoglobin, hematocrit, and several leukocyte parameters, indicating improved hematological status without affecting most erythrocyte indices, with responses tending to improve as the inclusion level increased.</p>
Rusli, et al. (2025)	<p>The treatment involved extracting <i>Centella asiatica</i> leaf meal using two types of solvents, namely distilled water and hot distilled water at 100°C, with extraction times ranging from 15 to 75 minutes. The most effective extract was then applied as a potential</p>	<p>Hot water extraction for 75 minutes produced the highest phenolic and flavonoid contents, as well as the strongest antioxidant activity, while the 100% extract exhibited the greatest inhibitory effect against <i>Escherichia coli</i> and <i>Salmonella</i> sp., indicating its</p>

broiler feed additive and evaluated potential as an antimicrobial broiler feed
for its antibacterial activity through additive.
in vitro testing.

The restriction on the use of Antibiotic Growth Promoters (AGPs) in poultry feed due to increasing concerns over antimicrobial resistance has encouraged the development of safer and more sustainable natural feed additives (Abbas et al., 2026). This global trend has created opportunities for the utilization of medicinal plants as alternatives, including *C. asiatica*, which has been shown to improve poultry production performance. Supplementation of *C. asiatica* in poultry diets is known to influence productivity and growth through enhanced feed intake, improved feed conversion efficiency, and increased daily body weight gain, all of which reflect faster, more uniform, and more efficient growth compared to non-supplemented groups (Darmawan et al., 2025). This improvement in growth is also associated with a greater ability of poultry to utilize nutrients more effectively, allowing dietary energy to be directed more efficiently toward tissue development. Therefore, *C. asiatica* has strong potential as a natural alternative to AGPs in supporting more productive, efficient, and sustainable poultry production systems.

CONCLUSION

Centella asiatica shows considerable potential as a natural feed additive in poultry production by improving feed intake, nutrient utilization, and poultry growth performance. Its bioactive compounds, including triterpenoids, saponins, and flavonoids, contribute to antioxidant, anti-inflammatory, and antimicrobial effects that support better gut health and immune function in poultry species such as broiler, laying hens, and quail. Overall, the application of *C. asiatica* in poultry feed can enhance productivity and feed conversion ratio, making it a promising alternative for sustainable and antibiotic-free poultry production systems.

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