JURNAL SAINS DAN TEKNOLOGI INDUSTRI PETERNAKAN

EFFECT OF ETHANOL EXTRACT OF KETAPANG LEAVES (*Terminalia catappa*) THROUGH DRINKING WATER ON BROILER CHICKEN PRODUCTIVITY

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Article history:
Received: 14-05-2026
Revised: 10-06-2026
Accepted: 11-06-2026

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ABSTRACT: The increasing demand for animal protein, especially from broiler chickens, must be balanced with improved broiler productivity. Antibiotic Growth Promoters (AGPs) are known to improve broiler growth performance; however, excessive use may lead to antibiotic residues and antimicrobial resistance. Therefore, safe and effective natural alternatives are needed. Ketapang leaves (*Terminalia catappa*) contain bioactive compounds such as flavonoids, tannins, saponins, phenols, and essential oils that have potential as natural antibacterial and antioxidant agents. This study aimed to determine the effect of ethanol extract of ketapang leaves administered through drinking water on broiler productivity, including feed consumption, body weight gain (BWG), and Feed Conversion Ratio (FCR). A total of 60 broiler chickens strain MB 202 aged 8–28 days were reared in a semi-closed house using a Completely Randomized Design (CRD) with 4 treatments and 5 replications. The treatments consisted of P0 (control), P1 (0.1 ml/100 ml drinking water), P2 (0.2 ml/100 ml drinking water), and P3 (0.3 ml/100 ml drinking water). The data were analyzed using ANOVA followed by Duncan's test at a 5% significance level. The results showed that ketapang leaf extract had a significant effect ($P<0.05$) on feed consumption, BWG, and FCR. Treatment P2 produced the highest BWG (1430.32 g/bird) and the lowest FCR value (1.24). These findings suggest that ketapang leaf ethanol extract may be used as a natural feed additive to support broiler productivity.
Keyword: Body weight gain; Broiler chicken; Feed consumption; Feed conversion rasio; ketapang leaf ethanol extract.

INTRODUCTION

Indonesia's increasing population growth, coupled with public awareness of the importance of animal protein consumption, has led to an increase in livestock production, particularly meat, to meet the population's nutritional needs. According to a report by the National Research Agency, poultry contributes significantly to animal protein consumption in Indonesia, accounting for 67%. Broiler chickens are one of the most widely cultivated poultry commodities as a source of animal protein.

Broiler chickens are known as superior livestock because they have a high level of productivity and good feed absorption efficiency, as reflected in the Feed Conversion Ratio (FCR) value above 1.7 (Suprijatna *et al.,* 2022). In addition, according to Wulandari *et al.,* (2024), broiler chickens can be harvested at the age of 4-6 weeks with a final body weight between 1.5 and 2 kilograms, making them the primary choice to meet the community's food needs. Therefore, productivity in the livestock sector must be increased to meet the community's nutritional needs. According to (Widianingrum & Septio, 2023), meeting the need for animal protein needs needs to be done through increased industrial development in the livestock sector.

As the demand for chicken meat continues to increase, it opens up opportunities for the veterinary drug industry to develop Antibiotic Growth Promoters (AGPs) that can maximize and accelerate the growth of ideal chicken body weight in a limited time (Sihombing & Fajri, 2024). One method commonly used to increase broiler productivity is the administration of AGPs (Afifah *et al.,* 2021). AGPs themselves exert their effects through changes in mitochondrial function in chicken intestinal cells, mitochondria have a crucial role as the main driver of energy metabolism (Sihombing &

Fajri, 2024). The administration of AGPs has been shown to increase the growth rate of broiler chickens by 3.8–11.1%, while improving the efficiency of the Feed Conversion Ratio (FCR) in the range of 3.9–8.2% (Prasetyo *et al.,* 2020). The addition of AGPs to broiler chickens can optimize growth performance in these chickens, thereby supporting productivity in the livestock sector and can meet the need for animal protein consumption. However, according to Sheby *et al.,* (2023), inappropriate antibiotic use can leave residues in livestock products, reduce product quality, endanger consumer health, and trigger antimicrobial resistance. Therefore, the use of AGPs needs to be closely monitored to prevent negative impacts. Continued use of feed additives can lead to the formation of metabolic products in the form of antibiotic residues (Putri *et al.,* 2014).

As public awareness of healthy and safe food increases, natural, safe, and consumer-friendly alternatives to antibiotics are needed. Absorption of natural ingredients is considered safer and has the potential to support sustainability in livestock production systems (Fadilla *et al.,* 2025). According to Suprijatna *et al.,* (2022), ketapang leaves are a source of natural ingredients rich in bioactive compounds. These leaves are known to contain various secondary metabolites with biological activity so they can be used as natural additives to improve livestock health and productivity. According to Sheby *et al.,* (2023), ketapang leaves contain bioactive compounds such as flavonoids. Flavonoid bioactive compounds in broiler chickens function to increase nutrient absorption which can optimize broiler chicken productivity (Astuti *et al.,* 2017). Ketapang leaves also contain antioxidant compounds that function to prevent free radicals that cause oxidative stress (Suprijatna *et al.,* 2022) . Ketapang leaf extract also contains phenols and essential oils with antibacterial properties (Sheby *et al.,* 2023). These characteristics suggest that ketapang leaves have the potential to serve as a natural alternative to AGPs for improving broiler productivity.

MATERIALS AND METHODS

Material

The materials used in this study were 60 MB 202 broiler chickens aged 8-28 days in good health. The chickens were kept in a semi- closed house divided into 20 experimental units measuring 1 m² with rice husk litter as the base. The feed used was commercial feed for the BRI starter phase with a protein content of 21%, water content of 12%, crude fat of 5%, crude fiber of 5%, ash of 7%, calcium of 80-1.1%, phosphorus of 0.5% and feed for the BR II finisher phase with a protein content of 19%, water content of 12%, crude fat of 5%, crude fiber of 5%, ash of 7%, calcium of 80-1.1%, phosphorus of 0.45%. The additive used was dried ketapang leaves that had been powdered for further extraction. The solvent used in the extraction process was 96% ethanol.

Method

200g of ground ketapang leaves were extracted using a maceration method using 2 liters of 96% ethanol. The maceration process was carried out for 3 x 24 hours, after which the extract was filtered to separate the filtrate and pulp. The pulp was re-extracted three times until a clear liquid extract was obtained. All the extracted filtrates were then combined and evaporated using a rotary vacuum evaporator to obtain a thick extract and use a yield of 20.25%. The maceration method using ethanol was chosen to maximize the extracted chemical compounds and minimize damage to active compounds. The extract has a flavonoid content of 6.89 mg/g as checked using spectrophotometry.

Research Design

This study was conducted using a Completely Randomized Design (CRD) with 4 treatments and 5 replications. Each treatment group consisted of 15 chickens, so each experimental unit contained 3 chickens. The treatments given were P0 (control), P1 (0.1 ml of ketapang leaf extract/100 ml of drinking water), P2 (0.2 ml/100 ml of drinking water), and P3 (0.3 ml/100 ml of drinking water). given daily for 28 days, after the provision of drinking water containing chicken extract was finished, it was continued with the provision of drinking water without additional extract ad libitum. Each chicken per experimental unit was examined for data collection. This study lasted for three weeks.

with the observed parameters including feed consumption, body weight gain (PBB), and Feed Conversion Ratio (FCR). The temperature and humidity in this study had an average of 28.9°C with a humidity of 73.7%. For the lighting program in this study, yellow lights were used in each compartment.

Data Analysis

The research data was analyzed using SPSS software with analysis of variance (ANOVA) at a 5% significance level. If there was a significant difference ($p < 0.05$) , a Duncan test was performed to determine the difference between treatments. The results of the data analysis were used to evaluate the effect of administering ethanol extract of ketapang leaves in drinking water on broiler chicken productivity. Sixty broiler chickens were randomly divided into four treatments with five replications. Each replication consisted of three chickens, and the distribution of chickens to treatments was carried out using a completely randomized design to minimize experimental bias.

RESULTS AND DISCUSSION

The results of the study on administering ethanol extract of ketapang leaves (*Terminalia catappa*) through drinking water on broiler chicken productivity are presented in Table 1.

Based on the results of the analysis of broiler chicken productivity for 21 days, there was a significant difference between the treatment and control ($P<0.05$). Administration of ketapang leaf extract through drinking water tended to reduce feed consumption compared to the control. This condition is thought to be related to the content of bioactive compounds such as flavonoids, tannins, and saponins which have antibacterial and antioxidant activities so that they can affect the physiology of the livestock's digestive tract. According to Hidayati *et al.,* (2022) , ketapang leaf extract can improve digestive tract health by increasing the height of intestinal villi and the balance of intestinal microflora. This is in line with Shaffira *et al.,* (2023) , who stated that the antibacterial activity of herbal compounds can inhibit the growth of pathogenic bacteria so that nutrient absorption becomes more optimal. Meanwhile, according to Putri *et al.,* (2025) , phytochemical compounds such as phenolic compounds, flavonoids, saponins, and tannins can act as natural AGPs in poultry because they have antibacterial properties that can suppress the development of pathogenic bacteria in the digestive tract.

Although feed consumption tended to be lower in the treatments, this was not accompanied by a decrease in growth performance. Although feed consumption tended to be lower in the treatments, this was not accompanied by a decrease in growth performance. The low consumption and FCR values, as well as the high BWG values in the P2 treatment, indicate that the consumed feed can be converted into body weight more efficiently. The P2 treatment reduced consumption by 11.77% and increased BWG by 21.23% compared to the control group. These results indicate that ketapang leaf extract plays a greater role in increasing nutrient absorption efficiency than increasing feed consumption. The bioactive compounds in ketapang leaf extract are thought to increase digestive enzyme activity, thus enabling more efficient nutrient breakdown and absorption. According to Ismiah *et al.,* (2022) , plant bioactive compounds can stimulate pancreatic secretion, which plays a role in improving nutrient digestion.

Table 1. Results of research data on consumption, BWG, and FCR by administering ethanol extract of ketapang leaves (*Terminalia catappa*) through drinking water on broiler chicken productivity.

Parameter	Unit	Treatment			
		P0	P1	P2	P3
Consumption	Grams /Head	2053.34±1.49^{c}	1972.16±99.57^{bc}	1811.72±60.01^{a}	1913.74±62.48^{b}
BWG	Grams /Head	1179.84±86.01^{a}	1301.00±29.74^{b}	1430.32±72.55^{c}	1214.78±119.07^{ab}
FCR		1.74±0.16^{c}	1.54±0.08^{b}	1.24±0.05^{a}	1.50±0.20^{b}

Note: Values are expressed as mean ± standard deviation. Means in the same row with different superscripts. Significantly different ($P < 0.05$) according to the Extended Duncan's Test.

In the P3 treatment, feed consumption increased compared to P2, but was not followed by a significant increase in body weight. This condition indicates that the administration of ketapang leaf extract at a higher concentration has not been able to increase the efficiency of nutrient absorption optimally. High concentrations of bioactive compounds, especially tannins, are thought to reduce palatability and interfere with protein absorption through the formation of complex bonds with proteins and digestive enzymes. Triyanto *et al.,* (2014) , stated that bioactive compounds under certain conditions can reduce feed palatability, thereby affecting nutrient consumption and efficiency. According to Sari *et al.,* (2025) , if the active compounds given to chickens exceed the tolerance limit, it can have a negative impact on chicken growth because it reduces ration absorption through binding to proteins and digestive enzymes, so that growth is hampered.

The low FCR value in the P2 treatment indicates that the consumed feed can be converted into body weight more efficiently, P2 treatment decreased FCR by 28,74% compared to the control group. These results align with Hanif & Manullang (2020) , who stated that a low FCR value indicates better feed conversion efficiency. This efficiency is related to the ability of flavonoids to improve digestive tract conditions through antibacterial activity against pathogenic bacteria, thus optimizing nutrient absorption. Tribudi *et al.,* (2018) also stated that plants containing flavonoids can increase nutrient absorption and improve FCR.

Overall, the research results show that administering ketapang leaf extract through drinking water has the potential to be used as a natural additive to increase broiler chicken productivity. This statement is supported by the results of research from Mawarni *et al.,* (2023), which states that bioactive compounds derived from herbal plants can be used as additives to replace AGP in broiler chickens. Based on this study, the P2 treatment provided the best results because it was able to increase nutrient absorption efficiency, produce the highest BWG, and reduce the FCR value compared to other treatments. This is also in line with the statement from Suprijatna et al. (2022), which stated that the appropriate use of ketapang leaf extract as an antibacterial agent in broiler chickens has the potential to increase productivity by improving livestock health status.

CONCLUSION AND SUGGESTIONS

The results of this study indicate that administration of ketapang leaf extract at a concentration of 0.2 ml/100 ml of drinking water was found to be most effective in producing the lowest feed consumption and FCR, while also producing the highest BWG of broiler chickens, which was more optimal compared to the control and other treatments. However, this study did not include a direct comparison with the group treated with AGP.

Suggestions for developing this research include combining it with other bioactive ingredients to further maximize productivity in broiler chickens.

Suggestions for further development of this research include combining it with other alternative ingredients to further maximize productivity in broiler chickens.

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