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The Effectiveness of Phyllanthus Niruri, Turmeric, and Javanese Curcuma Herbal Extracts on the Growth, Carcass Percentage, and Abdominal Fat of Broiler Chickens

Puji Astuti[1*], Heru Suripta[1]

[1] Universitas Muhammadiyah Karanganyar, Indonesia.

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Corresponding Author:
Puji Astuti
tutiamir88@gmail.com

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Abstract: This study aims to evaluate the effect of administering a combination of meniran (Phyllanthus niruri), turmeric (Curcuma longa), and temulawak (Curcuma xanthorrhiza) water extract in drinking water on the performance and carcass quality of broiler chickens. A total of 100 days-old broiler chickens (DOC) were used in the study which was arranged in a Completely Randomized Design with 4 treatments and 5 replications, each containing 5 chickens. The treatments consisted of: P0 (control, without extract), P1 (25% meniran: 25% turmeric: 50% temulawak), P2 (25%: 50%: 25%), and P3 (50%: 25%: 25%). The extract was given in drinking water as much as 10 ml/liter from 7 to 35 days of age. The parameters observed included feed consumption, water consumption, daily body weight gain (ADG), feed conversion (FCR), carcass percentage, and abdominal fat. The results showed that the herbal extract treatment had a significant effect ($P<0.05$) on feed consumption, carcass percentage, and abdominal fat, but was not significantly different on water consumption, ADG, and FCR. Treatment P1 showed the best performance, with the highest feed consumption, the highest carcass (72.86%), and the lowest abdominal fat (1.72%). It was concluded that the administration of a combination of meniran, turmeric, and temulawak water extract with a ratio of 25:25:50 significantly increased the growth efficiency and carcass quality of broiler chickens, and could be an alternative safe and effective natural feed additive.

Keywords: Broiler; Curcuma longa; Curcuma xanthorrhiza; Herbal extract; Performance; Phyllanthus niruri

Introduction

Broiler chickens are a leading commodity in the Indonesian and global meat industry, with demand increasing annually. To meet this market demand, breeders are required to improve growth and feed conversion efficiency, while maintaining carcass quality and abdominal fat content to meet healthy consumption standards (Khattak et al., 2025). One approach being developed is the administration of natural ingredients, particularly herbs, which are believed to have multifactorial benefits in improving chicken performance (Jahja et al., 2023; Orimaye et al., 2024). The herbs Phyllanthus niruri (Phyllanthus niruri), turmeric (Curcuma longa), and Javanese ginger (Curcuma xanthorrhiza) are natural compounds known for their pharmacological properties and potential for improving feed performance (Rohman et al., 2020). Phyllanthus niruri is known for its hepatoprotective and antibacterial properties, which indirectly improve chicken digestive health and nutrient absorption efficiency (Khandia et al., 2020; Obianwuna et al., 2024).

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Research by Ibrahim et al. (2024) and Trivadila et al. (2025), showed that Phyllanthus niruri can enhance the immunity of broiler chickens, reduce oxidative stress levels, and increase resistance to disease. A 20% dose of Phyllanthus niruri extract effectively inhibited the growth of Salmonella pullorum and improved the performance of infected broiler chickens (Zhang et al., 2025; Urban et al., 2025). Turmeric and Javanese ginger contain curcumin and other bioactive compounds that function as anti-inflammatory and antioxidants, stimulate appetite, and improve metabolic processes (Kalogerakou & Antoniadou, 2024; Mukherjee et al., 2024). Kumar et al. (2025) and Wang et al. (2021), stated that adding up to 1% turmeric to feed can increase appetite and daily feed consumption in broiler chickens. This has a significant positive effect on body weight gain, reaching an increase of around 8-12% compared to the control. Furthermore, research on Javanese ginger by Rodde et al. (2020), Zampiga et al. (2021), Maharjan et al. (2021), showed that this herbal supplement can also increase feed conversion ratio (FCR), reducing the feed required to reach a certain weight, thereby increasing the economic efficiency of production.

The positive impact of herbs on carcass quality and abdominal fat has also been demonstrated in several studies. Dosoky et al. (2018), Murwati et al. (2024), for example, reported that administering turmeric and Javanese ginger extracts not only accelerated growth but also reduced abdominal fat percentage and improved meat quality, which are key concerns in meeting market standards. This herb is believed to modulate fat metabolism, thus optimizing fat distribution throughout the body, preventing excess fat from being concentrated in the abdominal area. In-depth research on the effects of meniran, turmeric, and Javanese ginger on these parameters simultaneously in a single broiler chicken farming system is still limited. Therefore, this study was conducted to obtain comprehensive data on the benefits of these herbs.

Method

The research was conducted at the Animal Husbandry Practice Unit (UPT) of Muhammadiyah University of Karanganyar (UMUKA). The material used was 100 one-day-old Cobb strain broiler chickens with an average weight of 38 g per chicken. Phyllanthus niruri, turmeric, and Javanese ginger extracts were administered. The feed used was 22.0-20.0 PK for 1-7 days, 20.0-22.0 PK for 8-21 days, and 18.0-21.0 PK for 22-32 days. The ND IB vaccine (Medivac ND-IB) was administered at four days of age. The equipment used was 20 cages measuring 80x80x70 cm, equipped with feeders and drinkers; scales; pans; and thermometers.

The research used 100 broiler chickens divided into four treatments, each replicated five times. The treatments applied were administration of herbal extracts (meniran: turmeric: Javanese ginger) at 10 ml per liter of drinking water as follows: Control (T0): Chickens were given drinking water without extract. Treatment (T1): Broiler chickens were given drinking water containing Javanese ginger, turmeric, and meniran extracts at a ratio of 50%:25%:25%. Treatment (T2): Broiler chickens were given drinking water containing Javanese ginger, turmeric, and meniran extracts at a ratio of 25%:50%:25%. Treatment (T3): Broiler chickens were given drinking water containing Javanese ginger, turmeric, and meniran extracts at a ratio of 25%:25%:50%.

Research Variables

The observed variables were broiler chicken performance, including drinking water consumption, feed consumption, daily body weight gain (DGB), feed conversion ratio, carcass percentage, and abdominal fat.

Research Implementation

Herbal extracts were prepared by adding water at a ratio of 1:10. The herbal powder was infused in 90°C water for 15 minutes, then filtered. The herbal extract was evaporated until thick. The herbal extract was administered starting at 7 days of age, at a rate of 10 ml per liter of water, every two days. The chickens were weighed weekly. Slaughter was carried out at 35 days of age.

Data Analysis

Research variables were tested using a Completely Randomized Design (CRD) analysis of variance. Differences between treatments were further tested using Duncan's Multiple Range Test. Data on carcass and abdominal fat percentages were transformed to the arcsine χ.

Results and Discussion

Data on drinking water consumption, feed consumption, body weight gain, and feed conversion are shown in Table 1.

Drinking Water Consumption

The results showed no significant difference ($P > 0.05$) in drinking water consumption between broiler chickens treated with a mixture of meniran, turmeric, and Javanese ginger extract and control chickens without the extract. This indicates that the administration of herbal extracts in drinking water does not affect water consumption levels in broiler chickens. One of the main factors contributing to this is that broiler

chickens have a much smaller number of taste buds (300) than humans (Yoshida et al., 2021). According to Cordero et al. (2023), chickens have 340 taste buds located on the floor and roof of the oral cavity. With this limited number of taste nerves, chickens are less sensitive to various tastes, including the bitter taste of active compounds contained in herbal extracts such as alkaloids in meniran, curcumin in turmeric, and xanthorrizole in Javanese ginger. These compounds are known to have a bitter taste, but they are not enough to influence the chickens' preference or rejection of water consumption. Therefore, even though the drinking water contained herbal extracts, the chickens still consumed it at relatively the same levels as the control group.

Furthermore, the dosage of the extract was adjusted to be less concentrated, preventing the resulting aroma and taste from being overpowering, which could potentially reduce palatability. Therefore, the chickens did not experience any disturbance in drinking water, despite the active herbal ingredients. Al-Sanjary et al. (2023), reported a similar study that found that adding Javanese turmeric extract to drinking water did not reduce water consumption in broiler chickens. Similarly, research by Meng et al. (2023), showed that adding a combination of herbal extracts to drinking water had no significant impact on broiler water consumption.

Table 1. Average Drinking Water Consumption, Feed Consumption, Body Weight Gain, and Feed Conversion of Broiler Chickens

	Treatment			
	T0	T1	T2	T3
Drinking water consumption (ml/eq/hr)	188.91	188.86	190.72	184.21
Feed consumption (g/eq/hr)	62.02[a]	65.37[b]	66.25[b]	64.86[b]
Body weight gain (g/eq/hr)	42.04	43.91	43.33	42.66
Feed conversion	1.48	1.49	1.53	1.53

Note: Significantly different superscripts in the same row indicate a highly significant difference ($P < 0.01$).

Feed Consumption

Administering a combination of Phyllanthus niruri, turmeric, and Javanese turmeric extracts with different compositions significantly affected feed consumption in broiler chickens. These differences in herbal extract composition are thought to influence the chickens' physiological and metabolic activities, ultimately impacting their appetite and feed consumption. Phyllanthus niruri (Phyllanthus niruri) extract is known to contain active compounds such as flavonoids and alkaloids, which have immunostimulant and antioxidant effects. These compounds can strengthen chickens' immune systems, reduce oxidative stress, and increase digestive enzyme activity, thereby helping improve digestive efficiency and nutrient absorption (Uyanga et al., 2023). Turmeric (Curcuma longa) is rich in curcumin, an active compound with anti-inflammatory, antibacterial, and cholagogue (stimulating bile secretion) properties (Fuloria et al., 2022). Curcumin has also been reported to stimulate digestive enzyme secretion and improve digestive tract health in broiler chickens (Hernández-García et al., 2025). These effects can indirectly support appetite improvement.

Meanwhile, Javanese ginger (Curcuma xanthorrhiza) contains xanthorrizole and curcumin, which have similar effects to turmeric, but with stronger effects on the hepatoprotective system and improved liver function. Good liver function is crucial for feed metabolism and thus can improve the efficiency of nutrient consumption and utilization. The different composition ratios of the three extracts provide physiological stimulation to chickens, particularly in terms of digestive health, liver metabolism, and immune status. Research Irwani et al. (2022), shows that adding herbal combinations to drinking water can affect feed consumption, depending on the type and proportion of active ingredients used. A balance between antibacterial, digestive, and palatability functions is key to formulating the optimal extract combination. The results of this study indicate that the extracts of Phyllanthus niruri, turmeric, and Javanese ginger can aid the metabolic processes in chickens and also improve the immune system in broiler chickens, resulting in healthy chickens and optimal nutrient absorption from the feed provided.

Body Weight Gain

The results showed that the administration of Phyllanthus niruri, turmeric, and Javanese ginger extracts to drinking water did not affect body weight gain in broiler chickens ($P>0.05$). Although Phyllanthus niruri, turmeric, and Javanese ginger extracts have various physiological benefits, the results indicated that differences in the extract composition in drinking water did not significantly affect body weight gain in broiler chickens. Possible causes include the physiological adaptation of broiler chickens. Broiler chickens have the ability to adapt to changes in drinking water composition, as long as there are no significant changes

in aroma or taste. Therefore, even when the herbal extracts were administered in different compositions, there was no significant rejection or stress that would have impacted growth. The extract dosage used was non-toxic and not too concentrated. The ratio of meniran, turmeric, and Javanese ginger used was not extreme enough to disrupt the physiological functions of chickens.

Active compounds such as curcumin, xanthorrhizol, and flavonoids generally act as stimulants of the immune and digestive systems, but at moderate doses, their effects on body weight tend to be uniform across treatments. Meniran extract contains flavonoids, which have antioxidant and anticarcinogenic properties. Flavonoids in meniran have potential as immunomodulators, thus boosting the immune system and warding off attacks from viruses, bacteria, and other microbes. Turmeric and Javanese ginger contain curcumin, which has various active compounds, including antioxidant, hepatoprotective, anti-inflammatory, antifungal, and antibacterial properties, which have been shown to improve broiler chicken performance. Essential oils in Javanese ginger, such as zingiberene, curzerenone, and β-curcumene, also have a distinctive, slightly bitter taste. Tannin compounds have the potential to increase broiler growth because, according to Czerkas et al. (2024), tannins are polyphenolic compounds with antibacterial properties. Antibacterials are substances that can disrupt and kill harmful microbes in the body of broiler chickens.

One such substance is tannin in meniran extract. Several antinutritional substances may affect digestion in broiler chickens, resulting in low body weight. Although feed consumption increases, it does not affect daily weight gain in broiler chickens because the tannins in the extract are not properly digested.

Feed Conversion

Administering this combination of extracts had no significant effect on the feed conversion of broiler chickens. Phyllanthus niruri, turmeric, and Javanese ginger contain flavonoids and curcumin, which act as immunomodulators that can boost chicken immunity after vaccination, ward off viruses, bacteria, and other microbes. These compounds work primarily to maintain digestive health and the immune system, rather than directly increasing feed conversion efficiency. Due to the tannin content in Phyllanthus niruri extract, despite high feed consumption in broiler chickens, this was not accompanied by significant weight gain, resulting in an insignificant difference in feed conversion. According to Hussein et al. (2020), phytobiotic extracts only increase feed conversion in cases of health problems or subclinical infections. Under normal conditions and good management, their effect on feed conversion is often insignificant.

The standard feed conversion for broiler chickens is 1.52 in the fourth week, while in this study, the average feed conversion was between 1.48 and 1.53, indicating that feed conversion met the standard. Although feed consumption increased due to temulawak, feed conversion did not change significantly because weight gain was not proportional to the increase in consumption. Alem (2024), also showed that herbal extracts in drinking water increased consumption but did not significantly differ in feed conversion compared to the control.

Carcass Percentage

The analysis results showed that turmeric, Javanese ginger, and meniran water extracts in drinking water produced non-significant differences ($P>0.05$) in the carcass percentage of broiler chickens. McHugh et al. (2023), explained that carcass weight achievement is closely related to live weight and body weight gain. Other factors influencing carcass percentage are the amount of feed and water in the livestock's digestive tract. The carcass percentage of broiler chickens ranges from 65-75% of live weight. According to Correa et al. (2006), carcass weight is closely related to slaughter weight and body weight gain. This is consistent with the data obtained in Table 2. In this study, the average overall carcass percentage was 78.34%. Carcasses weighing 1590 g have a carcass percentage of 73.90%. In vivo biological activity showed that administering 15 mg/kg of flavonoids effectively increased breast meat weight by up to 12.90%, improved meat quality, and increased antioxidant activity in chickens.

Table 2. Carcass and Abdominal Fat Percentage of Broiler Chickens

Parameter	Treatment			
	T0	T1	T2	T3
Carcass (%)	75.87	80.97	78.84	77.69
Abdominal Fat (%)	1.61	1.51	1.45	1.83

According to Widyani et al. (2022), administering temulawak and turmeric extracts, either individually or in combination, to the drinking water did not significantly affect carcass percentage in broiler chickens. This was due to the relatively balanced weight gain between muscle tissue and internal organs. Kiramang et al. (2019), stated that analytically, administering herbal medicine did not significantly affect carcass percentage. This is suspected to be due to the bioactive substances in the herbal concoctions having a complementary effect (sparing effect), positively impacting several performance parameters, such as carcass weight (Verhelle & Saremi, 2024).

Carcass changes typically require treatments with strong and long-lasting metabolic effects.

Abdominal Fat Percentage

Administering Phyllanthus niruri (Phyllanthus niruri), turmeric (Curcuma domestica), and Javanese ginger (Curcuma xanthorrhiza) extracts in different compositions to drinking water had no significant effect (P>0.05) on abdominal fat. Abdominal fat is formed from excess energy not used for muscle growth and metabolic activity. Turmeric and Javanese ginger contain compounds such as curcumin and xanthorrhizol, which act as antioxidants and anti-inflammatory agents. However, their hypolipidemic (fat-reducing) effects are only clearly seen in experimental animal models with a high-fat diet and are not always applicable to broiler chickens fed a standard diet (Ahmadauli et al., 2025). Phyllanthus niruri contains flavonoids and tannins, but they do not directly affect lipogenesis or lipolysis in chicken adipose tissue. Obeidat et al. (2024), reported that herbal extracts do not affect fat storage as long as the chickens' energy needs are met from the main feed.

Curcumin in turmeric functions as a cholagogue (stimulates the gallbladder wall, which plays a role in fat breakdown), a hypolipidemic (lowers blood cholesterol), a hepatoprotective (protects the liver from toxic substances), and improves blood circulation. Curcuma extract can reduce all lipid compositions (triglycerides, phospholipids, and cholesterol) in the aorta, and triglyceride levels in serum ex vivo. Factors influencing abdominal fat formation include age, sex, species, nutritional content, and environmental temperature. Noetzold et al. (2025), argue that body fat formation in chickens occurs due to excess energy consumption. Based on research conducted, the average overall abdominal fat percentage of broiler chickens is 1.6%. The abdominal fat percentage of broiler carcasses ranges from 0.73% to 3.78%.

The percentage of abdominal fat in a chicken's body reaches 2-3% of its live weight. Kim et al. (2021), stated that abdominal fat in a chicken's body is said to be excessive when the percentage of abdominal fat weight is more than 3% of body weight. Abdominal fat is a byproduct that can affect carcass quality. This is in accordance with the opinion of Chen et al. (2023), who stated that the high or low quality of broiler carcasses is determined by the amount of abdominal fat contained in broiler chickens. The low weight of abdominal fat is in line with the low final body weight obtained from the research results.

Conclusion

Administration of meniran, turmeric, and temulawak extracts with different compositions to broiler chickens increased feed consumption, but did not affect drinking water consumption, body weight gain, feed conversion, carcass percentage and abdominal fat.

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Author Contributions

Conceptualization; methodology.; validation; formal analysis; investigation; resources; P. A., data curation: writing—original draft preparation; writing—review and editing.; visualization: H. S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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