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(RESEARCH ARTICLE)

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The effect of pandan leaf extract in drinking water on the physical carcass composition of broiler chickens

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Abstract

Productivity and health of broiler chickens are key aspects that can be improved through the use of feed additives, one of which is the utilization of pandan leaf extract. The objective of this study was to determine the physical composition of broiler carcasses when supplemented with pandan leaf extract in drinking water. Using four treatments and five replications and each replication consisting of five broiler chickens. The treatments applied in this study were as follows: Treatment PLE 1: drinking water without pandan leaf extract; treatment PLE 2: drinking water with 3% pandan leaf extract; treatment PLE 3: drinking water with 6% pandan leaf extract; and treatment PLE 4: drinking water with 9% pandan leaf extract. The results of the study showed that treatments PLE 2 and PLE 3 significantly ($P<0.05$) increased carcass weight (CW), slaughter weight (SW), meat percentage (MP), and carcass percentage (CP), while reducing fat percentage including skin (FS), compared to treatment PLE1. Meanwhile, treatments PLE 4 significantly ($P<0.05$) reduced SW and CW. Based on this study, it can be concluded that the addition of 3% and 6% pandan leaf extract in drinking water can increase slaughter weight (SW), carcass weight (CW), carcass percentage (CP), and meat percentage (MP), while reducing the percentage of fat and skin (FS) in broilers. However, the addition of 9% pandan leaf extract in drinking water decreased SW and CW compared to the control treatment.

Keywords: Broiler; Slaughter weight; Extract; Carcass; Pandan leaf

1. Introduction

The increasing demand for chicken meat continues to drive the development of broiler farming. Broiler meat is rich in protein, making it a popular food source in society. As a meat-producing livestock, the carcass portion of broilers is an important factor to consider. A slaughter animal is considered economically valuable if it yields a high carcass production. The quality of broiler carcasses is significantly influenced by factors such as breed, feed, and age. One approach to improving carcass quality is through the use of feed additives supplementary substances added to feed that can enhance livestock health and performance.

One natural ingredient with potential as a feed additive is the extract of pandan leaf **(***Pandanus amaryllifolius Roxb***)**. Pandan leaves contain bioactive compounds such as flavonoids, alkaloids, and tannins, which possess antimicrobial and antioxidant properties [1]. Previous studies have shown that these compounds can reduce pathogenic bacteria in the digestive tract of chickens, thereby improving nutrient absorption and supporting optimal growth [2]. According to [3] optimal nutrient absorption promotes optimal body growth, which in turn enhances meat quality.

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Research on herbal leaf extracts is of interest due to their phytochemical and secondary metabolite content, which exhibits antimicrobial activity that can degrade the cell membranes of pathogenic bacteria in the chicken gut [2, 4-6]. The results of a study [7] reported that increasing the carcass meat percentage in ducks can be achieved by administering 2–6% aqueous papaya leaf extract through drinking water. A similar finding was reported by [8], stating that administering 1–3% noni leaf juice through drinking water significantly reduced abdominal fat and increased carcass weight.

Interestingly, an alternative approach to improving carcass quality can be achieved by adding pandan leaf extract to broiler drinking water. The objective of this study was to determine the physical composition of broiler carcasses when supplemented with pandan leaf extract in drinking water

2. Material and methods

This study used 100 broiler chickens (Day-Old Chicks) of the CP 707 strain. The feed provided was a commercial ration, CP B511, produced by PT. Charoen Pokphand Indonesia Tbk. The research was conducted at the Farm of the Faculty of Animal Husbandry, Udayana University. Fresh pandan leaves were used for the extract. A total of 20 battery colony cages were used, each equipped with a drinking system and feed containers.

A Completely Randomized Design (CRD) was used, consisting of four treatments, with each treatment having five replications, and each replication consisting of five broiler chickens. The treatments applied in this study were as follows: treatment PLE 1: drinking water without pandan leaf extract; treatment PLE 2: drinking water with 3% pandan leaf extract; treatment PLE 3: drinking water with 6% pandan leaf extract; and treatment PLE 4: drinking water with 9% pandan leaf extract. Broilers were fasted for 12 hours prior to slaughter. They were slaughtered by cutting the jugular vein and carotid artery. To obtain the carcass weight, the legs, neck, and head were removed, and the internal organs were extracted, except for the kidneys and lungs. Carcass components such as meat, bones, and fat were then separated and weighed.

2.1. Preparation of Pandan Leaf Water Extract

Collect and clean the pandan leaves then grind them using a blender with a 1:1 ratio of pandan leaves and water, then filter. The resulting extract was added to drinking water according to the treatment levels (3%, 6%, and 9%). The phytochemical content of the pandan leaf extract is shown in Table 1.

Table 1 Phytochemical Screening of Pandan Leaf Extract

Compound	Test Result
Flavonoids	+
Tannins	+
Alkaloids	+
Saponins	+
Antioxidant Activity (%)	46,45%

Source: Analytical Laboratory, Udayana University, 2024

2.2. Observed Variables

This study observed several variables, including slaughter weight (SW), carcass weight (CW), carcass percentage (CP), meat percentage (MP), bone percentage (BP) and Fat and skin percentage (FS).

2.3. Statistical Analysis

Data were analyzed using SPSS (Statistical Product and Service Solutions) software version 25, if the data was homogeneous it was tested using one way ANOVA and if there was a significant effect it was continued with Duncan's test [9].

3. Results and discussion

The physical composition of 5-week-old broiler carcasses given pandan leaf extract is presented in Table 2. The results showed that treatments PLE 2 (3.22%) and PLE 3 (4.36%) had significantly (P<0.05) higher slaughter weights compared to treatment PLE 1. Table 1 shows that tannins, flavonoids, saponins, and alkaloids are phytochemical compounds present in pandan leaf extract. These compounds contribute to improved gut health, enhancing nutrient absorption efficiency. [1] reported that pandan leaf extract contains bioactive compounds with antimicrobial potential. [2], reducing pathogenic bacteria in the gut using herbal leaf compounds improves nutrient absorption, thereby optimizing broiler growth performance. In contrast, treatment PLE 4 showed a significant (P < 0.05) 2.5% reduction in SW compared to the control (PLE 1). This may be due to excessive tannin levels in the 9% dose, which could inhibit nutrient absorption. This aligns with [10], who stated that excessive tannin intake can disrupt nutrient uptake.

The results of the study showed that treatments PLE 2 (6.27%) and PLE 3 (7.42%) had significantly (P<0.05) higher CW compared to the control treatment (PLE 1). Pandan leaf extract contains flavonoids and alkaloids that act as antioxidants, reducing oxidative stress and improving feed metabolism [11]. These effects support better nutrient absorption, muscle growth, and carcass weight. However, CW in treatment PLE 4 decreased significantly (P < 0.05) by 2.55% compared to PLE 1, likely due to the negative effects of excessive extract on metabolism and physiological functions.

Table 2 Physical Composition of 5-Week-Old Broiler Carcasses Administered Pandan Leaf Extract

Variable	Treatment[1)]				SEM[3)]
	PLE 1	PLE 2	PLE 3	PLE 4	
SW (g)	2127[c2)]	2195.4[b]	2219.8[a]	2073.8[d]	5.92
Cw (g)	1577[b]	1675.8[a]	1694[a]	1536.8[c]	7.00
CP (%)	74.14[b]	76.33[a]	76.31[a]	74.10[b]	0.20
MP (%)	65.43[b]	66.82[a]	66.75[a]	65.44[b]	0.10
BP (%)	25.97[a]	25.94[a]	26.13[a]	26.05[a]	0.16
FS (%)	8.60[a]	7.23[b]	7.11[b]	8.51[a]	0.10

Note: 1) PLE 1 = Control (no pandan extract); PLE 2 = 3% pandan extract; PLE 3 = 6% pandan extract; PLE 4 = 9% pandan extract; 2) Values with different letters in the same row are significantly different (P<0.05); 3) SEM = Standard Error of the Treatment Means

The carcass percentage (CP) of broilers in treatments PLE 2 (2.95%) and PLE 3 (2.93%) was significantly higher (P < 0.05) compared to the control group (PLE 1). This indicates that administering pandan leaf extract at concentrations of 3% and 6% affects the CP of broilers. The increase is attributed to the presence of bioactive compounds in pandan leaf extract, which may influence the chickens' metabolism. With the appropriate dosage, bioactive compounds such as saponins, tannins, flavonoids, and alkaloids can help reduce the number of pathogenic bacteria in the chicken's intestine, thereby enhancing nutrient absorption and optimizing broiler growth performance. [12] stated that carcass percentage is influenced by final body weight, so a higher final weight will result in a higher carcass percentage. Similarly, [13] reported that the high carcass percentage in broilers is the result of greater final body weight. However, the control treatment PLE 1 resulted in a higher value than treatment PLE 4 (1.35%), although the difference was not significant (P>0.05). This may be due to an excessive concentration of certain compounds that could inhibit digestion or nutrient absorption, thereby reducing carcass percentage.

The meat percentage (MP) in broilers receiving treatments PLE 2 (2.12%) and PLE 3 (2.02%) was significantly higher (P < 0.05) compared to the control group (PLE 1). The bioactive compounds in pandan leaf extract, such as flavonoids, phenolics, and other antioxidants, can enhance metabolic efficiency. According to [14], these compounds are capable of improving gut microflora balance, thereby supporting better digestion and nutrient absorption. This can maximize muscle growth, which constitutes the main component of carcass meat. Furthermore, antioxidants present in pandan leaves may also reduce oxidative stress in chickens, a factor often affecting meat production efficiency [15]. In contrast, broilers in treatment PLE 4 had a MP that was 1.53% lower than that of the control group (PLE 1), though the difference was not statistically significant (P > 0.05). An excessive concentration of pandan leaf extract may elevate the level of bioactive compounds to a sub-toxic dose, which, according to [16] can affect nutrient metabolism through mechanisms such as metabolic stress and impaired digestive enzyme function. Moreover, a high extract concentration may reduce

the palatability of drinking water, leading to decreased water intake and ultimately hindering nutrient intake required for muscle development.

The average bone percentage (BP) across all four treatments showed no significant differences ($P > 0.05$). Bone is a component of the carcass' physical composition that matures early. It reaches its maximum growth rate early in development and does not significantly increase after a certain age [17].

The fat including skin percentage (FS) in broilers receiving treatments PLE 2 (15.93%) and PLE 3 (17.33%) was significantly lower ($P < 0.05$) compared to the control group (PLE 1). This reduction in FS is likely due to more efficient nutrient utilization from the feed to support growth and weight gain, resulting in less excess energy stored as fat. This aligns with the statement by [18] who explained that fat in meat is formed from surplus dietary energy stored as adipose tissue. An ideal carcass is one with high meat content and low fat levels [19]. Meanwhile, the percentage of FS in broilers under treatment PLE 4 was 1.05% lower than in the control group (PLE 1), but this difference was not statistically significant ($P > 0.05$). According to [20] bioactive compounds such as phenols and alkaloids in pandan leaf extract are effective at reducing fat and cholesterol levels at specific doses. However, [21] noted that excessive doses can lead to saturation of active components, reduced compound interactions, or even toxic effects that diminish their effectiveness.

4. Conclusion

Based on this study, it can be concluded that the addition of 3% and 6% pandan leaf extract in drinking water can increase slaughter weight (SW), carcass weight (CW), carcass percentage (CP), and meat percentage (MP), while reducing the percentage of fat and skin (FS) in broilers. However, the addition of 9% pandan leaf extract in drinking water decreased SW and CW compared to the control treatment.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

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