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(RESEARCH ARTICLE)

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Physical composition of Bali duck carcasses with fermented Gamal leaf extract (*Gliricidia sepium*) through drinking water

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Abstract

Bali ducks (*Anas sp*) have the potential to be a source of meat to meet animal protein needs, but their growth is still low. This study aims to determine the effect of administering fermented gamal leaf extract (*Gliricidia sepium*) through drinking water on the physical composition of male bali duck carcasses. The study was conducted over 8 weeks from October to December at the Sesetan Farm, Faculty of Animal Husbandry, Udayana University. A completely randomized design was used, consisting of four treatments and five replicates. Each replicate consisted of three male bali ducks weighing 46.76 g–47.24 g. The four treatments were levels of fermented gamal leaf extract administered via drinking water: 0%, 2%, 4%, and 6%, corresponding to treatments P0, P1, P2, and P3, respectively. The variables observed included slaughter weight, carcass weight, carcass percentage, bone percentage, meat percentage, and subcutaneous fat percentage, including skin. The results showed that the administration of fermented gamal leaf extract significantly ($P<0.05$) increased the percentage of meat and significantly ($P<0.05$) reduced the percentage of subcutaneous fat, including skin. However, it did not significantly ($P>0.05$) affect carcass weight, carcass percentage, bone percentage, and subcutaneous fat percentage, including skin. Based on the research results, it can be concluded that the administration of fermented gamal leaf extract through drinking water can increase the percentage of meat and decrease the percentage of subcutaneous fat, including skin; however, it does not affect slaughter weight, carcass weight, carcass percentage, and bone percentage.

Keywords: Balinese Duck; Fermented Gamal Leaf Extract; Physical Composition Of Carcass, Meat quality; Drinking Water Supplementation

1. Introduction

In Indonesia, duck farming has significant potential for development and can be expected to serve as a source of animal protein. The growing demand for duck meat is driven by its distinctive flavor, which is popular among the public. One of the local duck breeds that can meet the public's animal protein needs is the bali duck. The bali duck is recognized as a native breed and is part of bali's genetic heritage, which is being preserved [1]. Male ducks are more promising for development as meat producers, as they have lower breeding costs, faster growth rates, and are more efficient in feed utilization compared to female ducks [2]. One approach to improve the physical composition of male bali duck carcasses is by adding natural extracts.

Gamal leaves have a moisture content of 78.24%, crude protein of 25.7%, crude fat of 1.97%, crude fiber of 23.9%, ash of 7.7%, and BETN of 40.73% with TDN of 60.39 [3]. Additionally, gamal leaves contain phytochemical compounds such as saponins, tannins, coumarins, and flavonoids [4]. The interaction between these phytochemical compounds and microorganisms enhances the absorption of nutrients. A study [5] reported that feeding gamal leaves at 5% in broiler

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rations significantly reduced weight gain compared to feeding moringa leaves at 5%. Therefore, this study tested the continued use of fermented gamal leaves administered in extract form at levels of 2%, 4%, and 6% to evaluate their effects on male bali ducks.

2. Materials and methods

2.1. Materials

The ducks used in this study were 60 male bali ducks (DOD), which were purchased from a farmer in the Kediri area, Tabanan Regency. The cages used were colony cages made of wood and bamboo. Each pen was equipped with a feeder and waterer made of PVC pipe, with a water capacity of 1 liter and a feed capacity of 1 kilogram, located on the outside of the pen. The feed used was a commercial feed produced by PT. Charoen Phokphand Indonesia, Tbk., with the code CP 511B.

2.2. Experimental Design

The design used in this study was a completely randomized design (CRD) with four treatments and five replicates, each replicate unit using three male bali ducks weighing 47 g + 0.24 g. The gamal leaf extract (*Gliricidia sepium*) treatment through drinking water was as follows: P0 (0% fermented gamal leaf extract); P1 (2% fermented gamal leaf extract); P2 (4% fermented gamal leaf extract); and P3 (6% fermented gamal leaf extract).

2.3. Gamal Leaf Extract Production Process

Fermented gamal leaf extract is made from gamal leaves by adding 1 liter of water to 1 kg of fresh gamal leaves, then blending and filtering to obtain the extract. The extract is placed in a plastic bottle under anaerobic conditions and fermented using effective microorganisms for 5 days.

2.4. Observed Variables

The slaughter weight is obtained from weighing the ducks before slaughter and after fasting for 12 hours [6].

The carcass weight is obtained from calculating the weight of the duck without blood, feathers, head up to the base of the neck, legs up to the base of the knee, and internal organs [7].

The carcass percentage is obtained from the following formula:

$$\text{Carcass percentage} = \frac{Carcass\ of\ weight\ (g)}{cut\ weight\ (g)} \times 100\%$$

The bones taken are from carcasses, and the percentage of bones is obtained using the following formula:

$$\text{Percentage of bone} \frac{= Bone\ of\ wight\ (g)}{Carcass\ of\ wight\ (g)} \times 100\%$$

The meat taken is meat from the carcass, and the percentage of meat is obtained using the following formula:

$$\text{Percentage of meat} = \frac{Wight\ of\ meat\ (g)}{Carcass\ of\ wight\ (g)} \times 100\%$$

The fat taken is fat from the carcass, and the percentage of fat is obtained using the following formula:

$$\text{Fat percentage} = \frac{Subcutaneous\ fat\ weight\ including\ skin(g)}{Carcass\ o\ wight(g)} \text{ x } 100\%$$

2.5. Data Analysis

The data obtained in this study were analyzed using analysis of variance. If the treatment mean had a significant effect ($P<0.05$), the analysis was continued with Duncan's multiple range test [8].

3. Results and Discussion

Tabel 1 The effect of fermented gamal leaf extract administered through drinking water on the physical composition of 8-week-old male bali duck carcasses

Variable	Treatment[1)]				SEM[3)]
	P0	P1	P2	P3	
Slaughter weight (grams/head)	1280.00[a]	1305.00[a]	1290.00[a]	1285.00[a]	14.59
Carcass weight	709.00[a]	743.00[a]	725.00[a]	720.00[a]	15.43
Carcass percentage (%/head)	55.60[a]	56.80[a]	56.20[a]	56.20[a]	0.54
Bone Percentage (%/head)	27.00[a]	26.20[a]	27.00[a]	27.00[a]	0.33
Meat percentage (%/head)	48.20[b2)]	51.00[a]	50.60[a]	50.60[a]	0.37
Subcutaneous fat percentage including skin (%/head)	24.80[a]	22.80[b]	22.40[b]	22.40[b]	0.39

Description: 1) P0 = 0% gamal leaf extract; P1 = 2% gamal leaf extract; P2 = 4% gamal leaf extract; P3 = 6% gamal leaf 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 administration of fermented gamal leaf extract (*Gliricidia sepium*) through drinking water to 8-week-old male bali ducks at levels of 2%, 4%, and 6% resulted in no significant difference in slaughter weight (P>0.05). This is related to the fact that feed intake was the same across all treatments, and the feed provided already exceeded the nutritional requirements of the ducks. [9] states that carcass weight is influenced by feed intake, digestive efficiency, and feed nutrient quality.

The results showed that the treatments did not have a significant effect on carcass weight (P>0.05), which is related to the lack of significant differences in slaughter weight. [10] states that gamal leaves contain compounds such as tannins, saponins, and flavonoids, which have antinutritional properties.

The addition of fermented gamal leaf extract (*Gliricidia sepium*) through drinking water in male bali ducks across all treatments resulted in no significant difference in carcass percentage (P>0.05), which is related to the lack of significant changes in slaughter weight and carcass weight. Although fermented, gamal leaves still contain residual antinutrients such as tannins or lignin that inhibit the absorption of essential nutrients for muscle growth. As stated in [11], residual antinutrients can disrupt protein metabolism and reduce muscle tissue growth efficiency, thereby affecting carcass quality.

Table 1 shows that the bone percentage at treatment levels of 2%, 4%, and 6% did not differ significantly (P > 0.05). Bone formation depends heavily on mineral intake, such as calcium and phosphorus, rather than the secondary metabolites from herbal plants like gamal leaf extract. Gamal leaf extract contains compounds like flavonoids and saponins, which function in improving digestive health and immune system strength, not in bone formation. [12] explains that phytogenic compounds like flavonoids play a greater role in improving the digestive system.

Meat percentage is the percentage of meat from the total carcass weight, reflecting the success of nutrient conversion into muscle tissue [13]. Research results show that in Table 1, treatments P1, P2, and P3 produced meat percentage values that were statistically significantly different (P<0.05). [11] states that fermented gamal leaf extract contains low levels of compounds such as flavonoids, which act as natural antioxidants, thereby improving the digestive system. As a result, feed containing protein is digested more efficiently and directed toward muscle (meat) formation. Additionally, gamal leaves are high in protein, so even small additions can balance amino acid content, which is essential for muscle development.

Treatments at 2–6% resulted in statistically significantly lower (P<0.05) percentages of subcutaneous fat, including skin. Fermentation enhances the availability of active compounds and beneficial microbial activity, which improves digestion, resulting in less fat being stored in body tissues. [12] states that increased nutrient absorption due to fermentation directs more energy from feed toward muscle tissue (meat) formation rather than being stored as fat.

4. Conclusion

Based on the results of the study, it can be concluded that fermented gamal leaf extract can increase the percentage of meat and reduce the percentage of subcutaneous fat, including skin.

Compliance with ethical standards

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Disclosure of conflict of interest

We declare that there is no conflict of interest with any financial organization related to the material discussed in this paper.

Statement of ethical approval

The animal ethics committee has approved 60 bali duck male (1 day old) used in this study from the Faculty of Veterinary Medicine, Udayana University, Badung, Bali, Indonesia.

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