

## Physical Composition Carcasses of Bali duck male with given leaf water extract *Asystasia gangetica* (L) subsp. Micrantha

I Gusti Ngurah Gede Bintang MahaPutra <sup>1</sup>, Ni Made Witariadi <sup>2,\*</sup> and Dewi Ayu Warmadewi <sup>2</sup>

<sup>1</sup> Bachelor of Animal Husbandry Study Program, Faculty of Animal Husbandry, Udayana University, Badung, Bali, Indonesia, 80362.

<sup>2</sup> Faculty of Animal Husbandry, Udayana University, Badung, Bali, Indonesia, 80362.

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### Abstract

The use of natural additives is considered safer and more environmentally friendly than synthetic materials. Phytochemical compounds in plants act as antioxidants, can suppress fat accumulation in subcutaneous tissue thereby improving the quality of bali duck carcasses. The study aimed to determine the effect of administering *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract through drinking water on the physical composition carcasses of bali duck male. The research design used was a completely randomized design (CRD) with 4 treatments and 5 replications. The treatment of *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract through drinking water: 0%, 2%, 4%, and 6% consecutively for treatments P0, P1, P2 and P3. The observed variables included: slaughter weight, carcass weight, carcass percentage, bone percentage, meat percentage, and percentage subcutaneous fat including skin. The results showed that administering *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract was significantly ( $P < 0.05$ ) higher in the percentage meat variables in treatments P1, P2, and P3 of 42.51; 43.63; and 44.26% respectively compared to P0 of 41.44%, but had no effect ( $P > 0.05$ ) on the variables of slaughter weight, carcass weight, carcass percentage, bone percentage, and percentage subcutaneous fat including skin. It can be concluded that giving 4% (P2) of *Asystasia gangetica* (L.) subsp. Micrantha leaves through drinking water can improve the physical composition of the carcass with the best meat percentage results.

**Keywords:** *Asystasia gangetica*; Bali Duck Male; Carcass; Physical Composition; Meat Percentage

### 1. Introduction

Indonesia's population growth is projected to reach 281.2 million by 2023, and public awareness of the importance of consuming animal protein has led to an increase in demand for meat. People's food needs are highly diverse, including the need for vitamins, protein, and minerals obtained from livestock products such as meat. Meat is a source of animal protein because it contains a complete range of essential amino acids and its composition closely matches the human body's requirements. One local livestock with potential for development as a source of animal protein is the bali duck male.

Duck farming faces several challenges, particularly the fishy odor and tough texture of duck meat, making it less palatable to consumers. Traditional duck farming practices generally leave the animals susceptible to health problems due to environmental factors such as weather, cage conditions, and feed quality. Duck diseases are not only caused by viruses but also by bacteria and fungi. An alternative to maintaining livestock health and improving duck meat quality is the use of herbal plants *Asystasia gangetica* (L.) subsp. Micrantha.

\* Corresponding author: Ni Made Witariadi.

*Asystasia gangetica* is a weed that grows in agricultural and plantation lands, but has the potential to be used as feed for ruminant and non-ruminant livestock. According to [20], *Asystasia gangetica* can grow in rice field embankments, along roadsides, and in coastal areas, with the best growth under banana trees and contains 27.27% crude protein, 17.66% crude fiber, and a dry weight yield of 16.66 g/m<sup>2</sup>. The potential of *Asystasia gangetica* as a source of livestock feed is also supported by its phytochemical content. Chemical compounds found naturally in plants such as: alkaloids, flavonoids, phenols, saponins, tannins, vitamin C, and  $\beta$ -carotene [21]. Phytochemical compounds act as antibacterials, can increase the efficiency of feed digestion, nutrient absorption, and increase livestock body weight [8]. Increased livestock weight gain is directly related to increased carcass production [17]. Flavonoid compounds can improve feed digestibility and nutrient absorption, ultimately increasing livestock live weight [5].

Research results of [10], giving 4-6% *Asystasia gangetica* (L.) subsp. *Micrantha* leaf extract through drinking water can increase the percentage of carcasses in the chest, thighs, and carcass weight of bali duck male. This shows that giving leaf extract through drinking water can affect the distribution of physical components of the carcass, which is an important indicator of the quality of livestock products. Research by Giving 5-15% *Asytasia gangetica* flour in bali duck male rations does not affect livestock growth, can increase the height of the villi and the depth of intestinal crypts, protein and fat content of meat [21]. Research on giving *Asystasia gangetica*-based feed to muscovy ducks in the form of liquid extracts can increase digestibility and carcass quality [11].

## 2. Material and Methods

### 2.1. Cages and Ducks

The experiment used colony cages, each cage measuring 80 cm long, 80 cm wide, and 50 cm high, with an asbestos roof. The feeders and waterers were made of plastic and had a 1L capacity, the ducks used were 1-day-old were those with an average body weight  $\pm$  standard deviation ( $46.80 \pm 0.41$ g).

### 2.2. Rations and Drinking Water

The ration used was the commercial CP 511 B ration, with a crude protein content of 20%, crude fat content of 5%, crude fiber content of 5%, and metabolic energy content of 3,000 Kcal/kg (PT. Charoen Phokphand Indonesia, Tbk.). The standard nutrient requirements for ducks are based on the Indonesian National Standard [14], with a crude protein content of 20-22%, crude fat content of 5%, crude fiber content of 3-7%, and metabolic energy content of 2,900-3,000 Kcal/kg. The ration and drinking water were provided ad libitum. Aqueous extract of *Asystasia gangetica* leaves was administered through the drinking water according to the treatment.

### 2.3. *Asystasia gangetica* (L.) subsp. *Micrantha* and Extract Making Process

The *Asystasia gangetica* used is the part of the leaf that is green and fully developed. The nutrient content of *Asystasia gangetica* is: crude protein 21.56%; crude fiber 16.89%; crude fat 7.26%; and gross energy 2,754 Kcal/g [19]. The ratio for making *Asystasia gangetica* leaf water extract is: 1 kg of *Asystasia gangetica* leaves to 1 liter of water (1:1). The ingredients are ground until the leaves are crushed and homogeneous. Adding *Asystasia gangetica* leaf water extract to 100 ml of drinking water resulted in treatments P1 (98 ml water + 2 ml *Asystasia gangetica* leaf water extract), P2 (96 ml water + 4 ml *Asystasia gangetica* leaf water extract), and P3 (94 ml water + 6 ml *Asystasia gangetica* leaf water extract).

### 2.4. Experimental Design

This experiment used a completely randomized design (CRD), consisting of 4 treatments and 5 replications, with 3 bali ducks male/treatment unit. The treatments, which included *Asystasia gangetica* (L.) subsp. *Micrantha* leaf water extract, were administered through drinking water as follows: P0 = 0% *Asystasia gangetica* leaf water extract; P1 = 2% *Asystasia gangetica* leaf water extract; P2 = 4% *Asystasia gangetica* leaf water extract; and P3 = 6% *Asystasia gangetica* leaf water extract.

### 2.5. Observed variables

Observed variables, namely: (1) Slaughter Weight, obtained by weighing bali ducks male that have entered the harvest period and before being slaughtered have been fasted for 12 hours; (2) Carcass Weight, obtained from the slaughter weight after deducting blood, feathers, head, feet, and removal of internal organs [18]; (3) Carcass Percentage, obtained by dividing the carcass weight by the slaughter weight multiplied by 100% [2]; (4) Bone Percentage, obtained by dividing the weight of the bones that have been separated from the meat by the carcass weight multiplied by 100% [7]; (5) Meat Percentage, by dividing the weight of the meat that has been separated from the bones and subcutaneous fat including

skin by the carcass weight multiplied by 100% [7] ; and (6) the percentage of subcutaneous fat including skin, by dividing the subcutaneous fat including skin by the carcass weight multiplied by 100% [7].

## 2.6. Data Analysis

Experimental data were analyzed using analysis of variance. If significant differences between treatments ( $P < 0.05$ ) were found, the analysis was continued using Duncan's multiple range test [16].

## 3. Result and Discussion

The results of the study (Table 1) showed that the administration of *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract through drinking water at different levels was able to increase the percentage meat of bali duck male, but the variables of slaughter weight, carcass weight, carcass percentage, bone percentage, and subcutaneous fat percentage including skin were not affected by the administration of *Asystasia gangetica* leaf water extract.

**Table 1** Effect of administering water extract of *Asystasia gangetica* (L.) subsp. Micrantha leaves through drinking water on the physical composition of carcasses bali ducks male (8-week-old)

| Variable                                       | Treatment <sup>1)</sup> |                     |                    |                    | SEM <sup>3)</sup> |
|------------------------------------------------|-------------------------|---------------------|--------------------|--------------------|-------------------|
|                                                | P0                      | P1                  | P2                 | P3                 |                   |
| Slaughter weight (g)                           | 1268 <sup>a2)</sup>     | 1287 <sup>a</sup>   | 1316 <sup>a</sup>  | 1349 <sup>a</sup>  | 30.51             |
| Carcass weight (g)                             | 752 <sup>a</sup>        | 767 <sup>a</sup>    | 779 <sup>a</sup>   | 811 <sup>a</sup>   | 15.41             |
| Carcass percentage (%)                         | 59.41 <sup>a</sup>      | 59.74 <sup>a</sup>  | 59.39 <sup>a</sup> | 60.14 <sup>a</sup> | 1.86              |
| Bone percentage (%)                            | 31.19 <sup>a</sup>      | 30.79 <sup>a</sup>  | 30.45 <sup>a</sup> | 30.33 <sup>a</sup> | 0.55              |
| Meat percentage (%)                            | 41.44 <sup>b</sup>      | 42.51 <sup>ab</sup> | 43.63 <sup>a</sup> | 44.28 <sup>a</sup> | 0.53              |
| Percentage subcutaneous fat including skin (%) | 27.36 <sup>a</sup>      | 26.70 <sup>a</sup>  | 25.91 <sup>a</sup> | 25.38 <sup>a</sup> | 0.57              |

Information: A = 0% *Asystasia gangetica* leaf extract; B = 2% *Asystasia gangetica* leaf extract; C = 4% *Asystasia gangetica* leaf extract; and D = 6% *Asystasia gangetica* leaf extract; Values with different letters on the same line have significantly different meanings ( $P < 0.05$ ); SEM: "Standard error of the treatment means"

Administering *Asystasia gangetica* leaf water extract through drinking water at different levels has not been able to increase slaughter weight, carcass weight, and carcass percentage of bali duck male. This is because the rations provided contain almost the same protein and energy, so the ducks' ration consumption does not differ. These results are supported by research by [12], which found that administering *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract through drinking water to bali duck male at different levels resulted in no difference in ration consumption. According to [3], the availability of sufficient protein in feed will accelerate the rate of growth in livestock live weight. This is also supported by the crude protein content in *Asystasia gangetica*, which is reported to reach 21.56% [19]. Although the results of this study differed significantly, there was a trend of increasing slaughter weight, carcass weight, and carcass percentage in line with increasing levels of extract administered. This increase is related to the role of bioactive compounds found in *Asystasia gangetica* leaves, especially flavonoids, phenols and saponins as antioxidants that contribute to improving the physiological performance of livestock, improving digestive tract health and suppressing the activity of pathogenic microbes in the intestine.

Flavonoids are known to improve the digestive system by stimulating digestive enzymes and increasing intestinal permeability, resulting in more efficient nutrient absorption and optimal body weight gain [5]. Flavonoid compounds are also known to accelerate cell regeneration and increase blood circulation in muscle tissue, thereby supporting the process of carcass formation more optimally. Furthermore, [5], stated that flavonoid compounds support the development of body mass in poultry. According to [15], carcass percentage is influenced by muscle tissue growth, fat content, and the proportion of non-carcass organs, such as the head, feet, and internal organs. Age, genetics, and physiological conditions of livestock also influence the distribution of body components. According to [1], an increase in live weight is not always followed by an increase in carcass percentage, especially if body weight gain occurs proportionally in carcass and non-carcass.

The meat percentage of bali duck male with 4% and 6% *Asystasia gangetica* leaf water extract gave the highest results ranging from 43.63 - 44.28%. The increase in meat percentage is influenced by increased muscle tissue growth as a

result of improved physiological quality of the digestive tract. This shows that *Asystasia gangetica* leaf water extract can increase the proportion of meat in the carcass by increasing nutrient absorption and improving intestinal microflora, which is driven by flavonoid and saponin content [21;5;3]. Flavonoids and saponins play an important role in improving intestinal microflora, stimulating the growth of intestinal villi, thereby increasing the surface area for nutrient absorption, especially protein and energy, which are optimally utilized [5]. *Asystasia gangetica* has a crude protein content of 21.56% and protein is the main building block needed for muscle tissue formation [19]. According to [3], optimal protein absorption is crucial for supporting muscle growth, especially in young livestock in the growth phase. Increasing the percentage of meat also indicates that most of the weight gain during rearing is directed towards muscle tissue, rather than fat or bone. This is highly commercially advantageous, as meat is the carcass component with the highest market value. The duck carcasses the breast and thigh are the primary commercial cuts containing the largest meat content and are indicators of overall carcass quality [6]

Bone percentage results did not differ across treatments, and there tended to be a decrease in bone percentage values with increasing levels of *Asystasia gangetica* (L.) subsp. Micrantha leaf water extract administered through drinking water. This is because bone has a relatively slower growth rate compared to muscle and other soft tissues, so that the increase in carcass weight is predominantly derived from meat, and will automatically reduce the bone to total carcass ratio. This downward trend in bone percentage is thought to be related to the increase in meat tissue, causing the proportion of bone to total carcass to become smaller. This is in accordance with the opinion of [7], the bone percentage tends to remain constant or decrease in livestock experiencing optimal meat growth. The age factor of livestock influences bone tissue growth, that bone develops maximally at a young age and with increasing age, muscle tissue growth is more dominant than bone [13]. In this study, bone percentage results tended to decrease at higher extract levels. The decrease in bone percentage is consistent with the dominant increase in muscle mass, resulting in a smaller bone-to-total carcass ratio [22;7;13].

The percentage of subcutaneous fat, including skin, yielded similar results, but tended to gradually decrease at higher extract levels. This is due to the anti-lipogenic effects of flavonoids and saponins, which inhibit fat synthesis and absorption [9;8]. This fat reduction also improves the physical and microbiological quality of the carcass [15;4]. This aligns with the principles of growth physiology, which state that increased muscle mass without an accompanying increase in energy stores in the form of fat will result in a denser, lower-fat carcass composition [15]. According to [4], high levels of subcutaneous fat can increase water content in the tissue, which can accelerate the growth of putrefactive microorganisms. Therefore, the decreasing trend in subcutaneous fat in this study could be an added value in efforts to improve carcass quality both physically and microbiologically.

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## 4. Conclusion

4.1. It can be concluded that administering 4% water extract of *Asystasia gangetica* (L.) subsp. Micrantha leaves through drinking water can improve the physical composition carcasses of bali duck male by increasing the results in meat percentage.

### *Suggestion*

Based on the research results, it is recommended that breeders use a 4% water extract of *Asystasia gangetica* (L.) subsp. Micrantha leaves in drinking water as it can improve the meat percentage of bali duck male.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

The Animal Ethics Commission has approved 60 one-day-old ducks used in this research from the Faculty of Veterinary Medicine, Udayana University, Badung, Bali, Indonesia

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