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The Effect of Giving Dragon Fruit Peel and Papaya Seed Extracts through Drinking Water on the Percentage Commercial Carcass of Native Chicken

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Abstract— *The prohibition on the use of Antibiotic Growth Promoters (AGP) has encouraged farmers to seek alternative feed additives, such as dragon fruit peel and papaya seeds. Dragon fruit peel contains various antioxidants, including vitamin C, flavonoids, tannins, alkaloids, steroids, and saponins. Papaya seeds contain phytochemical compounds such as saponins, tannins, and flavonoids, which have potential antibacterial properties. This study aimed to determine the effect of administering aqueous extracts of dragon fruit peel, papaya seeds, and their combination through drinking water on the commercial carcass cuts of native chickens. This study used a Completely Randomized Design (CRD) with four treatments and five replications, where each replication consisted of three native chickens. The treatments applied were drinking water without dragon fruit peel and papaya seed aqueous extract (P0), drinking water with 4% dragon fruit peel aqueous extract (P1), drinking water with 4% papaya seed aqueous extract (P2), and drinking water with 2% dragon fruit peel aqueous extract combined with 2% papaya seed aqueous extract (P3). The observed variables included carcass weight and commercial carcass cuts. The results showed that the administration of dragon fruit peel and papaya seed aqueous extracts in drinking water did not have a significant effect (P > 0.05) on carcass weight or commercial carcass cuts of native chickens. It can be concluded that the administration of 4% dragon fruit peel aqueous extract, 4% papaya seed aqueous extract, and the combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract was not able to increase the commercial carcass cuts of 10-week-old native chickens.*

Keywords— Native chicken, Dragon fruit peel, Papaya seed, Commercial carcass, Aqueous extract, Feed additive, Natural growth promoter.

I. INTRODUCTION

Increasing public awareness of the importance of protein in the body has encouraged people to seek animal-based protein sources to meet their nutritional needs. One of the most popular sources of animal protein is chicken meat. Chicken meat contains high nutritional value and plays an important role in fulfilling nutritional requirements, particularly as a source of animal protein. Native chickens are among the poultry types that are highly preferred by consumers.

One of the indicators of successful native chicken production is an increase in carcass weight. According to Ulupi et al. (2018), the carcass is the part of the chicken's body that has high economic value. Commercial carcass cuts consist of the breast, thighs, back, and wings. In native chicken production, several challenges frequently affect carcass yield, including suboptimal growth performance and declining health status. To overcome these problems, farmers have commonly used Antibiotic Growth Promoters (AGPs) to stimulate growth, improve feed efficiency, enhance production performance, and maintain animal health. However, the use of AGPs may result in antibiotic residues in chicken meat, which can pose health risks to consumers (Sinurat et al., 2003). Consequently, the Indonesian government issued the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 14 of 2017, which prohibits the use of antibiotics as growth promoters in livestock production. Therefore, natural feed additives are needed as alternatives to prevent antibiotic residues in native chicken meat, such as dragon fruit peel and papaya seeds.

Dragon fruit peel (*Hylocereus polyrhizus*) has potential as a feed additive because it contains nutrients with antibacterial properties that may improve nutrient absorption efficiency (Mustika et al., 2014). Dragon fruit peel contains various antioxidant compounds, including vitamin C, flavonoids, tannins, alkaloids, steroids, and saponins (Noor et al., 2016). It also contains anthocyanins, which not only function as antioxidants but may also improve the appearance and performance of broiler chickens (Maheri et al., 2022). Papaya seeds (*Carica papaya* L.) are another natural ingredient that can be used as a feed additive due to their antibacterial properties. Papaya seeds contain phytochemical compounds such as saponins, tannins, and flavonoids, which have potential as natural antioxidants (Yanti, 2017). Sukadana et al. (2008) reported that triterpenoid isolates extracted from papaya seeds exhibited antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, thereby supporting digestive processes in chickens.

The objective of this study was to determine the effect of administering aqueous extracts of dragon fruit peel, papaya seeds, and their combination through drinking water on the percentage of commercial carcass cuts in native chickens.

II. MATERIALS AND METHODS

2.1 Place and Time of the Research

This research was conducted at the Farm of the Faculty of Animal Science, Udayana University, located at Jalan Raya Sesetan Gang Markisa No. 6, Sesetan Village, South Denpasar District, Denpasar City, Bali. The study was carried out in August 2025.

2.2 Native Chickens

The native chickens used in this study were unsexed and aged six weeks. A total of 60 native chickens were selected from 75 available native chickens for the experiment.

2.3 Cages and Equipment

The study utilized colony type cages made of bamboo, with dimensions of 90 cm in length, 70 cm in width, and 45 cm in height. The cages were equipped with bamboo slatted floors. A total of 20 cage units were used, with each cage housing three native chickens. Each cage was provided with a feeder and a drinker made of plastic bowls specifically designed for poultry. Additional equipment used in the study included buckets for mixing dragon fruit peel aqueous extract and papaya seed aqueous extract with drinking water, measuring cylinders for measuring water volume, a blender for preparing the dragon fruit peel and papaya seed aqueous extracts, strainers for filtering the extracts, and stationery for recording research data throughout the experimental period.

2.4 Ration and Drinking Water

The study used a commercial feed, CP 511 Bravo, produced by PT. Charoen Pokphand Indonesia Tbk. Feed and drinking water were provided *ad libitum*, and the remaining feed and water were measured on the following day. The drinking water used in this study was sourced from a well. The nutrient composition of the commercial CP 511 Bravo feed is presented in Table 1.

TABLE 1
NUTRIENT COMPOSITION OF COMMERCIAL CP 511 BRAVO FEED

Nutrient	Amount
Moisture (%)	Max 14.00
Crude Protein (%)	Min 20.00
Crude Fat (%)	Min 5.00
Crude Fiber (%)	Max 5.00
Ash (%)	Max 8.00
Calcium (%)	0.80 – 1.10
Phosphorus (with phytase enzyme) (%)	Min 0.50
Lysine (%)	Min 1.20
Methionine (%)	Min 0.45
Methionine + Cystine (%)	Min 0.80
Tryptophan (%)	Min 0.19
Threonine (%)	Min 0.75

Source: PT. Charoen Pokphand Indonesia Tbk

2.5 Dragon Fruit Peel and Papaya Seed Aqueous Extracts

The preparation of dragon fruit peel and papaya seed aqueous extracts began by collecting dragon fruit peels and papaya seeds that had been separated from their respective fruits. Both materials were thoroughly cleaned. The dragon fruit peels were then cut into small pieces to facilitate the blending process. Subsequently, the dragon fruit peels were blended with water at a ratio of 1:1, meaning 1 kg of dragon fruit peel was mixed with 1 L of water. Similarly, papaya seeds were blended with water at the same ratio of 1:1. After each material was blended until a homogeneous mixture was obtained, the extracts were filtered. The resulting dragon fruit peel and papaya seed aqueous extracts were then administered to the chickens according to the respective treatment groups.

2.6 Research Design

This study employed a Completely Randomized Design (CRD) consisting of four treatments and five replicates, resulting in a total of 20 experimental units. Each experimental unit consisted of three native chickens. The treatments were as follows:

- **P0:** Drinking water without dragon fruit peel or papaya seed aqueous extract (control)
- **P1:** Drinking water supplemented with 4% dragon fruit peel aqueous extract
- **P2:** Drinking water supplemented with 4% papaya seed aqueous extract
- **P3:** Drinking water supplemented with 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract

2.7 Randomization

Before the experiment commenced, 75 native chickens were weighed to obtain a homogeneous body weight distribution. A total of 60 chickens with an average body weight of 219.35 g and a standard deviation of ± 0.45 g were selected. The chickens were then randomly assigned to 20 cage units, with each cage unit containing three randomly allocated native chickens.

2.8 Research Preparation

One week prior to the start of the experiment, the cages and equipment were prepared, and cage sanitation was carried out using an antiseptic solution diluted at a ratio of 1:5 (1 mL of antiseptic mixed with 5 L of water) as a disinfectant. On the first day of the experiment, the chickens were weighed to determine their initial body weight and were marked with colored leg bands to facilitate identification and data recording.

2.9 Administration of Dragon Fruit Peel and Papaya Seed Aqueous Extracts

For treatment P0, chickens received drinking water without the addition of dragon fruit peel or papaya seed aqueous extracts. For treatment P1, a 4% concentration of dragon fruit peel aqueous extract was added to the drinking water, consisting of 960 mL of water and 40 mL of dragon fruit peel aqueous extract. For treatment P2, a 4% concentration of papaya seed aqueous extract was added to the drinking water, consisting of 960 mL of water and 40 mL of papaya seed aqueous extract. For treatment P3, drinking water contained a combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract, consisting of 960 mL of water, 20 mL of dragon fruit peel aqueous extract, and 20 mL of papaya seed aqueous extract. Drinking water was provided *ad libitum*, meaning it was continuously available throughout the day, and the remaining water was measured the following day.

2.10 Slaughtering of Native Chickens

Prior to slaughtering, the chickens were weighed to determine their final body weight and then fasted for 12 hours while still being provided with drinking water without treatment. Slaughtering was performed according to the procedure described by the USDA (United States Department of Agriculture, 1997), by severing the jugular vein and carotid artery located between the skull and the first cervical vertebra. The blood was collected and weighed. After death was confirmed, the chickens were immersed in hot water at a temperature of 65–75°C for 30–60 seconds to facilitate feather removal. Once the feathers had been removed, the chickens were weighed to determine slaughter weight. Subsequently, the internal and external organs were removed, and the carcasses were weighed to determine carcass weight.

2.11 Observed Variables

The variables observed in this study were carcass weight and the percentage of commercial carcass cuts, including breast, thigh, back, and wing percentages. Carcass weight and carcass cut percentages were calculated as follows:

1) **Carcass weight** was obtained by weighing the chicken after slaughter and the removal of blood, feathers, head, neck, internal organs, and feet.
2) $\textbf{Breast percentage} = \frac{(\text{Breast weight (g)}}{\text{Carcass weight (g))}} \times 100$
3) $\textbf{Thigh percentage} = \frac{(\text{Thigh weight (g)}}{\text{Carcass weight (g))}} \times 100$
4) $\textbf{Back percentage} = \frac{(\text{Back weight (g)}}{\text{Carcass weight (g))}} \times 100$
5) Wing $\textbf{percentage} = \frac{(\text{Wing weight (g)}}{\text{Carcass weight (g))}} \times 100$

2.12 Data Analysis

The data obtained were analyzed using analysis of variance (ANOVA). If significant differences among treatments were detected ($P < 0.05$), the means were further compared using Duncan's Multiple Range Test (DMRT) as described by Steel and Torrie (1993).

III. RESULTS AND DISCUSSION

The results of the study on the effect of administering dragon fruit peel and papaya seed aqueous extracts through drinking water on the percentage of commercial carcass cuts of native chickens are presented in Table 2.

TABLE 2
EFFECT OF ADMINISTERING DRAGON FRUIT PEEL AND PAPAYA SEED AQUEOUS EXTRACTS THROUGH DRINKING WATER ON THE PERCENTAGE OF COMMERCIAL CARCASS CUTS OF NATIVE CHICKENS

Variables	Treatment				SEM
	P0	P1	P2	P3	
Carcass Weight (g)	417.40a	423.60a	422.80a	458.20a	12.3
Breast Percentage (%)	26.21a	27.83a	27.02a	26.03a	0.91
Back Percentage (%)	24.73a	23.42a	23.99a	25.40a	0.8
Thigh Percentage (%)	34.32a	34.58a	34.52a	34.14a	0.57
Wing Percentage (%)	14.74a	14.17a	14.47a	14.43a	0.32

Notes:

P0: Drinking water without dragon fruit peel and papaya seed aqueous extracts (control). P1: Drinking water supplemented with 4% dragon fruit peel aqueous extract. P2: Drinking water supplemented with 4% papaya seed aqueous extract. P3: Drinking water supplemented with 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract.

SEM = Standard Error of the Treatment Mean

Means followed by the same superscript letter within the same row are not significantly different (P > 0.05).

IV. DISCUSSION

3.1 Carcass Weight

The carcass weight of native chickens receiving dragon fruit peel and papaya seed aqueous extracts through drinking water in all four treatments was not significantly different ($P > 0.05$) (Table 2). The absence of significant differences in carcass weight among treatments indicates that the aqueous extracts of dragon fruit peel and papaya seed were not able to increase carcass weight in native chickens. The bioactive compounds contained in dragon fruit peel and papaya seeds, such as flavonoids, phenolics, saponins, and tannins, function to reduce oxidative stress and maintain digestive tract health. However, in the present study, these compounds were not able to significantly enhance muscle deposition. Furthermore, the dosage levels used in this study were insufficient to significantly improve nutrient utilization efficiency, resulting in no increase in carcass weight. This finding is supported by Peng et al. (2022), who stated that the effectiveness of feed additives is highly influenced by the dosage level used, which affects growth performance and carcass development. In addition, all treatment groups received diets with similar nutrient compositions, resulting in relatively uniform growth performance among the chickens. According to North and

Bell (1990), chicken growth is strongly influenced by the balance of dietary nutrients, particularly protein and energy; therefore, diets with similar nutrient compositions tend to produce comparable production performance.

3.2 Breast Percentage

The breast percentage of native chickens receiving dragon fruit peel and papaya seed aqueous extracts through drinking water in all four treatments was also not significantly different ($P > 0.05$) (Table 2). This result indicates that the bioactive compounds present in dragon fruit peel and papaya seeds, including flavonoids, alkaloids, tannins, saponins, vitamin C, and phenolic compounds, at the dosage levels used in this study were not able to significantly enhance protein deposition and breast muscle development. Although saponins and tannins have the potential to improve digestive tract health through their antibacterial activity, thereby supporting nutrient absorption (Sukadana et al., 2008), the effectiveness of natural feed additives is influenced by factors such as dosage level, duration of administration, and the physiological response of the animals to these bioactive compounds (Mahfudz et al., 2009). The lack of significant differences in breast percentage may also be attributed to the fact that all treatment groups received diets with similar nutrient contents, resulting in relatively uniform growth and muscle tissue deposition. According to Corzo and Kidd (2004), muscle tissue development is highly dependent on the adequacy and balance of nutrients in the diet.

3.3 Back Percentage

The back percentage of native chickens receiving 4% dragon fruit peel aqueous extract, 4% papaya seed aqueous extract, and a combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract showed no significant differences ($P > 0.05$) (Table 2). This result may be attributed to the fact that the back portion of poultry is predominantly composed of bone tissue, which develops as the animal grows and contains a relatively low proportion of muscle tissue. This finding is consistent with Putra et al. (2021), who reported that the back portion is dominated by bone tissue rather than muscle tissue; therefore, its growth is more influenced by skeletal development than by muscle deposition. Bone formation and growth are primarily determined by the adequacy of minerals such as calcium and phosphorus, as well as vitamin D3 in the diet. Since all treatment groups received diets with similar nutrient compositions, bone growth occurred relatively uniformly and consequently did not affect back percentage. The bioactive compounds present in dragon fruit peel and papaya seeds, including flavonoids, alkaloids, tannins, saponins, vitamin C, and phenolic compounds, are known to improve digestive tract health and metabolic efficiency; however, they do not directly influence bone tissue formation. Flavonoids and phenolic compounds mainly function as antioxidants that protect cells from oxidative damage (Arifin and Ibrahim, 2018). Although saponins and tannins may enhance nutrient absorption through their antibacterial properties, the extract dosages used in this study were insufficient to produce a significant effect on the back percentage of native chickens.

3.4 Thigh Percentage

The thigh percentage of native chickens receiving 4% dragon fruit peel aqueous extract, 4% papaya seed aqueous extract, and a combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract did not differ significantly ($P > 0.05$) from that of the control group (Table 2). This finding indicates that the bioactive compounds contained in dragon fruit peel and papaya seeds, such as flavonoids, alkaloids, tannins, saponins, vitamin C, and phenolic compounds, at the dosage levels used in this study were not able to significantly enhance thigh muscle development. These compounds are primarily involved in maintaining digestive tract health and improving metabolic efficiency rather than directly affecting carcass composition (Khalaji et al., 2011). The absence of significant differences in thigh percentage may also be attributed to the fact that all treatment groups received diets with similar nutrient contents, particularly protein and energy, resulting in relatively uniform muscle growth. Harimurti (1990) stated that similar nutrient compositions in the diet will produce relatively similar muscle growth. In addition, thigh percentage is closely related to slaughter weight and carcass weight. According to Pasang (2016), thigh weight is associated with slaughter weight, while Soeparno (2005) reported that carcass components are closely related to both carcass weight and slaughter weight. Therefore, the lack of significant differences in slaughter weight and carcass weight among treatments resulted in similar thigh percentages across all treatment groups.

3.5 Wing Percentage

The wing percentage of native chickens receiving 4% dragon fruit peel aqueous extract, 4% papaya seed aqueous extract, and a combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract did not differ significantly ($P > 0.05$) among treatments (Table 2). This condition may be attributed to the fact that the wing is a carcass component predominantly composed of bone tissue, with a relatively lower proportion of muscle compared to other carcass parts. Londok

and Rompis (2018) reported that the wing is one of the carcass components with a smaller percentage than the breast, thigh, and back. This finding is supported by Mait et al. (2019), who stated that the wing consists of a greater proportion of bone and feathers, resulting in a relatively low contribution to meat formation. Bone tissue development occurs earlier than muscle tissue development; therefore, during the early growth phase, available nutrients are primarily utilized for skeletal formation (Ariawan et al., 2016). The absence of significant differences among treatments may also be explained by the fact that the bioactive compounds present in dragon fruit peel and papaya seeds, including flavonoids, alkaloids, tannins, saponins, vitamin C, and phenolic compounds, play a greater role in improving digestive tract health, enhancing antioxidant activity, and increasing nutrient utilization efficiency rather than directly influencing bone tissue growth. During the growth period, a portion of the absorbed protein is also utilized for feather formation and development, resulting in less protein being available for carcass tissue deposition (Adnyana et al., 2014). Therefore, the administration of dragon fruit peel and papaya seed aqueous extracts at the levels used in this study was not sufficient to produce significant changes in the wing percentage of native chickens.

V. CONCLUSION

Based on the results of this study, it can be concluded that the supplementation of dragon fruit peel and papaya seed aqueous extracts through drinking water at the levels of 4% dragon fruit peel aqueous extract, 4% papaya seed aqueous extract, and a combination of 2% dragon fruit peel aqueous extract and 2% papaya seed aqueous extract did not improve slaughter weight, carcass weight, breast percentage, back percentage, thigh percentage, or wing percentage of native chickens.

Future research should consider evaluating higher dosages, longer treatment durations, or alternative administration methods (such as feed incorporation) to determine whether these factors influence the effectiveness of dragon fruit peel and papaya seed aqueous extracts on carcass traits of native chickens.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research. The materials used in this study, including dragon fruit peel extract and papaya seed extract, were prepared independently by the researchers and were not influenced by any commercial or financial interests.

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