The effect of fermentation dragon fruit peel (*Hylocereus polyrhizus*) juice throughout drinking water for productivity of native chicken

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Abstract. This research aims to determine the productivity kampung chickens given dragon fruit *(Hylocereus polyrhizus)* peel juice in drinking water. The study used a Completely Randomized Design (CRD) consisting of 3 treatments and 6 replications, each replication consisting of 10 kampung chickens. The treatments given were drinking water without fermented dragon fruit peel juice (P0), drinking water containing 4% fermented dragon fruit peel (P1), and drinking water containing 6% fermented dragon fruit peel (P2). The variables observed were initial body weight, final body weight, weight gain, ration consumption, drinking water consumption, feed conversion ratio*, and* carcass yield. The results showed that increased body weight, weight gain, carcass weight, breast percentage and decreased feed conversion ratio were significantly different ($P<0.05$). Based on the research results, it can be concluded that given fermented dragon fruit peel juice in drinking water levels of 4% and 6% can increase body weight, body weight gain, carcass weight, breast percentage and decrease feed conversion ratio of male kampung chickens aged 6 - 11 weeks.

1 Introduction

Kampung chickens, also known as kampung chickens (not purebred) are local Indonesian chickens that have undergone domestication. Kampung chickens have an advantage over broiler chickens, as their meat's taste and texture are preferred by Indonesians. According to the community, especially in Bali, kampung chickens have a role as production livestock. As ceremonial (traditional and religious) animals, so kampung chickens have added value in increasing people's income.

Currently, efforts to develop kampung chickens still face various obstacles, including the traditional rearing system, which means that the productivity of kampung chickens is still relatively low. Intensive rearing patterns can improve the productivity of kampung chickens. Dragon fruit peel is an organic waste or residue from dragon fruit that we often encounter but is rarely reprocessed. Ref. [1] stated that dragon fruit peel contains antioxidant compounds such as flavonoids, phenols, saponins, and steroids, so it has the potential to be developed as

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a source of natural antioxidants. Dragon fruit peel waste is worth trying as a feed mixture for kampung chickens. However, according to Ref. [2], dragon fruit peel has a low protein and high crude fiber content, which is an obstacle to its use as animal feed, especially poultry.

Efforts to increase the nutrients in dragon fruit peel can be made through fermentation. A high enough crude fiber content in the ration will disrupt the digestibility of the ration in poultry [3]. The dragon fruit peel is used to juice it and give it to kampung chickens in drinking water as an ad libitum.

2 Methods

The cage used is a battery colony cage measuring 80 cm x 65 cm x 50 cm made of bamboo. There are 18 cage plots with 10 chickens each. Each cage is equipped with supporting equipment, including feed bins, drinking water containers, digital scales for measuring kampung chickens' ration and body weight, buckets, measuring cups, and writing tools for recording research results. 54 kampung chickens were observed aged 6 weeks and were obtained from farms in Sobangan Village, Badung Regency.

A fermented dragon fruit peel is made by preparing fresh dragon fruit peels that have been cleaned and then cut into small pieces, which are then mixed with baker's yeast and stored under anaerobic conditions for 3 days. After fermentation, the dragon fruit peel is crushed and mixed with drinking water. Rations and drinking are provided ad libitum . The fermented dragon fruit peel is mixed every morning and put into a plastic bottle. The content of phytochemical compounds in fermented dragon fruit peel juice, according to laboratory analysis [1] consists of flavonoid 16.62 mg/100 g; antioxidant activity 22.99 mg/ L GAEAC; and lactic acid bacteria total population 8,1 x 105.

The research design used was a Completely Randomized Design (CRD), with 3 treatments and 6 replications. The treatments given in this study included Treatment P0: Drinking water without adding dragon fruit peel, and Treatments P1 and P2: Drinking water containing 4%, 6%, and dragon fruit peel fermented. The data obtained were analyzed using variance if the treatments were significantly different at 5% ($P<0.05$), followed by Duncan's multiple range test [4].

3 Results

Performance of male kampung chickens aged 6- 11 weeks that were given fermented dragon fruit (Hylocereus polyrhizus) peel juice in drinking water on initial body weight, final body weight, body weight gain, ration consumption, drinking water consumption, feed conversion ratio (FCR) Table 1. and carcass yield and a part of carcass can be seen in Table. 2. The results showed that the initial body weights of kampung chickens given treatment P0, P1, and P2 each 490.15 g, 490.13 g; and 490.20 g based on statistical analysis were not significantly different ($P>0.05$) (Table 1). The final body weight of 11-week kampung chickens treated with P0 was 1349.77 g. Treatments P1 and P2 were 5.97% and 6.49% significantly different, respectively ($P<0.05$) than P0. The weight gain of kampung chickens for 11 weeks given P0 treatment was 859.62 g. Treatments P1 and P2 were 9.07% and 9.82% significantly different($P<0.05$), respectively than P0. The results of the study showed that giving dragon fruit peel juice was able to increase the final body weight and body weight gain of kampung chickens because the antibacterial content in dragon fruit peel fermentation was able to inhibit the growth of pathogenic bacteria so that absorption in the intestines occurred optimally. Dragon fruit peel contains flavonoids that have the potential to act as antioxidants and play a role in killing bacteria and denaturing bacterial cell proteins. This is in line with [5] that fermented dragon fruit peel can increase lactic acid bacteria in the small intestine of

quail aged 7 - 15 weeks. Ref. [3] stated that increasing body weight results from enlarging muscle cells and other tissues formed by increasing tissue such as fat, carbohydrates, minerals, and water from the rations consumed. The ration consumption and drinking water consumption of kampung chickens given treatment P0, P1, and P2 were respectively not significantly different (P>0.05) (Table 1).

Table 1. Performance kampung chickens 6 – 11 weeks given fermented dragon fruit peel juice in drinking water.

Variable	Treatment[1)]			SEM[2)]
	P0	P1	P2	
Initial body weight (g)	490.15 3)	490.13	490.20	10.75
Final body weight (g)	1349.77[b]	1435.45[a]	1443.40[a]	18.05
Weight gain (g/e/5 weeks)	859.62[b]	945.32[a]	953,20[a]	18.10
Ration consumption (g/6 weeks)	4489.90	4498.50	4494.24	51.46
Drinking water consumption (ml/6 weeks)	8262.65	8312.60	8539.00	160.04
Feed Conversion Ratio	5.22a	4.76b	4.72b	0.07

Note:
Drinking water treatment
P0: Drinking water without dragon fruit peel juice
P1: Drinking water with 4% fermented dragon fruit peel P2: Drinking water with 6% fermented dragon fruit peel
SEM: *Standard Error of the Treatment Means*
Values with the same letter in the same row are not significantly different (P>0.05)

The feed conversion ratio (FCR) for kampung chickens treated with P0 is 5.22, but treatments P1 and P2 were 8.81% and 9.59% significantly different (P<0.05) than P0 (Table 1). The research results showed that giving fermented dragon fruit peel juice through drinking water was able to reduce the FCR value because the flavonoid content in dragon fruit peel was able to inhibit Dewi the growth of pathogenic bacteria in the digestive tract so that the metabolism of nutrients in the ration ran optimally. Factors that influence the FCR value are the form and quality of the ration, age of the animal, breed, nutritional content of the ration, temperature, and digestive tract health [1], [5], [6].

3.1 Carcass Yield

The results of the addition of treatment P1 and P2 in drinking water gave carcass yield (carcass weight and breast percentage) of male native chickens aged 11 weeks significantly different (P<0.05) than P0 (Table 2). The carcass weight of kampung chickens for 11 weeks, given P0 treatment was 840.00 g. but treatments P1 and P2 were 6.11% and 6.68% significantly different(P<0.05) than P0. The results of the breast percentage (%) kampung chickens given treatment P1 and P2 are respectively 5.00% and 9.32%, significantly different (P<0.05) than treatment P0 (Table 2). The study showed that giving dragon fruit peel juice increased the carcass weight and breast percentage (%) of kampung chickens because the antioxidant content in dragon fruit peel fermentation reduced the effects of free radicals, increasing endurance. Consequently, the hormonal process in the body of kampung chicken increased, and it also had anti-radical effects and high antioxidant activity, which is in line with [1, 7].

Table 2. The effect of treatment for carcass yield of kampung chickens aged 6 - 11 weeks.

Variable	Treatment[1)]			SEM[2)]
	P0	P1	P2	
Slaughter weight (g)	1400.00	1406.13	1422.00	32.05
Carcass weight (g)	840.00[b3)]	894.70[a]	900.16[a]	8.05
Carcass (%)	60.00	63.63	63.30	1.10
Breast (%)	39.90[b]	42.00[a]	44.00[a]	2.26
Wing (%)	10.30	10.54	9.10	0.08
Tight (%)	21.80	21.40	20.20	0.50
Back (%)	28.00	26.06	26.70	0.80

Note:
Drinking water treatment
P0: Drinking water without dragon fruit peel juice
P1: Drinking water with 4% fermented dragon fruit peel P2: Drinking water with 6% fermented dragon fruit peel
SEM: *Standard Error of the Treatment Means*
Values with the same letter in the same row are not significantly different (P>0.05)

The content of phytochemical compounds in fermented dragon fruit peel juice according to laboratory analysis [1] consists of: flavonoid 16.62 mg/100 g; antioxidant activity 22.99 mg/ L GAEAC; and lactic acid bacteria total population 8,1 x 10^5. Lactic acid bacteria in fermented dragon fruit peel juice act as a probiotic to help the digestive process, protect and maintain a healthy digestive system, and increase carcass weight and breast percentage. According to Ref. [1], [3], [8] the supplementation of Saccharomyces cerevisiae in the diet can significantly increase the growth, and digestibility of feed substances.

4 Conclusion

Based on the research results, it can be concluded that fermented dragon fruit peel juice in drinking water levels of 4% and 6% can increase body weight, weight gain, carcass weight, breast percentage, and decrease feed conversion ratio of male native chickens aged 6 - 11 weeks.

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