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Effect of Fermented Rice Bran in the Ration on Weight and Percentage of Carcass and Non-Carcass Male Quail (*Coturnix coturnix japonica*) 7 Weeks Old

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Abstract

Quail (Coturnix coturnix japonica) is one of the poultry commodities that has a role in producing animal protein. The purpose of this study was to determine the effect of giving fermented rice bran in the ratio to the weight and percentage of carcasses as well as the weight and percentage of non-carcass male quail aged seven weeks The study was conducted using a completely randomized design (CRD) with five treatments and three replications. The treatments were applied as follows, rations with unfermented rice bran 20% and rations with fermented rice bran 5%, 10%, 15%, and 20%. Parameters observed were slaughter weight, carcass weight, non-carcass weight, carcass percentage, and non-carcass percentage. The data obtained were analyzed for variance. If there are significantly different results (P <0.05) between treatments, Duncan's smallest total distance test is carried out. The study results show that the administration of fermented rice bran in the male quail aged seven weeks showed no significant difference (P>0.05) on cut weight, carcass weight, non-carcass weight, carcass percentage, and non-carcass percentage. Giving fermented rice bran to a level of 15% in the ratio of male quail aged seven weeks was the best level because it produced the highest percentage of carcass and the lowest percentage of non-carcass. Chicken slaughter weight, carcass weight, non-carcass weight, carcass percentage and non-carcass percentage of male quail given 15% fermented rice bran, namely 110.60 g, 73.07 g, 42.73 g, 62.43 g and 35, 57 grams

Keywords: Rice Bran, Fermentation, Carcass, Non-carcass, Quail

1. Introduction

The increase in the population in Indonesia is one of the things that causes the opportunities and prospects for the livestock world to be brighter. As the population increases, the consumption of animal protein also increases. The high level of public awareness of the importance of nutritional value causes livestock products to overgrow. The community widely uses the demand for livestock products such as meat because they have good taste and high nutritional content. One source of meat is quail meat [1].

To meet the ever-increasing consumption of animal protein, quail is an alternative source of animal protein to meet public demand for nutrition [2]. Quail meat has a high nutritional value and is not inferior to other poultry [1]. Quail has a short cycle, and its maintenance does not require an extensive area, and its growth is fast. The selling value of quail at each age level is relatively high [3].

Quality rations must be composed of quality feed ingredients as well [4]. One of the feed ingredients commonly used in poultry rations is rice bran, but the quality of circulating rice bran is

not stable. [5], rice bran contains 88.93% dry matter nutrients, 12.39% crude protein, 12.59% crude fiber, 0.09% calcium and 1.07% phosphorus. However, the weakness of rice bran is that the fiber content is quite high, contains phytate compounds, is easily oxidized by outside air so that it quickly becomes rancid, and is easy to clot and mold. Therefore, technology is needed to be applied to rice bran. The technology used is fermentation to increase the nutritional content and reduce anti-nutrient substances from rice bran.

Fermentation technology is a method that can improve the nutritional value of feed to be of higher quality because the taste, aroma, texture, digestibility, and shelf life are better than the original material [6]. In fermentation, the breakdown of organic compounds into simple compounds involving the activity of microorganisms. [7] Microorganisms in the fermentation process will break down crude fiber into products that can be digested by livestock and can increase crude protein levels, affecting the level of consumption and weight gain of livestock [8].

2. Material and Methods

2.1 Research Design

The experiment was conducted using a completely randomized design (CRD) with five treatments and three replications. Each replication consisted of 3 tails, so the number of quail used was 45. The treatments applied are the ration contains 20% unfermented rice bran as a control (P0), the ration contains 5% fermented rice bran (P1), the ration contains 10% fermented rice bran (P2), the ration contains 15% fermented rice bran (P3), dan the ration contains 20% fermented rice bran (P4).

2.2 Time and Place of Research

This research was conducted on Badak Agung X No. 11 Street, Sumerta Kelod Village, East Denpasar. This research was conducted from 12 October until 16 November 2020.

2.3 Materials and Tools

Quail

The quail (*Coturnix coturnix japonica*) used in this study was a male quail that was 14 days old and had a relatively homogeneous body weight, with a weight range of 26.7g – 52.6g. Eighty quails were purchased from Lumajang Regency (East Java).

Research Tools

The equipment used in this study consisted of jars used to store bran and rations. Plastic bags to store mixed rations. Stationery such as pens, books, which are used to record weight and provide a code for each ration material. Thermohygrometer to measure temperature and humidity in the cage. Digital electric scales with a capacity of 3 kg and availability of 0.1 kg were used to weigh quail and feed ingredients. Label paper was used for each treatment considered. Broom used to clean the cage.

Cages and Equipment

The cage used in the study is a cage with a battery system divided into 15 plots. The cages were made of bamboo slats and wire netting with 176 x 67 x190 (W x W x H) cm, with each field measuring 35 x 30 x 30 (W x W x H) cm [9]. Each cage is equipped with a feed container made of bamboo and a drinking water container with 1 liter. The light at night uses 325 watt incandescent bulbs. Under each plot of the cage, drawers and plywood were made to accommodate the fallen quail droppings, and they were cleaned once a day.

2.4 Research Implementation

Preparation of the Research Cage

Preparation for the requirements needed to make a quail cage, namely so that the conditions of the cage are not too humid, then the location of the cage will still be exposed to sunlight. The temperature of the cage was measured using a thermometer. The temperature ranges from 25°C - 30°C. Drum spraying uses a disinfectant to suppress the bacterial population. The cage is equipped with lighting in the form of two 25 watt yellow lights, aiming to maintain the temperature of the drum at night.

Randomization of cages and Quail

Before randomization, two weeks old male quail were acclimatized for three days and were given adequate food and water. The cage was randomized, first by preparing 15 cardboard measuring 10 cm x 10 cm, which already contained the treatment number. Numbers are taken at random and then affixed to the cage at random. Randomize quail by randomly taking as many as the total available quail (80 tails) than weighing to get the average body weight. Forty-five quails in the weight range (26.7g – 52.6g) were taken randomly and put into the treatment cage at random. Before being placed in the treatment cage, each quail was given a thread tie on the quail legs, namely blue, orange, and green threads, to facilitate data collection.

Fermentation of Rice Bran

The rice bran fermentation process is carried out by weighing 3 kg of bran, 4% molasses, 25% water, and Tangguh brand fermenter 4% of the rice bran used. The liquid ingredients are mixed evenly, then poured on the rice bran, stirred until evenly distributed in a container, then put into a jar. It is then fermented for six days. The rice bran that has been fermented before being mixed in the ration is first aerated. To remove moisture in the fermented products to a more extended storage period of fermented products.

Preparation of Research Ration

The preparation of the ration begins by weighing the ingredients needed: corn, non-fermented rice bran, fermented rice bran, coconut cake, fish meal, soybean meal, and premix. Mixing artificial rations according to the specified dose. The ration contains 20% unfermented bran as a control (P0) which is weighing 200 grams of unfermented bran and mixed in 1000 grams of ration. The ration containing 5% fermented bran (P1) was prepared by weighing 50 grams of fermented bran and mixed in 1000 grams of the ration. The ration containing 10% fermented bran (P2) was prepared by weighing 100 grams of fermented bran and mixed in 1000 grams of the ration. The ration containing 15% fermented bran (P3) was prepared by weighing 150 grams of fermented bran and mixed in 1000 grams of the ration. The ration contains 20% fermented bran made by weighing 200 grams of fermented bran and mixed in 1000 grams of ration.

Provision of Ration and Drinking Water

The rations and drinking water were given ad-libitum, two times a day, in the morning and afternoon. The drinking water provided came from drilled wells near the research cage. The drinking water container is cleaned every day to prevent the disease, then filled again with new water. The provision of drinking water is carried out almost every time it runs out. The remaining rations were weighed weekly.

The ration used in this study was a combination of several feed ingredients: corn, fish meal, fermented rice bran, non-fermented rice bran, soybean meal, coconut meal, and premix. The

composition of the male quail treatment ration material can be seen in Table 2.1. The nutritional composition of the research ratio material can be seen in Table 2.2, the nutritional composition of the research ratio in Table 2.3, and the nutritional content of the research ratio based on the calculations below.

Table 2.1
Research Ration Material Composition

Type Feed Ingredients (%)	Treatment				
	P0	P1	P2	P3	P4
Corn	48	46	46	40	40
Rice Bran Without Fermentation	20	15	10	5	0
Fermented Rice Bran	0	5	10	15	20
Coconut Meal	6	8	7	11	12
Fish flour	10	8	5	7	5
Soybean meal	14	16	20	20	21
premix	2	2	2	2	2
amount	100	100	100	100	100

Description:

P0: The portion contains 20% unfermented rice bran as a control
P1: The portion contains 5% fermented rice bran
P2: The portion contains 10% fermented rice bran
P3: The portion contains 15% fermented rice bran
P4: The portion contains 20% fermented rice bran

Table 2.2
Nutrient Content of Research Ration Materials

Feed Ingredients	Energy Metabolism	Crude protein	Crude Fat	Crude Fiber	Calsium	Phosphorus
Corn	3350	8	3.8	2.2	0.02	0.28
Fermented Rice Bran	3939	12.8	16.99	6.33	0	0
Non Fermented Rice Bran	2980	12.9	13	11.4	0.07	0.22
Coconut Meal	1540	20.9	6.7	12	0.2	0.2
Fish flour	2730	55	7.72	2.2	5	2.5
Soybean Meal	2290	48	0.51	0.41	0.41	0.67
premix	0	0	0	0	0	0

Source: [11]

Table 2.3
Nutritional Composition of Male Quail Research Ration Based on Calculation

Nutrients	Treatment						Standard
	P0	P1	P2	P3	P4	Starter	Growers
Energy Metabolism (Kcal/kg)	2890	2892.9	2935.2	2898.3	2930	2800-2900	2600-2900
Crude protein (%)	19.89	20.01	20.6	21.51	21.1	19-24	17-24
Crude Fat (%)	5.66	5.78	5.7	6.09	6.21	Max 7	Max 7
Crude Fiber (%)	4.33	4.24	3.81	3.95	3.78	Max 7	Max 7

Information: Research Ration Calculation Results

Table 2.4
Nutritional Composition of Male Quail Research Ration Based on Laboratory Analysis

Nutrients[1]	Treatment						Standard Growers[2]
	P0	P1	P2	P3	P4	Starter[2]	
Energy Metabolism (Kcal/kg)	3253.9	3061,3	3311.2	3120.6	3442.4	2800-2900	2600-2900
Crude protein (%)	13.19	13.88	15.79	16.38	17.09	19-24	17-24
Crude Fat (%)	10.84	11.07	12.42	11.47	12.94	Max 7	Max 7
Crude Fiber (%)	13.20	13.24	12	12.86	10.94	Max 7	Max 7

Description:
1. Results of Analysis of the Nutrition and Animal Feed Laboratory of Udayana University (2020)
2. Based on Indonesian National Standard (2008)

Disease Prevention

Before the quail is put into the cage, the cage and equipment are cleaned and sprayed with GDM Liquid Organic Supplements to eradicate pests, viruses, bacteria, and fungi [11]. Every day the drinking water is cleaned. When the quail arrives in the cage to avoid stress, the quail are given drinking water mixed with vita chick to maintain endurance and increase appetite.

Variables

The variables observed in this study were slaughter weight, carcass weight, carcass percentage, non-carcass weight, and the percentage of non-carcass. Slaughter weight was obtained by weighing the weight of the male quail at the end of the study after being fasted for 8 hours. Carcass weight was obtained by weighing quail after slaughter, removing blood, feathers, legs, neck, and internal organs. Carcass percentage, calculated by the formula of carcass weight divided by slaughter weight multiplied by 100% [12]. Non-carcass weight was obtained by weighing blood, feathers, head and neck, feet, and internal organs. The percentage of non-carcass, calculated by the formula of non-carcass weight divided by slaughter weight multiplied by 100% [13].

Cutting and Data Retrieval

Quail slaughter is done by incision on the jugular vein and the carotid artery between the skull and the first cervical vertebra. The blood is collected and then weighed. Feathering is done after the quail is immersed in hot water with a temperature of 70ºC - 80ºC for a few seconds. Feathers are collected, dried, and then weighed.

To get the weight of the carcass, the neck and head and both legs were cut, removing the digestive tract and internal organs. Removal of the digestive tract and internal organs is done by splitting the stomach except for the crop. Specifically for the cache, it is removed by dissecting the skin at the base of the ventral neck that covers the crop. To separate the head and neck, it is done by cutting the Atlanta occipital joint, the junction between the atlas bone (cervical vertebrae) and the skull. To separate the legs, it is done by cutting the Tibio tarsometatarsus joint.

For non-carcass weight, is obtained by weighing all non-carcass parts (blood, feathers, head and neck, legs, and internal organs) or can be calculated by subtracting the slaughter weight from the carcass weight.

Data Analysis

The data obtained from the research results were analyzed using a variance. If there were significantly different results ($P<0.05$) between treatments, Duncan's smallest real distance test was carried out [14].

3. Results and Discussion

Based on the analysis of variance of the research data, it was found that the slaughter weight, carcass weight, non-carcass weight, carcass percentage, and non-carcass percentage of male quail were not affected by the provision of fermented rice bran in the ration. The average variables from the research results can be seen in Table 3.1

Slaughter Weight

From the statistical analysis results, the treatment of fermented rice bran in the ration had no significant effect (P>0.05) on the average slaughter weight of male quail. The highest results were obtained in treatment P4 (115.80g/head) followed by P3 (110.60g/head), P1 (96.17g/head), and P2 (93.27g/head) and P0 (85.90g/head).). There was a tendency for the highest yield of cutting weight to be obtained in the P4 treatment. Namely, P4 was 29.90g, 16.63g, 22.53g, and 5.20g higher than P0, P1, P2, and P3, followed by P3, which was higher at 24.70g, 14, 43g, and 17.33g of P0, P1, and P2. The value of P1 was 10.27g and 2.90g higher than P0, and P2 and P2 were 7.37g higher than P0, which was statistically not significantly different (P>0.05) as shown in Table 3.1. The highest male quail slaughter weight value tends to be obtained in treatment P4, which is 115, 80g/head, and the lowest in the P0 treatment was 85.90g/head. This is due to the quality and quantity of feed provided [15]. The nutritional composition of the research ratio (Table 3.4) is a factor that affects the slaughter weight. The balance of protein and energy is important in preparing poultry rations[16]. The increase in fermented rice bran levels led to a rise in the research ratio's energy metabolism, protein, and fat content [17]. This is likely to cause a tendency to increase the cutting weight. The protein content in the ration is used for tissue growth and production and is part of the enzyme structure, so that protein is known as one of the main constituents of body cells and tissues [18].

[19-20] stated that the final weight is determined by body weight gain and affects the slaughter weight. [21] stated that protein in the ration could be digested because of the energy. When converted into protein, the protein ration requires energy for metabolism in the digestive tract and cell metabolism. This shows that protein plays an important role in achieving cutting weight.

Carcass Weight

Based on Table 3.1, the provision of fermented rice bran in the ration had no significant effect (P>0.05) on the carcass weight of male quail. Giving fermented rice bran showed the highest yield at P4 (73.07g/head) followed by P3 (71.37g/head), P1 (60.93g/head), P2 (59.00g/head), and the lowest was P0 (52.83g/head). There was a tendency for the highest yield of carcass weight to be obtained in treatment P4. Namely, P4 was 20.23g, 12.13g, 14.07g, and 1.70g higher than P0, P1, P2, and P3 followed by P3, which was higher at 18.53g, 10, 43g, and 12.37g of P0, P1, and P2. Carcass weight at P1 is 8.10g and 1.93g higher than P0, and P2 and P2 are 1.20g higher than P0. [22] stated that the weight of the carcass greatly affects the weight of the carcass. The weight of the carcass produced was influenced by several factors, namely age, sex, slaughter weight, body size, fatness, quality, and quantity of rations and strains being reared [19]. Carcass production is related to carcass weight and size. Bodyweight is influenced by genetic factors, gender, age, ration consumption, and environment. [23] stated that the growth of the carcass component begins with bone growth, then muscle growth which will decrease after reaching puberty, followed by increased fat growth.

Non-Carcass Weight

The treatment of fermented rice bran in the ration had no significant effect (P>0.05) on the non-carcass weight of male quail. Treatment with 20% fermented rice bran (P4) gave the highest yield of non-carcass weight (42.73g/head) followed by P3 (39.23g/head), P1 (35.23g/head), P2

(34.27g/head), and the lowest was P0 (33.07g/head). There was a tendency for the highest yield of non-carcass weight to be obtained in treatment P4. Namely, treatment P4 was 9.67g, 7.50g, 8.47g, and 3.50g higher than P0, P1, P2, and P3 followed by P3, which was higher at 6.17g, 4.00g, and 4.97 of P0, P1, and P2. Non-carcass weight at P1 was 2.17g and 0.97g higher than P0 and P2, then P2 was 1.20 higher than P0. The statistical difference was not significantly different (P>0.05), as shown in Table 3.1. This is because the quail in this study were slaughtered at seven weeks of age, exceeding the period of male quail for broilers which are generally slaughtered at 5-6 weeks of age. [24] stated that older quails tend to have larger internal organs, legs, head, and abdominal fat, increasing non-carcass weight.

Carcass Percentage

The treatment of fermented rice bran in male quail rations had no significant effect (P>0.05) on the percentage of male quail carcasses. In P3 treatment, 15% of fermented rice bran gave the highest rate of carcass percentage in P3, namely (64.43%), followed by P1 (63.42%), P2 (63.20%), P4 (62.87%), and the lowest is P0 (61.52%) as shown in Table 3.1. According to [25], the percentage of a carcass is influenced by slaughter weight, sex, age, body weight, activity, nation, feed quality, and slaughter age. Slaughter weight will affect the percentage of carcass produced because the carcass percentage results from the comparison between carcass weight and slaughter weight. In addition, quail slaughtered at old age will experience an increase in the importance of the head and internal organs, so the percentage of carcass decreased. [24] stated that the standard for cutting quail to produce a maximum carcass is six weeks of age.

Percentage of Non-Carcass

In Table 4.1, it is shown that the results of the treatment of fermented rice bran in the ration had no significant effect (P>0.05) on the percentage value of non-carcass male quail. At P0 treatment, 20% of non-fermented rice bran gave the highest percentage of non-carcass, namely P0 (38.48%) followed by P4 (37.13%), P2 (36.80%), P1 (36.58%), and the lowest is P3 (35.57%). Quail that has a considerable live weight does not necessarily have a large percentage of non-carcass because there are still influences from strain, feed, and slaughter age. [26] stated that in small poultry such as quail, the percentage of non-carcasses during growth was relatively the same (constant). [25] that the percentage of non-carcass is influenced by the growth rate and age of the quail as indicated by the increase in the weight of the feathers, blood, head, neck, legs, liver, heart, gizzard produced. The age of slaughter also influences the percentage of non-carcass. Quail slaughtered at old age will experience an increase in head weight and internal organs so that the percentage of non-carcass increases.

Table 3.1
Mean Slaughter Weight, Carcass Weight, Non-Carcass Weight, Carcass Percentage and Non-Carcass Percentage of Male Quail Given Various Levels of Fermented Rice Bran

Variable	Treatment					SEM
	P0	P1	P2	P3	P4	
Slaughter Weight (g)	85.90a	96.17a	93.27a	110.60a	115.0a	5.70
Carcass Weight (g)	52.83a	60.93a	59.00a	71.37a	73.07a	3.85
Non-Carcass Weight (g)	33.07a	35.23a	34.27a	39.23a	42.73a	1.94
Carcass Percentage (%)	61.52a	63.42a	63.20a	64.43a	62.87a	0.53
Percentage of Non-Carcass (%)	38.8a	36.58a	36.80a	35.57a	37.13a	0.53

Description::

1. Values with the same letter in the same row indicate a non-significant difference (P>0.05).
2. P0: The quail were given a portion containing 20% unfermented rice bran as a control
   P1: The quails are given a portion containing 5% fermented rice bran
   P2: The quails are given a portion containing 10% fermented rice bran
   P3: The quail is given a portion containing 15% fermented rice bran
   P4: The quail is given a portion containing 20% fermented rice bran

4. Conclusion

Based on the results of research and discussion, it can be concluded, the administration of fermented rice bran in the male quail aged seven weeks had no effect on slaughter weight, carcass weight, non-carcass weight, carcass percentage, and non-carcass percentage. Giving fermented rice bran to a level of 15% in the ratio of male quail aged seven weeks was the best level because it produced the highest percentage of carcass and the lowest percentage of non-carcass. Chicken slaughter weight, carcass weight, non-carcass weight, carcass percentage and non-carcass percentage of male quail given 15% fermented rice bran, namely 110.60 g, 73.07 g, 42.73 g, 62.43 g and 35 , 57 grams.

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