



## Effect of Fermented Rice Bran and Corn Meal in Commercial Feed on The Production Performance of Broiler

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### ABSTRACT

Penelitian ini bertujuan untuk mengetahui pengaruh dedak padi fermentasi dan tepung jagung fermentasi dalam pakan komersial terhadap kinerja produksi ayam pedaging. Penelitian ini dilaksanakan di kampus Instituto Politécnico de Betano (IPB) yang berlokasi di Suco Betano, Posto Administrativo Same, Municipio Manufahi. Jumlah ayam broiler sebanyak 96 ekor unsexing. Metode yang digunakan adalah percobaan lapangan dengan menggunakan Random Block Design (RBD), yang terdiri dari empat kelompok dengan empat perlakuan adalah; Kontrol T0 (100% pakan komersial), T1 (Pakan komersial + 10% dedak padi fermentasi dan tepung jagung fermentasi), T2 (Pakan komersial + 15% dedak padi fermentasi dan tepung jagung fermentasi), dan T3 (Pakan komersial + 20% dedak padi fermentasi dan tepung jagung fermentasi). Data di analisis dengan menggunakan Analysis of Variance (ANOVA) jika ada perbedaan di antara perlakuan, dapat dilanjutkan dengan Duncan's Multiple Range Test (DMRT). Hasil penelitian menunjukkan bahwa pengaruh dedak padi fermentasi dan tepung jagung fermentasi pada penampilan produksi ayam broiler tidak berpengaruh signifikan ( $P > 0,05$ ) terhadap konsumsi pakan, berat badan, konversi pakan, dan efisiensi pakan. Namun, perlakuan T0 memiliki efek yang signifikan ( $P < 0,05$ ) pada nilai IOFC. Kesimpulan penelitian untuk pengaruh dedak padi fermentasi dan tepung jagung fermentasi tidak mempengaruhi kinerja produksi ayam pedaging seperti; konsumsi pakan, berat badan, konversi pakan, efisiensi pakan, dan IOFC.

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### ABSTRACT

*This research aimed to know the effect of fermented (rice bran and corn meal) in commercial feed on the production performance of broilers. This research was conducted at the campus of Instituto Politécnico de Betano (IPB) located in Betano Village, Administrative Post of Same, Manufahi Municipality. The number of broiler chickens was 96 unsexing. The method used was a field experiment using Randomized Block Design (RBD), which consisted of four groups with four treatments. These treatments were; T0 (100% commercial feed) control, T1 (Commercial feed + 10% fermented rice bran and fermented corn meal), T2 (Commercial feed +15% fermented rice bran and fermented corn meal). The data were analyzed*

*using Analysis of Variance (ANOVA) if there were differences among treatments, this the continued by Duncan's Multiple Range Test (DMRT). The result of the research showed that the effect of fermented rice bran and fermented corn meal on broiler production performance had no significant effect ( $P>0.05$ ) on feed consumption, body weight, feed conversion, and feed efficiency. However, the T0 treatment had a significant effect ( $P<0.05$ ) on the IOFC value. The conclusion of this study is that the effect of fermentation of rice bran and fermented corn meal does not affect the performance of broiler production such as; feed consumption, body weight, feed conversion, feed efficiency, and IOFC.*

### INTRODUCTION

The main problem faced by broiler farmers is the high selling price of commercial feed, which can be costly, considering that all commercial feed is imported from Indonesia to support the needs of broiler chickens. To lower the cost of feed purchases, it would be great if the domestic feed that is readily available in our nation could be combined with commercial rations. In addition to being a by-product of rice milling that makes up around 10% of the milled rice, rice bran is frequently used as an ingredient in animal feed.

Maize is an energy source feed ingredient for chickens that has a major role in the preparation of poultry feed. This feed ingredient is widely recognized in various countries including Timor Leste. Based on color, there are several varieties of maize or corn; in Timor-Leste, there are two varieties: white and yellow. Because yellow maize has more carotene than white corn, it is preferred for use in poultry feed. Eventhough maize is

widely used for chicken feed, has low protein. To improve the nutritional quality of corn, efforts can be made by using fermentation technology.

Local feed of raw materials such as rice bran have high crude fiber which is difficult for poultry to digest. This may have an impact on the low nutritional value of the feed, which could lead to less than ideal digestive efficiency and a higher amount of feed that the poultry's body does not absorb. A method to increase the nutritional value and digestibility of rice and corn bran that is safe to use is the fermentation technique. The goal of this method is to make rice and maize bran more protein-rich. Because microbes produce enzymes during the fermentation process, which occurs in both aerobic and anaerobic conditions, organic compounds (carbohydrates, fats, proteins, crude fiber, and other organic materials) undergo chemical changes that can enhance the nutritional quality of feed ingredients (Sukrayana *et al.*,

2011). The addition of fermented rice bran can help reduce the cholesterol content of broiler meat (Shuvo *et al.*, 2022).

Fermentation also serves as one of the processing methods for preserving materials and reducing and even eliminating toxic substances contained in a material and the existence of various types of microorganisms that can convert starch into protein with the addition of inorganic nitrogen through fermentation (Pamungkas & Wahyu, 2011).

The fermentation method used to reduce crude fiber in rice bran is fermentation using EM-4 liquid probiotics that contain most photosynthetic bacteria (*Rhodopseudomonas spp*), lactic acid bacteria (*Lactobacillus spp*), yeast (*Saccharomyces spp*) that are beneficial for the growth of livestock production. Based on this, a study was conducted on the fermentation of rice and corn bran to be combined with commercial feed on broiler production performance.

## METHODS

This research was conducted at the Instituto Politécnico de Betano, on 30 July to 19 August 2023 in the Manufahi district, using the practical cages of Livestock Production students, with a litter cage size of 8x6 m<sup>2</sup>. The broilers used in this study were 96 of 14-day-old Ross 707 strains with an average body weight of 628 gr produced by PT Charoen Pokphand Indonesia. The duration of the study was 21 days, the cages used in this study were litter-shaped cages with a total of 16 units of experimental cage plots having a size of 100x100x80 cm<sup>3</sup> per plot. Each plot is filled

with 6 broilers and the cage is equipped with rice husks and 75-watt incandescent light bulbs that function for lighting and heating. The materials used to make probiotics where; EM-4, pineapple, brown sugar, Moringa leaves, and coconut water.

Methods of fermented corn and rice bran are as follows. Weigh and prepare corn flour and rice bran as needed. Prepare probiotics that have been made before. Open the tarpaulin on the floor and measure the corn flour and rice bran separately after that pour probiotics on each of these ingredients. Mix the probiotics in the two ingredients separately evenly until homogeneous. After the mixture is homogeneous, put the two ingredients in each drum or plastic bag and close it tightly so as not to enter the air. Store in a good place so that it is not exposed to rain and sun, with a storage period of up to 21 days. Good fermentation results with a fragrant aroma like alcohol and a brown colour. The fermented feed is combined with commercial feed according to the treatment level specified.

The data obtained from the study were tabulated using excel and analyzed with ANOVA (Analysis of Variance) and the method used in the study was a field experiment method using a Randomized Block Design (RBD), if there are differences between treatments can be continued with further tests, namely Duncan's Multiple Range Test (DMRT). Randomised Block Design consisting of 4 treatments and 4 replicates and divided into 4 groups (16 experimental units), the four treatment include:

T0 : 100% commercial feed (control)

T1 : Commercial feed + 10% fermented rice bran and corn meal

T2 : Commercial feed + 15% fermented rice bran and corn meal

T3 : Commercial feed + 20% fermented rice bran and corn meal

The time for data collection on ration consumption variables can be recorded every morning before feeding, and body weight gain is weighed every week to determine the body weight gain of broilers. Furthermore, variables such as ration conversion, ration efficiency and IOFC were measured after the study was

completed. Feeding of broilers was done every morning and evening, given according to the required treatment level and drinking water was available ad-libitum.

**RESULT AND DISCUSSIONS**

The following table provides information on the values of some of the variables. Data from statistical analyses obtained from research on broiler production performance can be displayed on the variables in the table 2.

Table 1. Chemical Composition of Feed Nutrients

Type of feed	Crude Protein (%)	Crude Fiber (%)	Crude Lipid (%)	ME (Kcal/Kg)
Corn meal	9.24	4.54	6.98	3,157
Rice bran	14.34	10.10	12,99	3,113
Commercial feed	20	5	5	3,100

Source: [Gomes et al. \(2023\)](#)

Table 2. Effect of Fermentation of Rice Bran and Corn Meal in Commercial Feed on The Production Performance of Broiler

Variable	Treatments			
	T0	T1	T2	T3
Feed Consumption (g/bird)	2,733±57.3	2,723±67.8	2,746±20.9	2,749±60.7
Body Weight Gain (g/bird)	1,300±71.3	1,211±90.7	1,238±153.2	1,125±82.1
Feed Conversion Ratio	2.025±0.05	2.175±0.15	2.175±0.25	2.325±0.22
Feed Efficiency (%)	49.19±1.46	46.50±3.70	46.75±5.38	42.75±4.03
Income Over Feed Cost (IOFC) \$/bird	2.11± 0.1 <sup>c</sup>	1.98± 0.08 <sup>bc</sup>	1.88± 0.11 <sup>ab</sup>	1.78± 0.12 <sup>a</sup>

Notes: Superscript letters on different notations (a-b-c) in the same row indicate significantly different (P<0.05)

**Feed Consumption**

Feed consumption is calculated between the difference between the amount of feed given and the amount of remaining feed that is not consumed by broilers during the study period. The results of the study on the effect of fermented rice bran and corn on broiler feed consumption can be shown in Table 2.

The average feed consumption of broilers in the study can be shown in the highest treatment to the lowest, namely treatment T3 (2,749 ± 60.7), T2 (2,746 ± 20.9), T0 (2,733 ± 57.3) and T1 (2,723±67.8) g/head/21 days. Numerically, the T3 treatment showed a higher feed consumption of 2,749 g/head/35 days compared to the other

treatments. Based on the results of Analysis of Variance (ANOVA), the addition of fermented feed to broiler feed had no significant effect ( $P>0.05$ ) on feed consumption. The use of fermented rice bran and corn feed has not been able to provide a significant effect on feed consumption, but judging from the quantity of feed consumption is higher in the T3 treatment compared to the control treatment feed (T0). It is possible that fermentation technology is able to improve the palatability of feed so as to increase the appetite of broilers as shown in the T3 treatment level (2,749 g/head/21).

In accordance with the statement of [Zulfan & Zulfikar \(2020\)](#), the higher appetite for feed consumption in broilers can be due to the increased palatability of the ration due to the use of fermented feed ingredients. There are several other factors that affect ration consumption in broiler chickens including chicken breeds, cage area, energy and protein levels. [Fadli \(2015\)](#) provides additional evidence that the energy level of a ration tends to affect the amount of ration that chickens consume, therefore the ration's nutrient content needs to be modified to match the amount of protein and energy. The increase in feed consumption by chickens is because in general, poultry consume rations to meet energy needs, if energy needs have been met, ration consumption will decrease ([Suprayogi \*et al.\*, 2018](#)). This means that feed that has a low energy content causes chickens to consume more feed, therefore the better the quality of the feed given, the smaller the amount of feed consumed by livestock ([Ali \*et al.\*, 2019](#)).

### Body Weight Gain

Body weight gain can be known by weighing the weight of chickens every week in each experimental unit. The results of the study of the effect of fermented feed in commercial broiler feed on body weight gain can be seen in Table 1, the weight gain of broilers in the study can be shown from the highest treatment to the lowest, namely treatment T0 (1,300  $\pm$ 71.3), T2 (1,238  $\pm$ 153.2), T1 (1,211  $\pm$ 90.7) and T3 (1,125  $\pm$ 82.1) g/head/21 days.

Analysis of Variance (ANOVA) results indicate that the addition of fermented feed to broiler feed does not show a significant difference ( $P>0.05$ ) on broiler body weight gain. Therefore, there was no treatments that have different effects on the body weight gain of broilers, as seen in the increased of body weight gain in all treatments. Although the T0 (control) treatment showed the highest body weight gain of 1,300  $\pm$ 71.3/head/21 days, it was not different from the T2, T3 and T1 treatments. Research pertaining to the impact of fermented corn flour and rice bran in commercial feed has demonstrated that feed quality improves following fermentation, with outcomes remaining consistent across all treatments.

Furthermore, [Telew \*et al.\* \(2013\)](#) reported that the quality of rations influenced by fermentation biotechnology treatment can in principle improve the quality of high-fiber materials, both by simplifying the crude fiber fraction into basic components of available energy and single-cell protein derived from the multiplication of microorganism cell biomass. Related to this, [Fati \(2019\)](#) the decrease in

broiler body weight with more levels of fermented rice bran use in the ration is thought to be from the high crude fibre in the ration which cannot be digested properly by the digestive organs of broiler.

Ali *et al.* (2019) stated that the higher the feed consumption will be followed by an increase in body weight gain. To achieve optimal growth rates in accordance with genetic potential, rations are needed that contain nutritional elements qualitatively and quantitatively, thus there is a relationship between growth speed and ration consumption. This is in line with Anggitasari *et al.* (2016) that body weight gain in broilers is strongly influenced by the quality of feed consumed, because broilers need sufficient nutrients to support the growth process in body tissues. The addition of fermented rice bran can improve egg-laying performance and reduce cholesterol in the egg yolk of laying hens (Kim *et al.*, 2017).

#### **Feed Conversion Ratio (FCR)**

The feed conversion value was obtained by dividing the amount of ration consumed by the body weight gain produced during the study. Based on the results of observations about the effect of treatment on feed conversion can be shown from the highest to the lowest value in sequence, namely in the treatment T3 ( $2.325 \pm 0.22$ ), T2 ( $2.175 \pm 0.25$ ), T1 ( $2.175 \pm 0.15$ ) and T0 ( $2.025 \pm 0.05$ ).

According to the results of the study of the effect of fermented feed of rice bran and corn in broiler commercial feed on the basis of different treatment levels, where statistical analysis showed results that were not

significantly different ( $P > 0.05$ ) on feed conversion. The results showed that the T0 treatment (control feed) had a lower feed conversion rate than the other treatments (T1, T2 and T3). The low value of feed conversion in the T0 (control) treatment as commercial feed, presumably has a sufficient composition of nutrient content so that the higher feed efficiency value can be used by chickens to increase body weight.

In line with this, Bayoa *et al.* (2014) stated that the feed conversion rate shows the level of efficiency of ration use, meaning that the lower the feed conversion rate, the higher the feed efficiency value and the more economical it is. A decrease in feed conversion occurs because feed is able to be optimally utilized for production and reproduction. Increased production is due to good nutrient absorption because the digestive process increases due to increased activity of digestive enzymes such as amylase, protease and lipase (Natsir *et al.*, 2016). As a result, a more efficient use of nutrients from fermented rice bran can lower the feed conversion ratio (Liza *et al.*, 2022) and the thing that affects feed conversion is the metabolic energy content in the feed because it will affect consumption in broilers, in addition to genetic factors, maintenance management and the environment (Anggitasari *et al.*, 2016).

#### **Feed Efficiency**

Feed efficiency is obtained from the ratio between body weight gain and total feed consumption during maintenance and multiplied by 100% (Widodo *et al.*, 2021), and this value is opposite to feed conversion.

According to the results of research on the effect of fermented rice bran and corn feed on broiler commercial feed on the basis of different treatment levels, where statistical analysis showed the results of treatment had no significant effect ( $P > 0.05$ ) on feed efficiency in Table 2, based on the results of this research on the effect of treatment on feed efficiency can be shown from the highest to the lowest value in the treatment T0 ( $49.19 \pm 1.46$ ), T2 ( $46.75 \pm 5.38$ ), T1 ( $46.50 \pm 3.70$ ) and T3 ( $42.75 \pm 4.03$ ).

The average results of the treatment of broiler feed efficiency with the addition of fermented feed cannot affect each other. However, this result was shown in treatment T0 (control feed) which had the highest average feed efficiency of 49.19% and this followed by fermented feed for treatment T2 with a value of 46.75%. The results of fermentation of rice bran and corn for 21 days were able to provide nutrients in a balanced state where there was an increase in the quality and biological value of the feed ingredients. The high ration efficiency in broilers added to the ration with fermented feed in the T2 treatment (46.75%) can be seen in the high ration consumption that affects the high body weight gain as well. This shows the high biological ability of broilers in converting the consumed ration into a product, namely high weight gain (Liwe *et al.*, 2014), further fermentation causes a number of proteins, carbohydrates and fats to be broken down into amino acids, glucose and organic acids so that they are more digested and absorbed in the intestine.

The higher feed utilization efficiency level indicates the higher quality feed nutrient content and can produce low ration conversion. The smaller the amount of feed required to produce weight gain, the more efficient the feeding (Susanti *et al.*, 2019).

#### **Income Over Feed Cost (IOFC)**

The results of the calculation of the Income Over Feed Cost (IOFC) value in broilers fed with fermented rice bran and corn with different treatments can be seen in Table 2. Based on the results of the study, the Income Over Feed Cost (IOFC) value in each treatment can give unequal results, which are shown numerically from the highest to the lowest value in the T0 treatment ( $2.11 \pm 0.1$ ), T1 ( $1.98 \pm 0.08$ ), T2 ( $1.88 \pm 0.1$ ) and T3 ( $1.78 \pm 0.12$ ) \$/head.

The results of statistical analysis showed that the effect of fermented rice bran and corn in broiler feed on the value of IOFC can show a significant difference ( $P < 0.05$ ). The results showed that the average IOFC with the minimum value was found in the treatment of T2 and T3, this was due to the additional cost in making probiotics used for fermentation of rice bran and corn, which means increasing costs in purchasing materials. The higher the IOFC value, the higher the revenue earned from chicken sales. Therefore, to obtain the maximum IOFC value, there are several important things to be considered in the final body weight. This included feed consumption, feed price and selling price of broilers. In line with this, Suprayogi *et al.* (2018) added that good growth does not necessarily guarantee maximum profit, but followed by good ration

conversion and minimal feed costs will get maximum profit as well.

### CONCLUSIONS

The effect of fermentation of rice bran and corn meal in commercial broiler diets had no significant effect on feed consumption, body weight, feed conversion, feed efficiency and IOFC values. The results of this study, we can recommend to all academics and government and private institutions to conduct further research using fermented local feed.

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### CONTRIBUTION STATEMENT

In this article, Abilio dos Santos acts as the main contributor and correspondence contributor, while Gaspar Ferreira Vicente, Acacio Cardoso Amaral, Claudio Filipe Ximenes, Domingos Cruz Pinto, Jacinto de Araujo, Danina Nunes, and Julio Vicente acts as a member contributor.

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