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Broiler performance with the utilization of various levels of fermented peanut shells meal

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Abstract. Feed was the biggest cost in the process of raising livestock, so needed efforts to reduce these costs. One of the ways was by utilizing agricultural waste. Agricultural waste in the form of peanut shells is sometimes underestimated by the community because its benefits are not yet known. Several attempts to increase the nutritional value of peanut shells were by fermentation. This study used EM-4 probiotic to ferment peanut shell meal so that it could increase the nutritional value, it was expected that it could also improve the performance of broilers and reduce the fat level in the meat. This study aimed to know the effect of feeding fermented peanut shell meal on broiler performance. This study was designed using a completely randomized design with 4 treatments and six replications, each unit consisting of six broilers. Feed treatment are P0 (basal ration (without peanut shells)), P1 (basal ration + 5% peanut shell meal fermentation), P2 (basal ration + 10% peanut shell meal fermentation) and P3 (basal ration + 15% peanut shell meal fermentation). The results showed that the use of fermented peanut shell meal at various levels did not show a significant effect ($P>0.05$) on feed consumption but showed a significant effect ($P<0.05$) on body weight gain (BWG) and feed conversion ratio (FCR). Concluded that the use of fermented peanut shell meal as much as 5% could improve the performance of broilers.

1. Introduction

Humans need nutrition to support their basic life and for their development. Animal husbandry products were the largest contributor to animal protein in the world in the form of meat, milk and eggs. The meat itself could be obtained from poultry and ruminants; in general, people often consumed meat from poultry. This was because the price was relatively cheaper and easily accessible to the community. Poultry meat was widely distributed in the market, namely from broilers. Maintenance of broilers in the community was considered high because several companies had worked together to maintain until harvest. Quite a few independent businesses were interested in maintaining broilers due to the relatively high cost of feed.

The feed ingredient that was often used by society was bran which was used as a source of energy for their livestock, but the price of bran was quite expensive and its abundance was only after the rice harvest, while some agricultural staples could be used as animal feed which could be used as a source of energy or macro sources other nutrients [1]. The limiting factor for its use in rations was the high crude fiber content of the waste because poultry could not digest crude fiber. However, the presence of



crude fiber in the ration was essential because crude fiber had physiological and nutritional functions for poultry [2]. This statement was supported by Sutardi (1997) which stated that the growth of the intestine and cecum could be stimulated by fiber [3].

The low-grade fiber feed which was widely used in the preparation of poultry rations was the skin of several types of grains (wheat bran, soybeans and cocoa shells). Apart from their potential as an energy source, grain hulls also had advantages in suppressing cholesterol levels and body fat accumulation in livestock [4]. Also, fiber could reduce the absorption of fat so that the deposition of fat and cholesterol levels of the product could be suppressed. Grain skins that were often neglected by the community were peanut shells. In peanut shells, the composition was 9.5% water, 3.6% ash, 8.4% crude protein, 63.5% cellulose, 13.2% lignin, and 1.8% crude fat.

Efforts to increase the use-value of the grain hulls could be done by utilizing the ability of *Saccharomyces cerevisiae* yeast, namely the main microbe or yeast contained in tape yeast [5]. *Saccharomyces cerevisiae* could increase the digestibility of high fiber feed could act as a probiotic in poultry and could prevent the incidence of poisoning caused by aflatoxins or aflatoxicosis [6,7]. Some preliminary research results regarding the use of yeast in rations had been shown to improve the appearance, the used value of fiber feed, and reduced body fat in poultry. Reported that the use of 0.50% yeast in rations containing 15% brown shell was found to increase the weight gain of ducks [8]. Based on this description, a study was conducted using fermented peanut shell meal to improve broiler performance.

2. Materials and methods

2.1. Material

The study was carried out in the Sinjai Regency in June - July 2020. The used equipment in this study was a terraced cage, a feed place, a drinking area, a 5-watt incandescent lamp, a digital scale, a mixer, a measuring cup, a feed, a cutting board, a cutter and a bucket. The used materials were 100 DOC (Day Old Chicken), peanut shell meal, probiotics, molasses, disinfectant, milled corn, fish meal, rice bran, yeast tape, plastic bags, Vita Stress, ND-AI, ND-IB, Eye drops, plastic clips and drinking water.

2.2. Methods

The preparations made before the maintenance of broilers, namely the preparation of peanut skin fermentation and cage preparation before DOC broilers were put into the cage. DOC was in the starter cage for 14 days then moved to the finisher cage using 3 cm thick rice husks for 6 weeks. The weighing was done every week using analytical scales. The rations were given 4 times a day at 06:00 am 12:00 pm, 05:00 pm and 08:00 pm. Meanwhile, drinking water was given *ad libitum*.

This study was designed using a completely randomized design with 4 treatments and 6 replications, each unit consisting of six broilers. P₀ (basal ration (without peanut shell)); P₁ (basal ration + 5% fermented peanut shell meal; P₂ (basal ration + 10% fermented peanut shell meal) and P₃ (basal ration + 15% fermented peanut shell meal).

2.3. Measured Parameters

Parameters observed in this study were feed consumption, bodyweight gain and feed conversion ratio [9]. Table 1 shows the formulation and nutrient content of the basal feed.

Table 1. Formulation and nutrient content of the basal feed.

Composition of feed (%)	Treatment			
	T ₀	T ₁	T ₂	T ₃
Feed Materials				
Milled corn	20	20	20	20
Rice bran	60	55	50	45
Fish meal	20	20	20	20
Fermented Peanut shell meal	-	5	10	15
Nutrient Content				
Dry matter	88.5	84.2	79.8	75.5
Crude protein	20.2	19.6	19.1	18.6
Crude fat	5.2	4.9	4.7	4.4
Crude fiber	8.3	7.7	7.2	6.6
Calcium	0.3	0.3	0.3	0.3

3. Results and discussions

The results of research on feed consumption, weight gain and feed conversion ratio are presented in table 2. The provision of fermented peanut shell meal had a significant effect on broiler performance.

Table 2. The effect of using fermented peanut shell meal on broiler performance.

Treatments	Feed consumption (g/bird/week)	Weight gain (g/bird/week)	Feed conversion ratio
T ₀	2,801±126.7	2,018 ^d ±177.0	1.39 ^{bc} ±0.09
T ₁	2,871±193.3	2,475 ^a ±138.9	1.18 ^a ±0.07
T ₂	2,797±101.6	2,280 ^{ab} ±190.0	1.31 ^{ab} ±0.09
T ₃	2,734±1456	2,049 ^c ±296.4	1.48 ^c ±0.21

^{ab}different superscripts in the same column showed a very significant difference ($P < 0.01$).

3.1. Feed consumption

Table 2 showed the data from the analysis of variance that the treatment had no significant effect ($P > 0.05$) on the consumption of broiler rations. Consumption by giving peanut shell meal increased in treatment T₁ which was compared to control then decreased again in T₂ and T₃ treatment, this was because the amount of peanut shell meal was higher in the treatment and had a slightly coarse texture so that it affected the level of palatability of livestock of the feed. This case was following the opinion [10] which stated that palatability determined the amount of food consumed. It was further stated that the factors that influenced the level of palatability of the ration were the taste, color and texture of the feed. Besides, feed consumption was influenced by the form of feed, feeding in the form of pellets could increase feed consumption income [11].

Feed consumption which was not significantly affected ($P > 0.05$) was statistically due to the relatively similar ration between the control and treatment as well as the nutrient content which was not much different (table 1), so there was no difference between treatments. The provision of the same rations in this study was carried out because the age and the used type of livestock were also the same. Following the opinion [12], that consumption of feed with almost the same nutrient consumption would cause the same feed consumption. In line with this, several factors affected feed consumption in livestock as stated Suprijatna *et al.*, (2005) that the amount of consumption was influenced by body size, genetic traits, environmental temperature, quality and quantity of feed [13].

3.2. Bodyweight gain

Based on the results of the study, the use of fermented peanut shell meal in the broiler ration, the average broiler body weight gain was presented (table 3). Based on the results of the analysis of variance, it showed that the use of fermented peanut shells on the ration on broiler body weight gain showed a very significant effect ($P < 0.01$). This was thought to be due to the presence of tape yeast containing *Saccharomyces cerevisiae* yeast [5]. *Saccharomyces cerevisiae* could increase the digestibility of high fiber feed [6]. According to Wallace and Newbold (1993), it could increase the digestibility of crude fiber rations in the cecum into flying fatty acid products, namely acetic acids, propionic and butyric [14].

The largest average broiler body weight gain was T_1 of 2,475 g/bird/week, then followed by successively T_2 of 2,280 g/bird/week, T_3 of 2,049.50 g/bird/week and the lowest were without the use of fermented peanut shell meal with 2,018.33 g/bird/week body weight gain. This was assumed from the results of a study that had been done that had the highest feed consumption, namely T_1 (2,871 g/bird/week). This was according to the opinion [16], that weight gain was influenced by the amount of ration consumed and the quality of the ration. Added by Wahyu (1997), body weight gain was influenced by the amount of ration consumed by broilers [15]. The opinion Ichwan (2004) stated that body weight gain was influenced by the amount of ration consumed, the higher the level of ration consumption, the higher the body weight gain was produced and conversely the lower the consumption, the lower the bodyweight gain [16].

The results of a study conducted by Siregar (1980) reported that the use of 0.10% yeast (*Saccharomyces cerevisiae*) in chicken rations significantly increased body weight gain, the efficiency of ration use, and utilization of food substances and decreased the amount of N and P which were secreted in faeces [17]. Also reported Piao *et al.*, (1991), supplementation of 0.10% yeast culture in the ration could significantly improve feed intake, FCR and weight gain of broilers [18].

3.3. Feed conversion ratio (FCR)

Based on the results of the study, the use of fermented peanut shell meal in broiler rations, the average feed conversion ratio of broiler bodies was presented in table 3. Analysis of variance showed that the use of fermented peanut shell meal in the ration on the broiler FCR value shows a very significant effect ($P < 0.01$). This was thought to be because fermentation using yeast on peanut shells would improve nutrition and increase the digestibility of crude fiber in the ration, according to the opinion Park *et al.*, (1994) stated that several main factors that influenced ration conversion included ration quality, temperature, cage sanitation, ventilation, treatment and cage management, factors of ration provision, lighting also played a role in influencing ration conversion, rate of travel of rations in the digestive tract, physical form of rations and nutritional composition of rations [19].

The best average conversion ratio was T_1 with a conversion value of 1.18 followed by T_2 with a conversion value of 1.31, T_3 with a conversion value of 1.48 and T_0 with a conversion value of 1.39. The feed conversion value was obtained from the comparison between feed consumption and body weight gain. Based on these results, it showed that the difference in ration conversion above was closely related to ration consumption and body weight gain. According to Lacy and Vest [20], cut weight was closely related to ration consumption so that with increasing ration consumption, the slaughter weight could increase and vice versa. This is following the opinion Murtidjo (2003), stating that the ration conversion value could be met by several factors, including environmental temperature, the rate of travel of the ration through the digestive tract, physical form, and ration consumption [21]. This was supported by Anggorodi (1996), that the value of a ration is not only determined by the value of ration consumption and the growth rate of body weight was also determined by the rate of ration conversion, where the ration conversion described the number of used rations for the growth of broiler [22].

4. Conclusion

Based on the results of the study that has been done, it could be concluded that the substitution of peanut shell meal into the ration could improve broiler performance in treatment T₁ by as much as 5% because the treatment could increase bodyweight gain of livestock and had a low FCR value.

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