Potential feed substitute of Cirripedia sp. flour on body weight gain, feed conversion ratio, feed consumption of buck

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Abstract. The aim of this study was to determine the effect of Cirripedia sp. flour as a fish flour substitution on body weight gain, feed conversion ratio and feed consumption of the rabbit. The experimental design used was 4 treatments and 5 replication each. This research were 100 Rex buck aged 4 months. The feed treatments used were P0 (complete feed 100% with 15% fish flour), P1(complete feed 100% with 12.5% fish flour and 2.5% Cirripedia sp. flour), P2 (complete feed 100% with 10% fish flour and 5% Cirripedia sp. flour), P3 (complete feed 100% with 7.5% fish flour and 7.5% Cirripedia sp. flour). The data were recorded at the fourth week after observation based on feed consumption, body weight gain, and feed conversion ratio. Data were analyzed with ANOVA (Analysis of Variance). Average feed consumption of P0 to P3 were 114,54, 112,09, 114,04, 112,71 g. Average of body weight gain of P0 to P3 were 20,01, 20,87, 20,72 and 20,75g. Average of feed conversion ratio of P0 to P3 were 5,79, 5,41, 5,62 and 5,48. The result showed with no significant difference (p>0.05) among the treatment in feed consumption, body weight gain, and feed conversion ratio in the rabbit.

1. Introduction

Business rabbit farm is one of the potential livestock commodities as a provider of animal-based meat, but in Indonesia it has not been able to develop rapidly compared to poultry or ruminants [1]. Information that is still minimal in the community that rabbit meat has better quality than poultry meat or other livestock is a factor in the low consumption of people for rabbit meat [2]. Rabbit meat has a finer structure, color and shape that resembles chicken and contains high protein as much as 20% - 21%, low fat and cholesterol so that it can be used as an alternative producer of animal protein to meet people's nutritional needs for animal products [3].

The most important part in rabbit farming is feed, with the aim of each farmer getting the expected profit. One of the obstacles faced in rabbit farming is relatively expensive feed prices, even though feed is the largest component of production costs (60-70%) [4]. The main nutritional component needed by rabbits besides crude fiber is protein and calcium [3]. Buck need around 17-20% protein [5]. Fish meal is one of the feed sources of animal protein with a fairly large protein content and reaches 64% [6]. The
high cost of feed raw materials, especially protein feed ingredients, is needed for alternative feed ingredients to reduce the cost of feed. One of the alternative ingredients protein feed is Cirripedia sp. Cirripedia sp. is one type of invertebrate that lives in the sea and is attached to the substrate, this biota can be found on coral reefs, rocks, coastal concrete and can form holes and cause damage [7]. Cirripedia sp. is often overlooked and considered a marine pest because of its detrimental nature, but also has the advantage that one can use it as animal feed [8,9]. Research using Cirripedia sp. flour for feed concentrate mixture has been carried out on broilers [8]. High protein content in feed can be an energy source to help increase animal body weight [2].

2. Materials and Methods

2.1. Experimental design

This research is experimental which aims to determine the effect of fish meal with Cirripedia sp. flour as a feed substitution on feed consumption, body weight gain and feed conversion ratio of Rex’s buck. The materials used in this study were 100 Rex’s buck aged between 3-4 months, complete feed with fish meal which has been replaced with Cirripedia sp. flour, disinfecting cages and water. This study used a completely randomized design (CRD) with 4 treatments and 5 replications, namely P0 (complete feed with 15% fish meal content and 0% Cirripedia sp. meal), P1 (complete feed with fish meal content of 12.5% and 2.5% Cirripedia sp. meal), P2 (complete feed with 10% fish meal content and 5% Cirripedia sp. meal), P3 (complete feed with 7.5% fish meal content and 7.5% Cirripedia sp. meal).

The tools used in this study are flour mills, basins, digital scales with accuracy of 1 gram, ovens, stirrers, pans, baking pans and manual pellets, plastic containers, individual cages with bamboo walls and pedestals with asbestos roofs to protect from rain and sun. Each bulkhead has a length x width x height = 60 x 40 x 40 cm and each one of the rabbits is filled with one.

2.2. Rearing system

The feed adaptation period (preliminary) was carried out for 10 days giving grass and complete feeds with multilevel concentrations, namely the addition of 10%, 20%, 30% to 100% on the 10th day of the adaptation period. The remaining feed is taken every day for 4 weeks (28 x 24 hours) on each rabbit. The remaining feed is taken from the feed site or falls in the cage. The remaining feed is taken and then weighed. The remaining weight data is used to calculate feed consumption. Weighing body weight was carried out at the beginning of the treatment after adaptation while weighing the final body weight was carried out at the end of the study expressed in grams / head / day. Calculation of feed conversion value is obtained from the calculation of feed consumption divided by body weight gain.

Feed consumption (g) = Number of feed given (g) − Number of unconsumed feed;

FCR = Feed consumption/Body weight;

Feed efficiency = (Body weight gain / Feed consumption) × 100.

2.3. Statistical analysis

The data obtained and collected during the study will be analyzed using SPSS Version 26.0 software. The data was tested by Analysis of Variance p< 0.05 SPSS v.26 and if there was a significant difference, it would be continued with Duncan’s multiple distance test (5%).

3. Results and Discussion

3.1. Feed Consumption

Based on the results of the study, analysis of the variety of feed consumption showed that the substitution of fish meal with Cirripedia sp. meal in feed gave no significant effect ( p <0.05). Feed consumption is calculated from the amount of feed consumed by livestock, because the feed contains nutrients that will be used to fulfill the main life of the livestock production [10]. The level of feed consumption is influenced by the palatability of livestock to the feed given and the physical properties of the feed [11]. Palatability of feed is related to satisfaction with a feed and the amount of feed consumed by livestock [10]. The palatability influenced by the shape, smell, and texture of feed [12]. Complete feed on
treatment feed P1, P2, P3 has a smell, taste, texture that is not so much different from the treatment P0 as a control, this is what causes the average feed consumption of each treatment is not much different.

3.2. Body Weight Gain

Based on the results of the study, analysis of the variety of feed consumption showed that the substitution of fish meal with *Cirripedia* sp. meal head in feed substitution had no significant effect (p < 0.05). Crude fiber is a component that is difficult to digest by the digestive organs of rabbits so that it will affect the digestibility of other food substances such as protein, fat, minerals and vitamins [13]. Crude fiber that is not digested will bring food substances, especially protein and energy, out with the feces so that the protein in the feed cannot be utilized optimally. The crude fiber content in the treated feed is 14-15%, the amount can still meet the daily fiber requirement of 12% [6], but the energy content of fiber in feed does not improve or increase daily body weight [14].

Because feed consumption is not significantly different, the body weight gain in this study was also not significantly different between treatments. It is according to Marai's opinion [14] that body weight gain is also influenced by the level of feed consumption and environmental temperature factors. The ambient temperature where the life of a rabbit that lives in a subtropical climate ideally is 18°C with air humidity 60–80% [15], but the temperature of the cage at the time of the study in tropical climates is around 25°C and afternoon 30°C with humidity ranging from 65 - 77%. An increase in environmental temperature will result in changes in behavior as indicated by the expenditure of body heat production which causes a decrease in feed consumption [14].

3.3. Feed Conversion Ratio

Based on the results of the study, the analysis of the variety of feed consumption showed that the addition of the substitution of *Cirripedia* sp. meal with fish meal in feed gave no significant effect (p < 0.05). Feed conversion is a value that shows the amount of feed consumed to produce body weight gain in a certain unit of time [16]. Feed conversion values that were not significantly different in this study were caused by feed consumption and body weight gain which also had results that were not significantly different. This is supported by the statement of [10] that feed conversion is strongly influenced by feed consumption and daily weight gain of livestock, besides that the concentration level that is not much different in each feed treatment also causes the results of feed conversion values not much different. Feed conversion is a comparison between the feed given and the body weight obtained [17]. The lower feed conversion rate means the quality of feed is getting better [18].

| Treatment | FC  | FCR  | BWG   |
|-----------|-----|------|-------|
| P0        | 114.54 ± 1.84 | 5.79 ± 0.51 | 1191.60 ± 66.965 |
| P1        | 112.09 ± 7.23  | 5.41 ± 0.50  | 1228.00 ± 78.724 |
| P2        | 114.04 ± 3.26  | 5.62 ± 0.24  | 1215.80 ± 47.767 |
| P3        | 112.71 ± 7.67  | 5.48 ± 0.40  | 1210.20 ± 23.026 |

Different superscripts in the same raw show significant difference (p<0.05).

4. Conclusion

Based on the research that has been carried out using *Cirripedia* sp. flour as a feed for substitution fish meal complete feed, it rabbit did not significantly influence feed consumption, body weight gain and feed conversion ratio of Rex’s buck.

5. References

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6. Acknowledgments
The authors gratefully acknowledge the financial support from the Annual Budget of the Faculty of Veterinary Medicine as well as the instrument support.