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EFFECT OF COMBINATION OF COMMERCIAL FEED AND MAGGOT ON PROTEIN RETENTION IN FRESHWATER LOBSTERS *(Cherax quadricarinatus)*

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Abstract

This study aims to determine the effect of the combination of commercial feed and maggot on protein retention in freshwater lobster (Cherax quadricarinatus). This research was conducted from July to August 2024. The samples that have been taken are then taken to the laboratory for analysis and then ANOVA tests are carried out to find out the differences. The results of the study showed that the results of the ANOVA analysis showed a significant difference in protein levels between the treatments tested. Based on the ANOVA output, the calculated F value was 150.106 with a significance value (Sig) of 0.000, which is smaller than 0.05, so it can be concluded that there was a significant difference between the treatment groups tested. In follow-up tests using Tukey HSD, comparisons between groups showed that each treatment had significant differences in mean value. For example, the mean difference between P0 and P1 is -1.81000, which has a significance value of 0.001, which means the difference is significant. Likewise, the comparison between P0 and P2, P0 and P3, P1 and P2, P1 and P3, and P2 and P3 all showed significant differences (p<0.05 values). Furthermore, analysis with a subset for alpha = 0.05 showed that P2 had the highest average protein levels (24.2733), followed by P3 (22.9633), P1 (20.4533), and P0 (18.6433). These groups were divided into four homogeneous subsets, which suggests that P2 treatment was significantly higher compared to other treatments. Overall, the results of the ANOVA and Tukey HSD assay showed that the different treatments significantly affected protein levels, with the P2 treatment showing the highest protein levels.

Keywords: *combinations; commercial feed; Cherax quadricarinatus; protein; squirrel*

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh kombinasi pakan komersil dan maggot terhadap retensi protein pada lobster air tawar (Cherax quadricarinatus). Penelitian ini dilakukan Juli – Agustus 2024. Sampel yang telah diambil kemudian di bawah ke laboratorium untuk di analisis dan selanjutnya dilakukan uji ANOVA untuk mengetahui perbedaannya. Hasil penelitian menunjukkan bahwa Hasil analisis ANOVA menunjukkan adanya perbedaan yang signifikan dalam kadar protein antara perlakuan yang diuji. Berdasarkan output ANOVA, nilai F yang dihitung adalah 150.106 dengan nilai signifikansi (Sig) 0.000, yang lebih kecil dari 0.05, sehingga dapat disimpulkan bahwa ada perbedaan yang signifikan antara grup perlakuan yang diuji. Pada uji lanjutan menggunakan Tukey HSD, perbandingan antara kelompok menunjukkan bahwa setiap perlakuan memiliki perbedaan rata-rata yang signifikan. Sebagai contoh, perbedaan rata-rata antara P0 dan P1 adalah -1.81000, yang memiliki nilai signifikansi 0.001, yang berarti perbedaan tersebut signifikan. Demikian juga, perbandingan antara P0 dan P2, P0 dan P3, P1 dan P2, P1 dan P3, serta P2 dan P3 semuanya menunjukkan perbedaan yang signifikan (nilai p <0.05). Selanjutnya, analisis dengan subset untuk alpha = 0.05 menunjukkan bahwa P2 memiliki rata-rata kadar protein tertinggi (24.2733), diikuti oleh P3 (22.9633), P1 (20.4533), dan P0 (18.6433). Kelompok-kelompok ini terbagi dalam empat subset homogen, yang menunjukkan bahwa perlakuan P2 secara signifikan lebih tinggi dibandingkan dengan perlakuan lainnya. Secara keseluruhan, hasil ANOVA dan uji Tukey HSD menunjukkan bahwa perlakuan yang berbeda mempengaruhi kadar protein secara signifikan, dengan perlakuan P2 menunjukkan kadar protein tertinggi.

Kata Kunci: *Cherax quadricarinatus; kombinasi; manggot; pakan komersil; protein*

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INTRODUCTION

Lobster is one of the profitable species in cultivation activities. Lobster is a type of shrimp that has export potential and is divided into seawater lobsters and freshwater lobsters (Basuki, et al, 2021). The freshwater lobster (Cherax quadricarinatus) is one of the crustacean species that has received significant attention in the aquaculture industry. Freshwater lobsters have great economic potential as a promising aquaculture commodity. One of the important factors in the success of cultivation is feed efficiency.

Feed is the most important element in cultivation activities, especially in the enlargement phase. Lobster is a type of cultivated animal that grows slowly so it needs a large amount of feed. A lot of feed is needed to meet the nutritional needs of freshwater lobsters used for their growth (Makasangkil et al, 2017). The increased amount of feed will certainly have an impact on the capital that must be spent and affect the expected profits later. Therefore, freshwater lobster farmers need to look for a type of feed that is relatively cheap and has a very good impact on lobster growth. In this case, it means that the feed used must have a high protein value. One of the animals that is often used as animal feed is maggot larvae (Hermetia illucens). Maggot larvae have a high protein value compared to other types of insects, which ranges from 40-50%, while the fat content is 29-32% (Hartati et a, 2022).

Maggots (Hermetia illucens larvae) are known as an inexpensive and high-quality alternative source of protein. In the context of aquaculture, including freshwater lobster farming, protein retention is important because protein is one of the main nutrients needed by the animal. In practice, to ensure optimal protein retention in aquaculture organisms, especially freshwater lobsters, it is important to have high-quality feed and high protein that can meet the nutritional needs of lobsters. Protein retention research on freshwater lobsters has been conducted on several types of alternative feed other than commercial pellet feed. Some of these types of feed include chicken intestinal flour (Sari et al 2025) and earthworms (Sari et al 2024). There have been no studies that have examined protein retention in freshwater lobsters fed maggot larvae. Therefore, this study aims to examine the effect of the combination of commercial feed and maggot on protein retention in freshwater lobster (Cherax quadricarinatus).

METHOD

This research has been conducted in Mallusetasi District, Bone Regency, South Sulawesi. The research procedure is 1) Preparation Stage of Freshwater Lobster (Cherax quadricarinatus), which is used in this study is a 2-month-old lobster and comes from cultivators in Mallusetasi Village, Sibulue District, Bone Regency, South Sulawesi Province. The size of the lobster with a weight of 2 to 2.30 grams and a length of 4 to 5 cm per head and each container is filled with 3 lobsters with three repetitions, the test animals used by sorting the weight and length of the lobster: 2) Preparation of Cultivation Containers, namely Preparing 9 pieces of plastic wahdah with a simple size as a maintenance medium. Before use, the plastic container is washed with water and rinsed thoroughly, then filled with freshwater water taken from the bottom of the freshwater lobster cultivation site; 3) Freshwater lobster filling, that is, before filling, the same weight and length are selected with the same weighing method; and 4) Maintenance, namely freshwater lobsters are kept in tuppeware containers for 1 month, feeding is carried out 1 time a day Every 2 weeks water quality parameters are measured in the form of DO, pH, temperature, salinity. The

experimental design was carried out using 3 treatments and 3 repetitions. The treatment in this study can be seen in Table 1:

Table 1:
Research Treatment

Treatment	Feeding Percentage
A	100% Commercial feed
B	100% Maggot feed
C	50% komersil + 50% maggot

Furthermore, the Protein Content Measurement, namely lobsters that have been kept fasted for 1 x 24 hours are taken as many as 9 fish are dried in the oven at a temperature of 70° C until the weight is constant. Lobter and dry feces produced during maintenance have been known to have their dry weight blended until they become flour, then measured for protein and energy. Protein retention measurements were measured using a *calorimeter bomb* and were carried out at the Biochemistry Laboratory of the Pangkep State Agricultural Polytechnic, South Sukawesi. Protein Retention according to Watanabe et al. (2001) is calculated with the following formula:

$$\text{Retensi Protein} = \frac{Increased\ body\ protein(g)}{Pprotein\ consumed\ (g)}\ x100\%$$

The results of the measurement of protein retention values were analyzed by ANOVA (Analysis of Variance) test. If there is a difference, it is continued with the w-tukey test if there is a real difference. from the initial data description, normality test, comparative analysis, regression analysis, correlation analysis, overall analysis and interpretation and presentation of data.

RESULT AND DISCUSSION

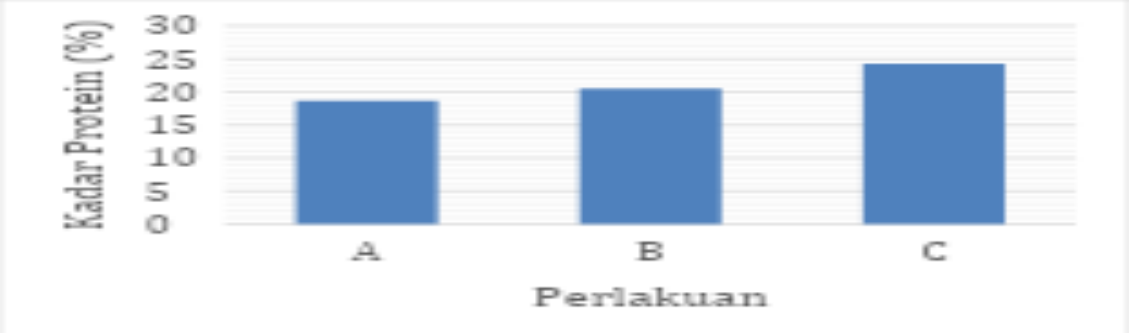
The results of protein retention measurements in freshwater lobsters can be seen in Table 2 and Figure 1:

Tabel 2:
Kadar Protein Total

Kode Sampel	Kadar Protein (%)			
	P1	P2	P3	Rata-Rata
A	18,34	19,19	18,4	18,64
B	20,2	20,43	20,73	20,54
C	24,64	24,06	24,12	24,27

Source: research analysis results

Figure 1:
Average Protein Content Diagram



Source: research analysis results

Table 1 and Figure 2 show the results of measuring total protein levels in three repeats for each sample tested. In the table, treatment C (50% commercial + 50% maggot), which has the highest protein retention rate compared to other treatments. The protein levels in each sample varied between repeat 1, repeat 2, and repeat 3, but the average value was relatively stable. The results of the ANOVA analysis showed a significant difference in protein levels between the treatments tested. Based on the ANOVA output, the calculated F-value was 150.106 with a significance value (Sig.) of 0.000, which is smaller than 0.05, so it can be concluded that there was a significant difference between the treatment groups tested.

From the results of the study, the protein retention produced in this study is quite high. The value of 24.12% obtained was higher when compared to studies that used chicken intestines as feed (Sari *et al*, 2025) but this value was slightly lower than the retention value obtained in studies using moist feed + probiotics which obtained a retention value of 28.86% (Junaidi and Scabra, 2023). The high protein retention value in this study is likely because the feed given is quite easy to digest by freshwater lobsters. Maggot can increase protein retention in freshwater lobsters because they contain high protein that is easily absorbed by lobsters and contain other important nutrients such as fats, carbohydrates, and vitamins that support lobster growth and health (Suryaningrum *et al*, 2017).

CONCLUSION

Combination maggot feed and commercial feed have the highest retention value among other treatments. The protein retention value obtained in this study was higher than similar studies with the same organism. These findings reinforce the potential of *G. matanensis* to be domesticated, especially if the adaptation process is carried out in a cultivation environment that mimics the parameters of its natural habitat. Individuals with high K-scores should be prioritized as prospective parents in domestication programs.

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