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Utilization of Kelakai Wetland Plants (*Stennochlaena palutris*) and Different Doses of Probiotics in Feed Formulations on the Growth of Climbing Perch (*Anabas testudineus* Bloch)

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Abstract: The aim of the study was to test the provision of feed made from kelakai with the best probiotic dose for the growth of climbing perch. It is expected that the feed formulation made from kelakai in the form of pellets will increase its growth by administering probiotics. The research method used a completely randomized design (CRD) with 4 treatments and 3 replications, rearing for 30 days in an aquarium. Treatment A: feeding pellets with 20% kelakai flour and 0% probiotics, treatment B: feeding pellets with 20% kelakai flour and 5% probiotics treatment C: feeding pellets with 20% kelakai flour and 10% probiotics, treatment D: giving pelleted feed with 20% kelakai flour and 15% probiotics. The results showed that all treatments were not significantly different, the highest relative length growth was in treatment C (20% kelakai flour; 10% probiotics), the highest relative weight growth of climbing perch was in D treatment (20% kelakai; 15% probiotics), survival 100 % in all treatments. Water quality is within a range that supports the growth and survival of climbing perch.

Keywords: Climbing perch; Growth; Kelakai; Probiotics

Introduction

The active compound of Kelakai leaves (Stenochlaena palustris (Burm.) Beddome) contains flavonoid metabolites, gallic tannins and catechol tannins, steroids, saponins, polyphenols and triterpenoid terpenoids (Sulasmi et al., 2018). Aminah et al. (2021) stated that feed pellets fed with Fe-containing Kelakai extract could increase the haematological effect of snakehead fish infected with A. hydrophila during a recovery time of 15 days after infection.

The results of the study Fatmawati et al. (2018), showed that feeding on the growth of snakehead fish (Channa Striatus) a substitution of kelakai varied with gondang (Pila ampullacea) showed good growth at a 20% kelakai content of the total feed composition.

The results of the proximate analysis have been carried out by Fatmawati et al. (2018), on variations of kelakai flour and gondang flour in snakehead fish feed proximate test results with a feed protein content of 43.5%. The nutritional content needed by fish is protein ranging from 20-60%, fat 4-18%, carbohydrates consisting of less than 8% crude fiber and 20-30% BETN, vitamins and minerals ranging from 2-5%. The total amount of raw materials for preparing fish feed formulations is 100% (Setiawati et al., 2013).

Giving probiotics is expected to enter the digestive tract of fish so that it can improve the ability of fish to digest feed. Nayak (2010) administration of probiotics can increase aquaculture production, increase disease resistance and support increased growth. This study tested the provision of probiotics in the kelakai formulation feed, which is expected to increase the

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growth and survival of climbing perch fish (Norhayati et al., 2020).

Malhamah (2013), the content in the flour of kelakai is 24.10% protein, 0.7% fat, 7.66% fiber and 52.11% carbohydrates and 9.16% ash and 13.93% water. The results of the research by Fatmawati et al. (2018), the flour content of youngelakai leaves water content 11.34%, ash content 12.75, protein 27.13%, crude fiber 10.54%, fat 2.18% and the flour content of kelakai leaves water content 10.10%, water content ash 10.95% Protein 26.79%, crude fiber 15.62% and fat 1.86%. It is hoped that the kelakai flour which has been formulated in the form of pellets with the administration of probiotics can increase the growth and survival of the Papuan fish.

Climbing perch (Anabas testudineus Bloch) are omnivorous fish, living in the swamps of South Kalimantan. Kepmen KPRI No. 40 Kepmen-KP/2014 concerning the release of climbing perch has the advantage of being easier to mass produce, adaptive to the cultivation environment, especially in response to pelleted feed. So it is necessary to do research on the formulation of the formula in the form of pellets with probiotics. The aim of this research was to provide the best dose of probiotics on the growth and survival of climbing perch.

Method

Time and place of Research

The research was carried out with an allocation of 6 (six) months, at the Faculty of Fisheries and Marine Science ULM Banjarbaru.

Materials and tools

Fish feed ingredients kelakai flour, fish meal, corn flour, rice bran, tapioca flour, fish oil, vitamin mineral mix. which has been formulated with an estimated protein of 27% based on the highest results in the study of Fatmawati et al. (2016), EM4 Fisheries Probiotics, Each treatment was given an additional probiotic dose of 0 ml/kg, 5 ml/kg, 10 ml/kg, 15 ml / kg of feed. Spraying probiotics on the feed is first activated by mixing the probiotics with molasses which has been diluted with distilled water. The amount of feeding is 3% of body weight with a frequency of 2 times a day, namely at 08.00 WITA and 16.00 WITA. 12 aquariums measuring 0.60 x0.40m x0.4 m with a water depth of 25 cm. The test fish used climbing perch (Anabas testudineus Bloch) measuring 5-7 cm with a stocking density of 20 fish per aquarium. Maintenance time for 30 days. Tools used in sampling; digital balance (ACIS) accuracy of 0.01g; length measuring tools, scoops and basins. water quality measurement consists of a DO meter measuring temperature and dissolved oxygen (Dissolved Oxygen), a pH meter measuring water pH, a spectrophotometer for measuring ammonia (NH3).

Research Treatment

- Treatment A: Feeding with pellets with 20% kelakai flour and 0% probiotics
- Treatment B: Giving pelleted feed with 20% kelakai flour and 5% probiotics
- Treatment C: Giving pelleted feed with 20% kelakai flour and 10% probiotics
- Treatment D: Giving pelleted feed with 20% kelakai flour and 15% probiotics

Relative Length Growth

Relative length growth is calculated using the Effendi formula (2002), as follows:

$$Lr = \frac{L_t - L_0}{L_0} \times 100\% \quad (1)$$

Information:

Lr = Relative length growth (%)

L_t = Final length of climbing perch fish fry (g)

L_0 = Initial length of climbing perch fish fry (g)

Relative Weight Growth

Relative weight growth (%) is calculated using the Effendi formula (2002), as follows:

$$Wr = \frac{W_t - W_0}{W_0} \times 100\% \quad (2)$$

Information:

Wr = Relative weight growth (%); W_t= final weigh of climbing perch fish fry (g)

W_0 = climbing perch fish fry initial weight (g)

Feed Conversion Ratio

Feed conversion ratio (FCR) is a measure that states the ratio of the amount of feed needed to produce 1 kg of cultivated fish meat. FCR values can be calculated using the formula below (Zonneveld et al., 1991):

$$FCR = \frac{Pa}{Bt - Bo + Bm} \quad (3)$$

Information:

FCR = Feed Conversion Ratio

Pa = Amount of feed given (g)

Bt = Fish biomass weight on day t (g)

Bo = Fish biomass weight at the start of stocking (g)

Bm = Dead fish biomass weight (g)

Survival Rate

The survival rate (SR) is the ratio between the number of fish that lived until the end of rearing and the

number of fish at the start of rearing. To calculate SR, the formula can be used Effendi (2002):

$$SR = \frac{Nt}{No} x100\% \quad (4)$$

Information:
SR = Survival rate (%)
Nt = Final number of fish
No = Initial number of fish

Data Analysis

The tool for processing statistical data uses the IBM SPSS Statistics Version 25 program. Water quality data is analyzed descriptively.

Result and Discussion

Relative Length Growth (%)

The results of rearing for 30 days show data on the relative length growth of climbing perch fish presented in Figure 1.

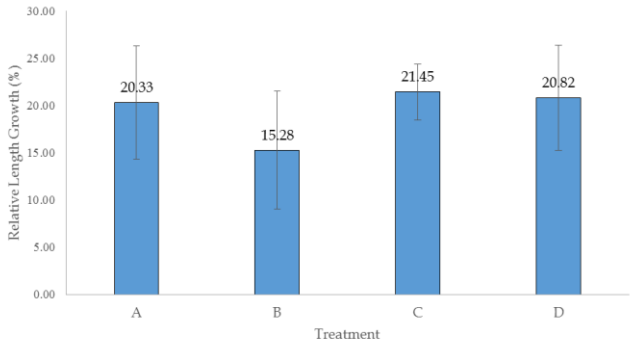

Figure 1. Relative length growth

The graph in Figure 1 shows that feed made kelakai flour with the administration of probiotics can increase the growth rate of the relative length of climbing perch fish. This shows that the feed with the addition of probiotics given is able to meet the intake needed for the growth of parrot fish. According to Prihadi (2016) in Syahruddin (2021) growth is influenced by several factors, namely internal factors and external factors, internal factors include heredity, disease resistance and ability to utilize food, while external factors include physical, chemical and aquatic biological properties. Food and water temperature are the main factors that can affect fish growth.

Syamsul et al. (2019) Feed with the addition of kelakai flour and probiotics on the relative length growth of climbing perch fish, was not significantly different between treatments, but the highest growth in length was in treatment C, followed by treatments D, A and B. The addition of 10% probiotics increased length growth more than the additional doses other probiotics, according to Soumakil (1996) in Mustakim (2008) differences in growth patterns in fish, possibly due to differences in the level of gonad maturity, season, and water fertility. According to Asyari (2007), the food obtained by fish is mainly for movement, recovery of damaged organs, after that the excess food obtained is used for growth.

The results of the analysis of the diversity of ANOVA on the relative length growth of climbing perch fish (P> 0.05) showed that the feeding with the ingredients of kelakai flour and doses of probiotics had no significant effect on the growth in length of climbing perch. The dose of probiotics has an important role in the digestibility of feed protein. It is possible that in this study the dose of probiotics given for fermenting feed was too low, causing no significant difference between treatments -15% has no effect on the growth of climbing perch. According to Handayani 2007 in Abrar et al. (2019) with the presence of a fermentation process in the addition of probiotics which can improve protein quality, maintain nutritional value during storage and remove anti-nutrients. According to Abrar et al. (2019) the higher the dose of probiotics given, the higher the rate of increase in the length and weight of the fish. This is due to fermented feed making it easier for fish to digest feed than unfermented feed, so that less energy is needed for fish to digest feed and the excess energy can be used for growth, one of which is to increase the length and weight of fish.

Relative Weight Gain

The relative weight growth between the control treatment (A) and the B, C and D treatments was significantly different between the treatments, the treatment was able to increase the growth rate of climbing perch fish weight, and the highest relative weight growth was in treatment D, followed by treatments A, C, and B. Growth Relative weight can be seen in Figure 2.

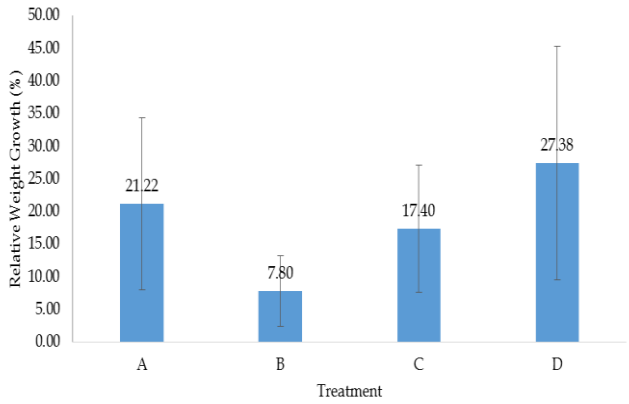

Figure 2. Graph of relative weight growth of climbing perch fish

Table 2 and the graph in Figure 2 shows the growth of climbing perch fish between treatments looks relatively slow, the highest average growth is in treatment D growing only by 27.38%, during 30 days of maintenance, but the results of this study are faster growth compared to Torang's study (2013) parrot fish reared for 56 days were able to grow 18.7% by giving magot feed. This slow growth can be caused by the slow adaptation of the climbing perch fish to the digestibility of the protein in the feed given due to the content of plant-based starch in the feed and possibly due to the ineffectiveness of the climbing perch fish in digesting the feed given, even though they have been given probiotics, the results of research by Maulidin et al. (2016), low protein digestibility resulting in low growth.

The results of the analysis of the diversity of the ANOVA on the weight growth of the Papua fish showed that the treatment had no significant effect on the relative weight growth of the Papua fish. the highest relative weight growth was in treatment D. According to Fujaya (1994) Growth can be considered as the result of a process of feed metabolism which ends with the preparation of body elements. Not all feed eaten by fish is used for growth. Most of the energy from feed is used for body maintenance. The rest is used for growth and reproduction activities. This can be seen from the statistical tests which show that there is no significant difference between treatments. This means that basically, whether given probiotics 5%, 10%, 15% which are sprayed on feed made from kelakai substitution, the effect on fish growth is not much different. Therefore, for the provision of pelleted feed, it can be applied with the addition of probiotics ranging from 5-15%. Or 15% probiotics can be applied because the graph shows higher growth, even though it is not statistically significant. The survival rate of kelakai seeds for 30 days of rearing reached 100% in all treatments. This means that the probiotic doses tested can still be tolerated for its survival. Classified as good, Husen (1985) in Mulyani (2014). that survival rate ≥ 50% is classified as good, 30-50% survival is moderate and less than 30% is not good. According to Effendi (2002), that the survival rate of fish is caused by appropriate environmental factors such as pH, temperature and availability of feed.

The survival of climbing perch fed with the addition of 0-15% probiotics had no significantly different effect (P>0.05). The survival of climbing perch seeds that were maintained for 30 days by feeding probiotics added to the feed is presented in Figure 3. Based on Figure 3. It can be seen that the survival value obtained by treating the probiotics with Probiotic Feed is equal to 100%. This shows that during maintenance there was no death in fish. This is presumably because the use of probiotics can increase the survival of fish in line with research by Iribarren et al. (2012)the use of probiotics can increase the survival of fish and reduce the burden of environmental pollution due to accumulation of waste in the waters. Thus the use of probiotic-fed feed can reduce the mortality rate caused by pathogens and aquatic waste (Handayani et al., 2017).

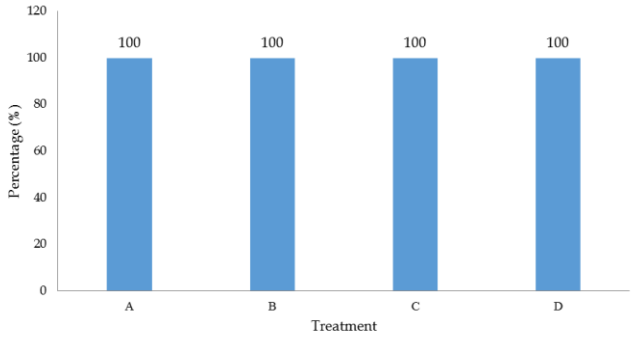

Figure 3. Survival of papuyu fish fry

Feed Conversion Ratio (FCR)

The feed conversion ratio (FCR) is used to determine the conversion rate of feed consumed to the increase in fish biomass growth. The smaller the FCR value indicates the feed consumed by fish is more efficiently used for growth, conversely the greater the FCR value indicates the feed consumed is less efficient or the utilization of growth is low.

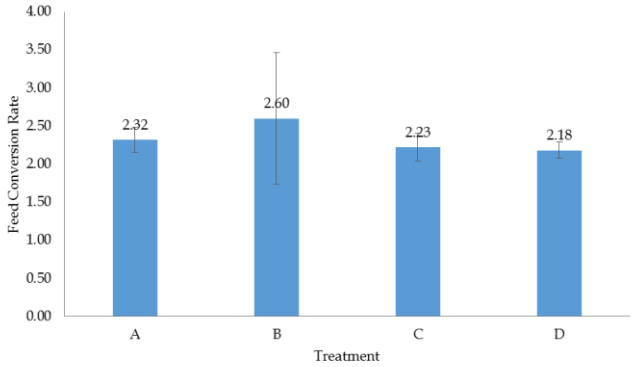

Figure 4. Feed conversion ratio

Feed quality is influenced by the digestibility or absorption capacity of fish for the feed consumed. The smaller the feed conversion value, the. the quality of the feed is getting better, but if the feed conversion value is high then the fish feed is not good (Djariah, 2005).

The results of calculating the feed conversion ratio during rearing were the highest in treatment D followed by treatments A, B and C ranging from 2.18 to 2.60. According to Mudjiman (1998), feed conversion in fish ranged from 1.5 to 8, so the feed conversion ratio with 20% of the substitution of kelakai feed with a probiotic dose of 0-15% given to all treatments is still in a good range to support the growth and survival of the parrot

fish that are kept. Feeding treatment D with the addition of probiotics resulted in better feed conversion, according to Watson et al. (2008) probiotics were able to act as immunostimulants thereby increasing the feed conversion ratio, inhibiting the growth of pathogenic bacteria, producing antibiotics, and improving water quality. Kurniasih et al. (2021) stated that one that affects the level of digestibility is the presence of enzymes in the digestive tract of fish and in feed ingredients that can provide digestive enzymes such as those produced by Bacillus sp. thought to form colonies and attach to the intestines of fish (Anggraeni et al., 2015). This will urge pathogenic bacteria not to grow and not hamper the digestive process of fish thereby increasing digestibility. Hermawan et al. (2014), stated that the feed conversion ratio with a smaller value indicates the feed consumed by fish is more efficiently used for growth, and conversely the greater the feed conversion ratio indicates that the feed consumed by fish is less efficient.

Water Quality

Water quality parameters measured in this study included pH, temperature, DO, and ammonia at the beginning and end of the study. The results of measuring water quality parameters can be seen in Table 1.

Table 1. Water Quality at the Beginning and End of the Study

	Initial Water Quality				Final Water Quality			
Parameter	A	B	C	D	A	B	C	D
pH	7.33	7.47	7.5	7.3	6.9	7.2	7.1	7.1
Temperature (^{0}C)	28	28	28	28	28	28	28	28
DO (ppm)	5.5	4.8	5.5	4.8	5.5	4.8	5.5	4.8
Ammonia (ppm)	0.15	0.12	0.15	0.15	0.25	0.2	0.18	0.2

The results of pH measurements at the beginning and end of the study ranged from 6.9-7.33, according to Rafli et al. (2020) pH with a range of 7-8 is suitable for the growth of climbing perch fish. A good pH range for parrot fish is 6.6–9.0 (Ghufran, 2010). The results of measuring a temperature of 28 ^{0}C during maintenance are in accordance with Anggra et al. (2013) water temperatures range from 25-27 ^{0}C, and parrotfish like a temperature range of 25-330C (Ghufran, 2010) dissolved oxygen ranges from 4.8-5.5 ppm, Rafli et al. (2020) stated that dissolved oxygen (DO) ranged from 4.5-7.2 ppm, and oxygen levels suitable for the growth of parrotfish were 3-4 ppm (Ghufran, 2010) while ammonia was in the range of 0.18- 0.25, research by Hanafie et al. (2021) The ammonia content during the study ranged from 0.13 – 0.32 mg/L which was still suitable for the life and survival of the parrotfish. The range of water quality in this study showed that it was still in the fairly normal range and was good for the growth and survival of the climbing perch larvae (Fahruni et al., 2018).

Conclusion

Feeding made from kelakai and a dose difference of 5-15%/kg did not affect the growth rate of fish fry, but showed a synergistic effect that was able to improve the growth of relative length, relative weight of climbing perch fish seeds, survival rates, feed conversion ratio values. The value of water quality that can support growth and survival in the maintenance of parrot fish seeds.

Author Contributions

This authors in this research are divided into executor and advisor.

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Conflicts of Interest

The author declares no conflict of interest ini this research.

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