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EFFECTS OF FEED IN FASTING TIME DIFFERENCE ON GROWTH RATE AND SURVIVAL OF CLIMBING PERCH (ANABAS TESTUDINEUS BLOCH)

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ABSTRACT
Climbing perch are freshwater fish which based on their eating habits in their natural habitat are omnivorous and are widely cultivated in South Kalimantan. The aim of this research was to determine the effect of different fasting times on the growth rate, survival and efficiency of feed utilization in Climbing perch fry. This research used a completely randomized design with 4 treatments and 3 replications. Treatment A: 1 day of fasting and 1 day of feeding; treatment B: 2 days of fasting and 1 day of feeding; treatment C: 3 days of fasting and 1 day of feeding; and treatment K: fed every day (control). Parameters observed included growth in length and relative weight, survival, feed utilization efficiency and FCR. The results of this study showed that food starvation had a significant effect on relative length growth (5.06 ± 3.90-39.14 ± 4.89), relative weight growth (15.94 ± 8.04-176.44 ± 26), feed utilization efficiency (6.72 ± 3.47-52.22 ± 6.54) and had no significant effect on FCR (1.94 ± 0.26-11.42 ± 5.85). The highest average survival results were in treatments A and K at 100% and the lowest were in treatment C at 88%.

KEY WORDS
Fasting, papuyu, growth, survival, feed efficiency.

Climbing perch (Anabas testudineus) is a fish that is widely cultivated in South Kalimantan, because it has a distinctive and delicious taste, and has a fairly high selling price (Wijianto et al., 2021). This fish is an omnivorous fish based on its eating habits in its natural habitat, which eats meat and plants (Aryzegovina et al., 2022).

Feed is the most important factor in fish cultivation activities, most of the raw materials are imported which causes prices to increase (Kurniawan et al., 2022). Feeding is done to produce energy that can support fish growth and development. Feed problems often become obstacles in cultivation activities. The feed problem is one of the problems that researchers and farmers are trying to solve, especially to find the most optimal formula or mechanism for maintaining and cultivating fish (Puspita et al., 2022).

Efforts to overcome the problem of production costs due to increasing feed prices is to provide feed efficiently, but this can also reduce the negative impact of feed on the environment. Efficient feeding means periodic feeding of fish with the aim of optimizing the absorption and utilization of feed by the fish's body (Puspita et al., 2022). Fasting fish is expected to experience an increase in appetite. This situation is caused by compensatory growth, namely an extraordinarily fast growth phase, following a period of nutritional deficiency (Maulina et al., 2018).

If it is related to feeding efficiency, fish will be more effective in utilizing food when the fasting process is carried out for a certain period of time so that it will lead to an increase in body growth rate and the process of protein metabolism from feed can be digested optimally (Siegers, et al., 2021). Feeding fish can also reduce the negative impact of food on the environment because it will reduce the remaining food that the fish do not eat. This research aims to analyze the effect of different fasting times on growth, survival and efficiency of utilization of Climbing perch seed feed.

METHODS OF RESEARCH

This research was carried out for ± 5 months and was carried out at the Freshwater Aquaculture Production UPT, Banjarbaru, South Kalimantan. The materials used in this research were Climbing perch seeds with a size of 3-4 cm as test animals and commercial feed PF-1000. Research procedures include preparation of tools and materials. The rearing containers prepared were 12 jars filled with well water with a volume of 8 L, and also prepared Climbing perch seeds with a fish stocking density used of 2 fish/L.

Figure 1 – Preparation of Tools and Materials

Maintenance is carried out for 45 days, with feeding using the ad libitum method, namely 5% of the fish weight with a feeding frequency of 3 times a day. Every day observations are made on the morphology, behavior, whether there are wounds or not, as well as looking at fish cannibalism. Sampling is carried out every 15 days. Water quality measurements will be carried out at the beginning and end of the research, including measurements of temperature, pH, DO and ammonia.

The design used in this research was a Completely Randomized Design (CRD) with 4 treatments and 3 replications. The difference in fasting times used refers to research conducted by Cahyanti et al., (2015) on baung fish. The treatment used in this research, namely:

- Treatment A = 1 day of fasting and 1 day of feeding;
- Treatment B = 2 days of fasting and 1 day of feeding;
- Treatment C = 3 days of fasting and 1 day of feeding;
- Treatment K = Control (fed every day).

K2	**C3**	**A2**	**K3**	**A1**	**C1**
B1	**K1**	**A3**	**C2**	**B3**	**B2**

Figure 2 – Treatment layout

According to Effendie (2000) relative length growth can be calculated using the formula, namely:

$$L_r = \frac{(L_t - L_0)}{L_0} \times 100\%$$

Where: Lr = Relative length growth (%); Lt = Average length at the end of the study (cm); L0 = Average length at the start of the study (cm).

Relative weight growth uses the Effendie (2000) formula, namely:

$$W_r = \frac{(W_t - W_0)}{W_0} \times 100\%$$

Where: Wr = Relative weight (%); Wt = Average weight at the end of the study (g); W0 = Initial average weight of the study (g).

Survival calculations were carried out at the end of the research using the formula according to Effendie (2000), namely:

$$SR = \frac{N_t}{N_0} \times 100\%$$

Where: SR = Survival rate/survival; Nt = Number of seeds at the end of the study; N0 = Number of seeds at the beginning of the study.

The value of feed utilization efficiency can be determined using the Tacon formula (1987), namely:

$$\mathrm{EPP} = \frac{(W_t - W_0)}{F} \times 100\%$$

Where: EPP = Feed utilization efficiency (%); F = Amount of feed consumed during the study (g); Wt = Total weight of test fish at the end of the study (g); W0 = Total weight of test fish at the start of the study (g).

The feed conversion ratio value according to Parker, 2012 can be calculated using the formula, namely:

$$\mathrm{FCR} = \frac{F}{(W_t + D) - W_0}$$

Where: FCR = Feed conversion ratio; F = Total amount of feed (g); D = Weight of dead fish (g); Wt = Final weight (g); W0 = Initial weight (g).

The water quality parameters observed in this study include temperature, DO, pH and ammonia. Observations were carried out twice, namely at the beginning and at the end of raising the test fish.

Data on growth in relative length, relative weight, survival, efficiency of feed utilization and feed conversion ratio were obtained, tested for normality and homogeneity, and then carried out anova and further tests with Duncan. Water quality data including temperature, DO, pH and ammonia were observed descriptively.

RESULTS AND DISCUSSION

The highest average relative length growth was in treatment K 39.14 ± 4.89%, followed by treatment A 11.83 ± 1.67%, followed by treatment B 6.13 ± 2.29%, and the lowest in treatment C 3.80 ±2.15%.

The results of the Liliefors normality test, Barlett homogeneity, analysis of variance (ANOVA) with differences in feed fasting times had a very significant effect on the relative length growth of Climbing perch fry. The data was continued with the Duncan test with the results showing that treatment K was very significantly different from A, B, and C, these results showed that treatment K was better than the other treatments.

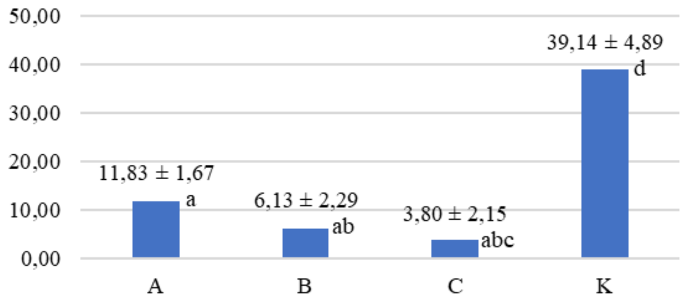

Figure 3 – Graph of Relative Length Growth of Climbing perch Seeds

The results of the study showed that raising Climbing perch fry with different food fasting times had a length increase that was no better and lower than the treatment of fish that were not fasted (control). This is thought to be because fish will use their food intake for activities first and then use it to increase the length of the fish's body as according to Lovell (1989), Rachmawati et al. (2017) that before growth occurs, energy needs for maintenance must be met first.

In this study, it was observed that the Climbing perch took their food to the surface, which made the fish require more energy. This is the same as Maulana (2019) who stated that the Climbing perch took their food by jumping as if they were attacking. This method of taking food causes the fish to require a lot of energy for activities during maintenance so that the nutrients obtained from the feed are not used optimally for growth.

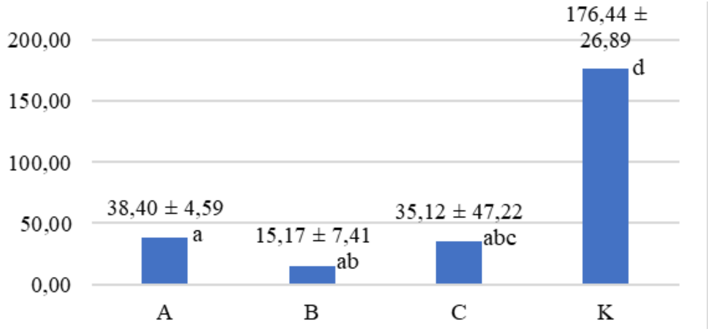

Figure 4 – Graph of Relative Weight Growth of Climbing perch Seeds

The highest average relative length growth was in treatment K 176.44 ± 26.89%, followed by treatment A 38.40 ± 4.59%, followed by treatment C 35.12 ± 47.22% and the lowest in treatment B 15.17 ±7.41%.

The results of the Liliefors normality test, Barlett homogeneity, analysis of variance (ANOVA) with differences in feed fasting times had a very significant effect on the relative weight growth of Climbing perch fry. The data is continued with testing

Duncan with the results showed that treatment K was very significantly different from A, B, and C. These results showed that treatment K was better than the other treatments.

The results of this study were the same as the results of relative length growth which showed that raising Climbing perch fry with different fasting times had a weight gain that was no better than the treatment of fish that were not fasted (control). It is thought that this happens in the same way as growth in length, where the food intake that the fish gets is used to adapt again, not for growth.

The weight growth of fish given fasting treatment in this study obtained lower results compared to fish that were not fasted. Fasted fish are thought to receive less food intake, so the fish will experience hunger and adapt to their physiological conditions. Fish will grow according to the existing feed intake. This is in accordance with the opinion of Zonneveld et al., (1991); Amrullah et al., (2021) fish need food to get body energy and fish will experience a more significant decrease in body energy, if fish are kept for a longer time in conditions of lack of food (fasting).

There are many studies on the method of feeding with fasting on fish growth, such as Rismoni (2023) with climbing perch, Cahyanti et al., (2015) with baung fish, Raudah et al., (2023) with gourami fish, and Puspita et al., (2022) with catfish. All these studies show that fish have full compensatory and overcompensatory growth if fed occasionally, but in this study the daily feeding method gave better results in terms of fish weight growth. This is thought to be because climbing perch may not adapt well to intermittent feeding methods.

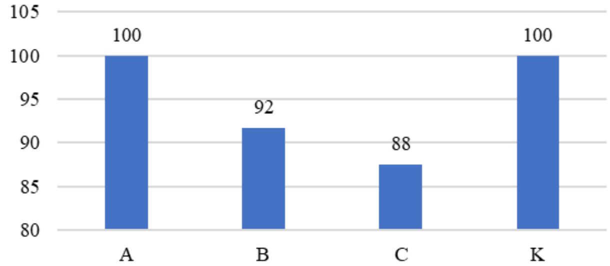

Figure 5 – Climbing perch Seed Survival Graph

The highest survival rate in treatments A and K was 100%, followed by treatment B 92% and the lowest in treatment C 88%.

Fish deaths during rearing were observed, parts of the tail fin were cut off, and some fish were even found with only the head bones left. This is thought to be because the nature of Climbing perch is a fish with cannibalistic qualities, there is competition between fish and fights for food where larger fish attack small fish. non-kin groups at the post-hatching stage. This class occurs in meat-eating species early in life. This is also found in all groups of fish where large size differences occur within age groups, and as a result this creates problems in fish farming.

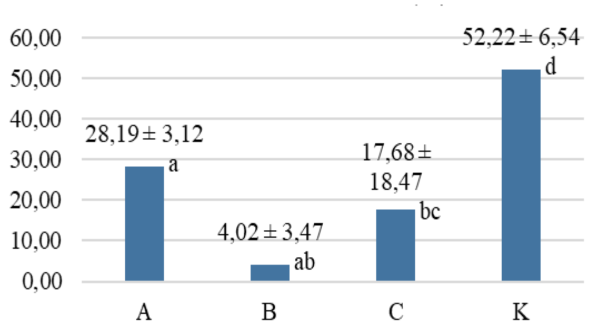

Figure 6 – Graph of the Efficiency of Utilizing Climbing perch Seed Feed

The highest average feed utilization efficiency was in treatment K 52.22 ± 6.54%, followed by treatment A 28.19 ± 3.12%, followed by treatment C 17.68 ± 18.47%, and the lowest in treatment B 4.02 ± 3.47%.

The results of the Liliefors normality test, Barlett homogeneity, analysis of variance (ANOVA) with differences in feed fasting times had a very significant effect on the efficiency of utilization of Papuyu seed feed. The data was continued with the Duncan test with the results showing that treatment K was very significantly different from A, B, and C. These results showed that treatment K was better than the other treatments.

The highest feed utilization efficiency value was shown in treatment K, namely 52.22 ± 6.54% when fed every day and for fasting in treatment A, namely 28.19 ± 3.12%, this is probably due to the treatment of fasting for a day and being given The protease activity per day of feed was higher and the lowest result was in treatment B, namely 6.72 ± 3.47% with two days of fasting and one day of feeding, possibly due to the low nutritional content of the fish, so that protein absorption in the fish was not absorbed optimally. Ananda et al., (2015) stated that feed can be said to be good if the feed efficiency value is more than 50% or even close to 100%, whereas in this study for the satiation treatment the feed utilization efficiency value was <50%, which means the efficiency of feed utilization in the study this is not good.

The low value of feed utilization efficiency in this study indicates that Climbing perch require larger amounts of feed. This research, Marzuqi, et al., (2012) also states that a low feed utilization efficiency value means that fish need more feed to increase fish weight because only a small portion of the energy from the feed provided is used by the fish for growth.

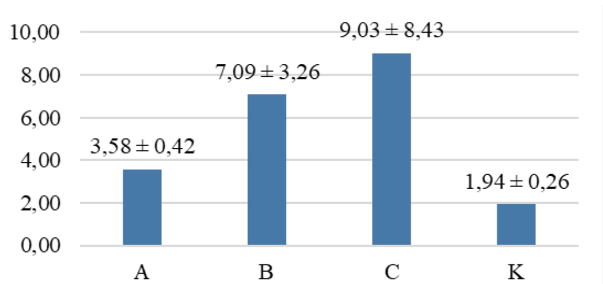

Figure 7 – Climbing perch Seed Feed Conversion Ratio Graph

The highest mean feed conversion ratio was in treatment C 9.03 ± 8.43%, followed by treatment B 7.09 ± 3.26%, followed by treatment A 3.58 ± 0.42%, and the lowest in treatment K 1.94 ± 0.26%. The results of the Liliefors normality test, Barlett homogeneity, analysis of variance (ANOVA) with differences in feed fasting times had no significant effect on the feed conversion ratio of Papuyu seeds.

Mudjiman (2004), the feed conversion ratio value for fish ranges from 1.5-8.5. When compared with the results during the rearing period, the feed conversion ratio value can be said to be good, which means the fish are optimal in utilizing the feed provided. The feed conversion ratio in this study was small but had no real effect on the growth of Climbing perch, this is thought to be because the fish use feed nutrients to survive and move so that it is not optimal for growth in length and weight.

Wahyudewantoro (2013) states that the quality of growth can be seen through conversion of feed to produce meat in fish. The food eaten by fish must be able to support growth so it requires proper nutrition to be given to the fish. According to Djariah (2005); Pramudiyas (2014), that the quality of feed given to fish will be influenced by the fish's digestibility and absorption of the feed it consumes, the smaller the feed conversion ratio value, the better the feed quality will be.

Table 1 – Water Quality Measurement Results

Parameter	Average	Optimal levels according to the literature
Temperature	28,3 - 31,6°C	22°C-32°C (Wijianto *et al*., 2021)
DO	3,0 - 6,2 mg/L	>3 mg/L (Slembrouck *et al*., 2005; Mariana *et al*., 2015)
pH	7,00 - 7,06	4-8 (Widodo *et al.,* 2007; Susila 2016)
Ammonia	0,25 – 1,00 mg/L	Tidak lebih dari 1 mg/L (Tatangindatu *et al*., 2013; Miranti *et al*., 2017)

Source: Primary Data (2023).

The results of temperature measurements ranging from 28.3 - 31.6°C, Wijianto et al., (2021) stated that the requirements for fish growth are temperatures ranging from 22°C-32°C, DO ranging from 3.0 mg/L - 6.2 mg/L, this value is still within the optimal range for the life of Climbing perch. Slembrouck et al., (2005); Mariana et al., (2015) stated that in general the dissolved oxygen range is >3 mg/L. The pH range is good for the growth of Climbing perch according to Widodo et al., (2007); Susila (2016), namely 4-8. The pH value during maintenance ranges from 7.00 - 7.06, so it is still within the optimal range for Climbing perch fry.

Ammonia ranges from 0.25 mg/L - 1.00 mg/L. still supports the maintenance of Climbing perch seeds. Tatangindatu et al., (2013); Miranti et al., (2017) stated that the ammonia concentration that can support the life of Climbing perch is no more than 1 mg/L. This is compared to this study, where the ammonia concentration value was high, reaching 1.00 mg/L for treatments A and K, which means it is still good for papuyu life, but looking at the survival value, this treatment is higher than other treatments where the water ammonia concentration value is higher. This proves that Climbing perch have a high tolerance for poor water quality conditions. Akbar (2018) stated that climbing perch is a type of swamp fish which has advantages compared to other fish, namely its high survival rate. Climbing perch can survive in poor water quality conditions, and can even live in mud.

CONCLUSION

The difference in feed saturation time for Climbing perch fry had a very significant effect on relative length growth, relative weight, survival and feed utilization efficiency and had no significant effect on the feed conversion ratio. The best feed utilization efficiency for the fasting treatment was treatment A with 1 day of fasting and 1 day of feeding (28.19%), meaning that the fasting method can be used as a solution to reduce feed use.

REFERENCES

1. Akbar, J. 2018. Ikan Papuyu Teknologi Manajemen dan Budi Daya. Lambung Mangkurat University Press. Banjarmasin.
2. Amrullah, M. I., Nikhlani, A., dan Pagoray, H. 2021. Pengaruh pemuasaan terhadap pertumbuhan dan kelangsungan hidup benih ikan Biawan (Helostoma temminckii). Jurnal Aquawarman, 7(2): 44-53.
3. Ananda, T., Rachmawati, D., dan Samidjan, I. 2015. Pengaruh papain pada pakan buatan terhadap pertumbuhan ikan Patin (Pangasius hypopthalmus). Jurnal of Aquaculture Management and Technology, 4(1): 47-53.
4. Aryzegovina, R., Aisyah, S., dan Ira, D. 2022. Analisis isi usus dan lambung untuk menentukan food and feeding habit ikan Betok (Anabas testudineus). Konservasi Hayati, 18 (1): 9-21.
5. Cahyanti, W., Atmadi, V. P., Jojo, S., dan Anang, H. K. 2015. Efek pemuasaan dan pertumbuhan kompensasi pada benih ikan Baung (Hemibagrus nemurus). Media Akuakultur, 10(1): 17-21.
6. Effendi, M.I. 2000. Biologi Perikanan. Yayasan Pustaka Nusantara. Yogyakarta.
7. Kurniawan, E., Jalaluddin, dan Yupiyanti. 2022. Pengaruh ragi tempe terhadap waktu fermentasi pakan ikan Lele dari ampas tahu. Jurnal Pendidikan Dan Konseling, 4(6): 191.
8. Mariana, R. S., Yulisman, dan Muslim. 2015. Laju pertumbuhan dan kelangsungan hidup larva ikan Betok (Anabas testudineus) pada berbagai periode pergantian jenis pakan. Jurnal Akuakultur Rawa Indonesia, 3(1): 70-81.
9. Marzuqi, M., Astuti, N. W. W., dan Suwirya, K. 2012. Pengaruh kadar protein dan rasio pemberian pakan terhadap pertumbuhan ikan Kerapu Macan (Epinephelus fuscoguttatus). Jurnal Ilmu dan Teknologi Kelautan Tropis, 4(1): 55-65.
10. Maulana, A. R. 2019. Pengaruh kedalaman air yang berbeda dengan dasar gambut terhadap sintasan dan pertumbuhan larva ikan papuyu (Anabas testudineus). Skripsi. Universitas Islam Riau.
11. Maulina, A.N., Samsundari, S., dan Anis, Z. 2018. Pengaruh perbedaan perbedaan waktu pemuasaan terhadap pertumbuhan dan rasio efisiensi protein ikan gurame (Osphronemus Gouramy). Acta Aquatica: Aquatic Sciences Journal, 5(2): 60.
12. Miranti, F., Muslim, dan Yulisman. 2017. Pertumbuhan dan kelangsungan hidup larva ikan Betok (Anabas testudineus) yang diberi pencahayaan dengan lama waktu berbeda. Jurnal Akuakultur Rawa Indonesia, 5(1): 33-44.
13. Mudjiman, A. 2004. Makanan Ikan. Penebar Swadaya. Jakarta.
14. Parker. 2012. Aquaculture Science. New York: Delmar.
15. Pramudiyas, D., dan Rizki. 2014. Pengaruh perubahan enzim pada pakan komersil terhadap pertumbuhan dan rasio konversi pakan (FCR) pada ikan Patin (Pangasius sp)". Skripsi. Universitas Airlangga Surabaya.
16. Puspita, M.S., Helmizuryani, Sukma, A., dan Khusnul, K. 2022. Pengaruh perbedaan pemuasaan pakan terhadap pertumbuhan dan kelangsungan hidup ikan Patin (Pangasius hypopthalmus). Journal of Global Sustainable Agriculture, 2(1): 37.
17. Rachmawati, F. N., Susilo, U., dan Sistina, Y. 2010. Respon fisiologi ikan nila Oreochromis niloticus, yang distimulasi dengan daur pemuasaan dan pemberian pakan kembali. In Prosiding Seminar Nasional Biologi Universitas Gajah Mada.
18. Raudah, A., Kartika, R.R., dan Ahmad, M. 2023. Pengaruh pemuasaan dengan pemberian pakan komersil mengandung temulawak (Curcuma xanthorrhiza) terhadap pertumbuhan dan kelangsungan hidup ikan Gurami (Oshpronemus gourami). Skripsi. Universitas Lambung Mangkurat.
19. Rismoni, I. 2023. Efisiensi pakan dan performa pertumbuhan ikan Betok (Anabas testudineus) yang dipelihara menggunakan metode pemuasaan secara periodik. Skripsi. Universitas Sriwijaya.
20. Siegers, W. H., dan Prayitno, Y. 2021. Pengaruh efisiensi pakan dan waktu pemuasaan yang berbeda terhadap pertumbuhan dan kelangsungan hidup ikan Nila (Oreochromis niloticus). JFMR (Journal of Fisheries and Marine Research), 5(3): 635-645.

21. Smith, C., dan Reay, P. 1991. Cannibalism in teleost fish. Reviews in Fish Biology and Fisheries, 1: 41-64.
22. Susila, N. 2016. Pengaruh padat penebaran terhadap kelangsungan hidup larva ikan Betok (Anabas testudineus) yang dipelihara dalam baskom. Jurnal Ilmu Hewani Tropika (Journal of Tropical Animal Science), 5(2), 72-75.
23. Tacon, A.E.J. 1987. The Nutrition and Feeding Formed Fish and Shrimp. A Training Manual Food and Agriculture of United Nation Brazilling, Brazil. pp. 108-123.
24. Wahyudewantoro, G. 2013. Hubungan panjang berat dan faktor kondisi ikan Belanak (Liza subviridis) di perairan Taman Nasional Ujung Kulon, Pandeglang, Banten. Jurnal Ilmu-ilmu Hayati dan Fisik, 15(3): 175-178.
25. Wijianto, Pangestu,. M., dan Iftisar, R. 2021. Manajemen pembesaran ikan Papuyu (Anabas testudineus) di desa Mekar Indah Kecamatan Seruyan Hilir Timur Kabupaten Seruyan Provinsi Kalimantan Tengah. Jurnal Pkm Belida Indonesia, 1(1): 1.