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THE EFFECT OF FEEDING NATURAL FEED TYPES OF ARTEMIA AND ROTIFERA WITH DIFFERENT COMPOSITIONS ON MAINTAINING OF SNAKEHEAD LARVAE (CHANNA STRIATA)

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ABSTRACT
The purpose on this research is to analyze and evaluate the survival and growth of the snakehead larvae (*Channa striata*) with different natural feeds. This study used an experimental method with a Completely Randomized Design (CRD) with 3 treatments and 3 replications. Snakehead larvae were kept in an aquarium containing 15 L of water for 30 days with a density of 2 fish/L. Feeding composition in treatment A (75% *Artemia*: 25% *Rotifer*), treatment B (50% *Artemia*: 50% *Rotifer*), treatment C (25% *Artemia:* 75% *Rotifer*).The result showed that the provision of natural feed with different compositions had no significant effect on the survival of snakehead larvae, and had a significant effect on the growth of the length and absolute body weight of the fish where optimal results were found in treatment A using a natural feed composition of 75% *Artemia* and 25% *Rotifer*.

KEY WORDS
Natural feed compost, survival, growth, snakehead larvae.

Snakehead fish (*Channa striata*) is one of the native fish that live in fresh waters in Indonesia, especially in Sumatra, Kalimantan and Java. Snakehead fish farming activities began to develop in the community by relying on larvae that came from nature. (Ghaffar *et al.,* 2012). Fish growth is related to the availability of protein in feed, because protein is a source of energy for fish and protein is a nutrient that is needed by fish for growth. The larval phase is a critical point in the rearing of fish larvae, the main factor causing the critical point in the larval rearing phase is the determination of the type of feed as an appropriate initial feed for its growth. Inappropriate feed can cause slow growth and death of fish. In the larval stage, the fish are given nutrients in the form of natural food.

Natural food is the smallest organism that has a very large role in supporting the life of fish larvae because it is the initial food and as the main food. The high nutritional content of natural feed is necessary for the growth and development of larvae. Some of the advantages of using natural food are its small size according to its mouth opening and its movement in the water which stimulates the larvae to eat it. The type of natural feed used is *Artemia*. and *Rotifer*. The need for *Artemia* and *Rotifer* as feed for larvae is highly dependent on the mouth opening and digestion rate of fish larvae. Therefore, it is necessary to conduct research on the effect of giving different types of natural feed on the maintenance of snakehead fish larvae.

This study aims to analyze and evaluate the survival of snakehead fish larvae by giving different natural feed compositions.The purpose of this study was to increase the survival rate and growth performance of snakehead fish (*Channa striata*) larvae fed a combination of natural food Artemia and Rotifera.

METHODS OF RESEARCH

This research was conducted for 30 days at the Wet Laboratory, Faculty of Fisheries and Marine Affairs, University of Lambung Mangkurat, Banjarbaru, South Kalimantan. The fish larvae rearing container uses an aquarium measuring 40x30x30cm, filled with 15 L of water and given medium aeration. Snakehead fish larvae are 7 days old after hatching, obtained from natural spawning. The stocking density of snakehead fish larvae is 2 fish/L (Mollah, 2009). The size of the snakehead fish larvae is 0.9-1 cm which is maintained for 30 days. The natural feed used is *Artemia* and *Rotifer*.

Experimental design was Completely Randomized Design (CRD). The treatments were A (combination of 75% *Artemia* and 25% *Rotifer*); B (combination of 50% *Artemia* and 50% *Rotifer*); E (combination of 25% *Artemia* and 75% *Rotifer*); which was triple replicated.

Feeding of snakehead fish larvae was carried out four times a day at 08.00 a.m, 12.00 a.m and 05.00 p.m. The amount of natural food given to fish larvae is 500 individuals/fish/day (Qin & Fast, 1998; War & Altaff, 2014).

Prior to stocking, fish larvae were sampled to measure initial weight and length. Larvae were stocked in the aquarium as many as 30 fish/aquarium with a stocking density of 2 fish/L. The water in the maintenance medium is replaced every 7 days to maintain the water quality in good condition. After 30 days, the larvae were harvested and the numbers were counted and the body weight and length of the fish larvae were measured for data purposes.

The variables measured in this research were relative growth (RG), specific growth rate (SGR), feed efficiency (FE), feed Convertion Ratio (FCR), and survival rate (SR).

Data were analyzed using one way analysis of variance (ANOVA). The difference between treatments means to be significant at 95% were analyzed with Duncan’s Duncan's Multiple Range Test (DMRT). SPSS software were applied for the data analysis.

RESULTS OF STUDY

Absolute growth rate of the snakehead in 30 days culture is shown in Figure 1. The value of absolute weight growth rate based on the results of research that has been carried out for 30 days, giving natural feed types namely *Artemia* and *Rotifer* with different compositions showed the highest results were found in treatments A (0.22 g) and B (0.22 g) then the lowest in treatment C (0.13 g) (Figure 1). Based on the results of the ANOVA test, it was shown that in this study it had a very significant effect on the absolute growth rate of snakehead fish larvae.

The specific growth rate of the snakehead in 30 days culture is shown in figure 2. The value of relative length growth based on the results of research that has been carried out for 30 days, with the provision of natural feed types namely *Artemia* and *Rotifer* with different compositions showed the highest results were found in treatment A (532%) and B (356%) then the lowest was in treatment C (238%) (Figure 2). Based on the results of the ANOVA test, it showed that the treatment given in this study had a very significant effect on the growth of the relative weight of snakehead fish larvae.

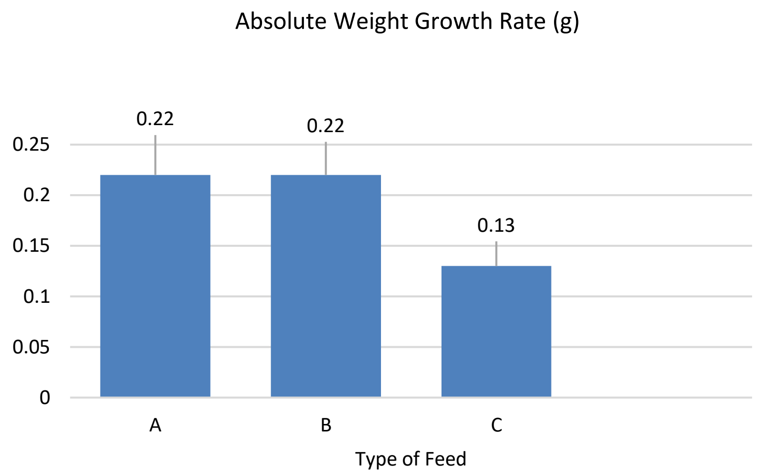

Figure 1 – Absolute growth rate of the snakehead in 30 days culture

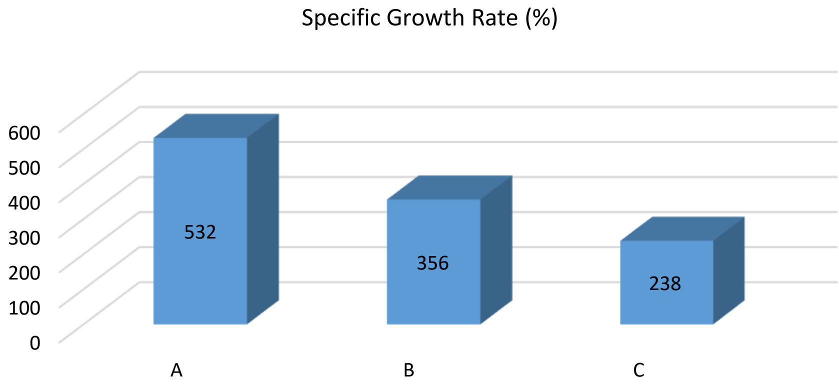

Figure 2 – The specific growth rate of snakehead in 30 days culture

The absolute length growth rate of the snakehead in 30 days culture is shown in figure 3. The value of absolute length growth rate based on the results of research that has been carried out for 30 days, the provision of natural feed types namely *Artemia* and *Rotifer* with different compositions showed the highest results were found in treatment A (2.41 cm) followed by treatment B (1.75 cm), then the lowest was in treatment C (1.52 cm) (Figure 3). Based on the results of the ANOVA test, it was stated that the provision of different feed compositions had a significant effect on the absolute length growth rate.

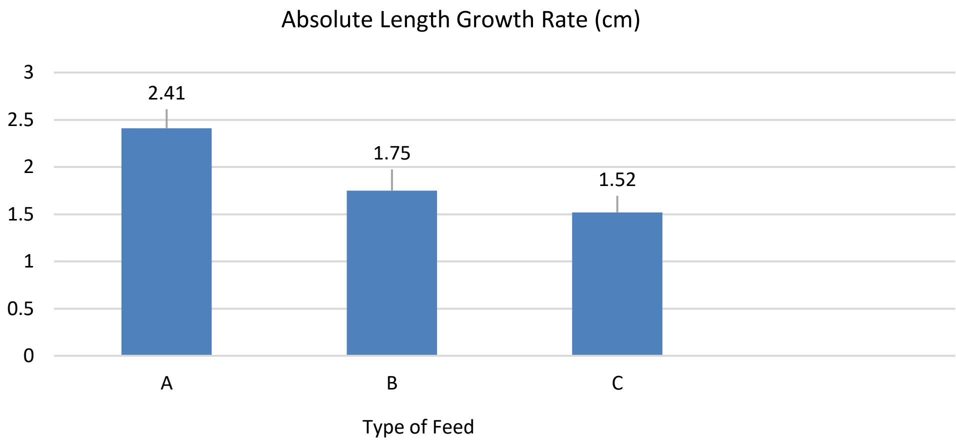

Figure 3 – Absolute length rate of the snakehead in 30 days culture

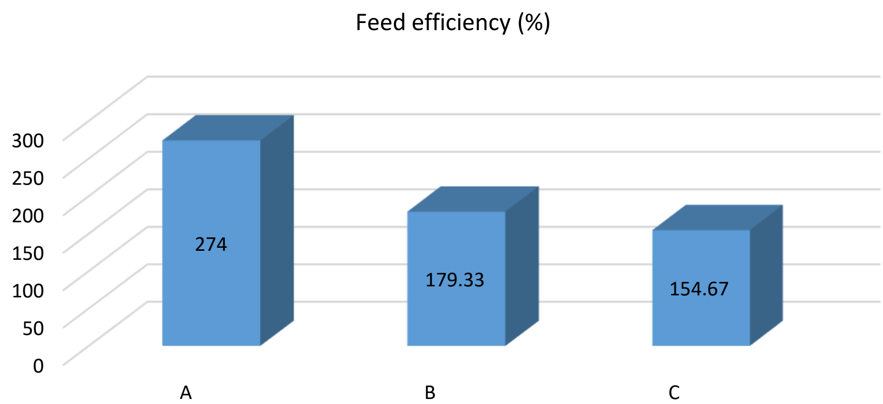

Figure 4 – Feed efficiency of the snakehead in 30 days culture

The result in figure 6 showed that survival rate for all the treatment is 100%. All fish from all treatments survived until the end of treatment.

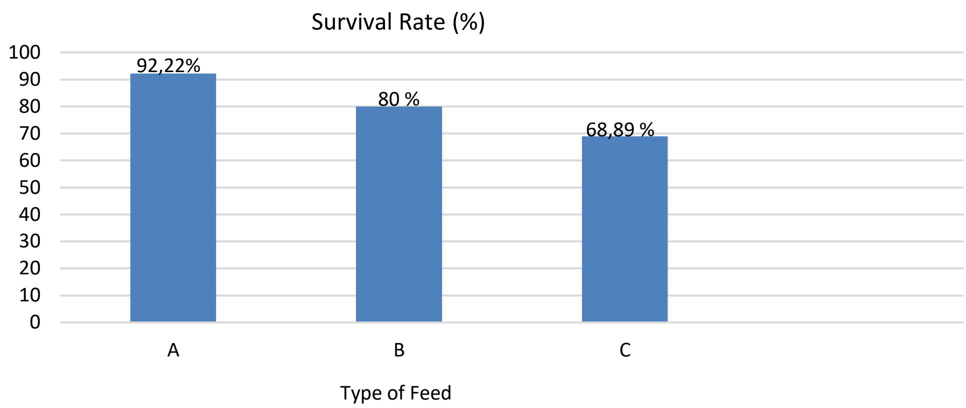

Figure 5 – Survival rate of the snakehead in 30 days culture

The survival value is based on the results of research that has been carried out for 30 days, giving different types of natural feed, namely *Artemia* and *Rotifer* with different compositions, showing different results between treatments. The highest survival rate was found in treatment A (92.22%) (Figure 6). The results of the ANOVA test showed that the calculated F value (3.80) < f table (4.46) with a level of 5% showed results that had no significant effect on the survival of snakehead fish. This was due to the same amount of feed given to each treatment, namely 500 individuals/fish/day.

Table 1 – The average of water temperature and pH of the snakehead culture

No	Parameter	Treatment	Before	After
1.	Temperature (C)	A	26,9	27,3
		B	26,9	27,1
		C	26,9	27,2
2.	DO (mg/l)	A	3,12	5,4
		B	3,12	5,2
		C	3,12	4,0
3.	pH	A	6,10	5,41
		B	6,10	5,46
		C	6,10	5,45
4.	NH3 (mg/l)	A	0,04	1,695
		B	0,04	1,5
		C	0,04	0,9

Water temperature and pH of the snakehead culture in 30 days is shown in table 1. Water temperature of all treatments is in the normal range. Water quality is a supporting factor in the growth and survival of fish that are kept. Observations of water quality during the study included temperature, DO, pH, and NH_3. The water temperature during the research period ranged from 26.9^{0}C-27^{0}C. DO water during the study period ranged from 3.12 to 5.4 mg/L. The pH of the water ranges from 6.10 to 5.46. NH_3 during the study period 0.04-1.695 ml/L. The results of the observations can be seen in table 1.

DISCUSSION OF RESULTS

The highest absolute weight growth was in treatment A with a natural feed composition of 75% *Artemia*, 25% *Rotifer* and B 50% *Artemia*, 50% *Rotifer* then the lowest was in treatment C with 25% *Artemia* 75% *Rotifer* natural feed composition. Differences in the type and dose of feed given to each treatment resulted in significant differences between treatments, it was suspected that the nutritional content of the feed was not the same. The protein contained in the feed is the main factor affecting the growth of fish (Halver, 1977). The low value of absolute weight growth in treatment C was thought to be because the nutritional content used in the feed was not in accordance with the physiological conditions of the larvae. In the newly hatched larvae there is a remnant of egg yolk that can be used for several days after which the larvae will look for natural food that matches their mouth opening. Natural feed is very necessary in fish cultivation and hatcheries, because it will support the survival of fish seeds (Alem, 2016). Treatments A and B showed the best results. It was suspected that the given composition had a significant effect on the absolute weight growth rate of the snakehead fish larvae. This is because the nutritional content contained in the natural feed provided has met the needs of fish larvae. The nutritional content of *Artemia*. Consisting of protein 52.2%. *Rotifer* protein content is in the range of 28 to 63% (Lubzen *et al.,* 1989).

The highest relative weight growth was in treatment A with a natural feed composition of 75% *Artemia* and 25% *Rotifer*, then followed by treatment B 50% *Artemia* and 50% *Rotifer* then the lowest was in treatment C with 25% *Artemia* and 75% *Rotifer* natural feed composition. Differences in the type and dose of feed given to each treatment resulted in significant differences between treatments, it was suspected that the nutritional content of the feed was not the same. The protein contained in the feed is the main factor affecting the growth of fish (Halver, 1977). The low value of relative weight growth in treatment C was thought to be because the nutritional content used in the feed was not in accordance with the needs and physiological conditions of the larvae. In the newly hatched larvae there is a remnant of egg yolk that can be used for several days after which the larvae will look for natural food that matches their mouth opening. Natural food is very necessary in fish cultivation and hatcheries, because it will support the survival of fish seeds (Alem, 2016). Treatments A and B showed better results, it is suspected that the nutritional composition of treatments A and B was in accordance with the nutritional needs of the snakehead fish larvae. The nutritional content of *Artemia* consists of protein 52.2 ± 8.8%, fat 18.9 ± 4.5%, carbohydrates 14.8 ± 4.8%, and ash content of 17.4 ± 6.3% (Leger, 1986), while *Rotifer* protein content is in the range of 28 to 63% (Lubzen *et al*., 1989).

The highest mean absolute length growth rate was found in treatment A, presumably because the feed consumed contained nutrients that matched the needs of fish larvae. The next average absolute length growth rate was found in treatment B which was not significantly different from treatment C. The low mean value in treatment C was thought to be due to the influence of the feed consumed which contained nutrients that were not sufficient for the needs of fish larvae to grow. Giving different feed compositions in each treatment resulted in different values, it is suspected that the composition of the feed given had different nutritional content. The composition of the feed in treatment A, namely 75% *Artemia* and 25% *Rotifer* gave a good value on absolute length growth. Effendi *et al.* (1997), stated that the appropriate feed requirements for fish larvae are small, smaller than the larva's mouth opening.

The high survival value in treatment A was suspected because the composition of the feed given was in accordance with the development of the digestive system and the size of the mouth opening of the snakehead fish larvae, so that they could absorb feed optimally. The survival of the larvae is largely determined by the feed, the larvae will die if the feeding is not optimal, both in quality and quantity (Effendie, 1979). In treatment A with 75% *Artemia* and 25% *Rotifer* feeding, it was in accordance with the needs of the snakehead fish larvae. The nutritional content of *Artemia* consists of protein 52.2 ± 8.8%, fat 18.9 ± 4.5%, carbohydrates 14.8 ± 4.8% and ash content of 17.4 ± 6.3%. *Rotifer* protein content is in the range of ±45 and lipid content is around 9% to 28%. The low survival value of snakehead fish larvae in treatment C is suspected to be insufficient feed consumption for fish larvae and the lack of feed provided. Priyadi (2010) said that the survival of fish is largely determined by the availability of feed. Fish will die if in a short time they do not manage to get food, because there is starvation and exhaustion.

The water temperature in this study ranged from 26.9^{0}C-27.3^{0}C in all treatments. The temperature range can be stated as good to support the growth of snakehead fish that are kept, which is at 25.5-30^{0}C (Almaniar, 2011). This statement shows that the water temperature during the study was still in optimal conditions for the life of snakehead fish larvae. The content of dissolved oxygen (DO) in the water during the study ranged from 3.12 to 5.4 mg/L. Adriani (1995) stated that the dissolved oxygen content for the maintenance of snakehead fish ranged from 3.0 to 3.3 mg/L. Meanwhile, according to Kordi (2011), good dissolved oxygen for the cultivation of snakehead fish, which ranges from 3-6 mg/L, the statement can be said that the dissolved oxygen level in this study can still meet the life needs of snakehead fish larvae. The pH of water during the study ranged from 5.46-6.10 in all treatments. Snakehead fish will experience optimal growth at pH values between 4-9 (Mukhflikhah, 2008). From this statement, it can be said that the pH of the water during the study was still in normal conditions for the life of snakehead fish larvae. Ammoniak (NH_3) levels in this study ranged from 0.04-1.1695 mg/L. The high levels of ammonia in this study were suspected of being uneaten by fish which resulted in high ammonia levels. Azka (2012) in Siska (2018) states that the increase in ammonia levels is closely related to the entry of easily biodegradable organic matter (protein) into the waters. The use of this type of feed affects water quality, which decreases allowing bacteria to grow and results in high larval mortality (Alawi, 2014). The high levels of ammonia in the water are thought to be uneaten feed and urine excreted by fish which causes high ammonia.

CONCLUSION

Provision of natural feed *Artemia* and *Rotifer* with different compositions did not significantly affect the survival of snakehead fish larvae with a value of 68.89-92.22%. The provision of natural feed *Artemia* and *Rotifer* with different compositions significantly affected the growth of fish body length and weight where optimal results were found in treatment A using a natural feed composition of 75% *Artemia* and 25% *Rotifer*.

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