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EFFECT OF SUPPLEMENTARY FEEDING OF GOLDEN SNAIL FLOUR (POMACEA ANALICULA) WITH DIFFERENT DOSES OF COMMERCIAL FEED ON MILKFISH (CHANOS CHANOS) AT RANDUSANGA WETAN BREBES REGENCY CENTRAL OF JAVA

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Abstract

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Milkfish (Chanos chanos) are plant eaters such as moss, klekap, and plankton (both vegetable and animal). This fish is also one of the economically important types of fish because it is widely consumed by the people of Southeast Asia, especially in Indonesia. Gold snail is an additional alternative material for animal protein source and can reduce or replace fish meal in feed formulations. This study aimed to determine the effect of adding gold snail flour to commercial feeds on the growth of milkfish fry and the best dose of gold snail flour in culling milkfish. The method used in this study is an experimental method with a completely randomized design (CRD). Consisting of 3 treatments and 1 control with 3 replications. treatment A: 100% golden snail flour, treatment B: 75% commercial feed + 25% gold snail flour, treatment C: 50% commercial feed + 50% gold snail flour, control: 100% commercial feed. The study's results showed that adding gold snail flour to commercial feed had a very significant effect on absolute individual weight growth, absolute length growth and food conversion ratio and had no significant effect on daily growth rate and relative growth rate. The best treatment was treatment B (75% coercive feed + golden snail flour 25%).

Keywords : milkfish (*Chanos chanos),* golden snail flour *(Pomacea analicula)* commercial feed, Randusanga Wetan, Brebes

1. INTRODUCTION

Whitefish (Chanos *Chanos)* is one of the brackish water commodities that has the potential to be cultivated, due to the high market demand, relatively stable prices and easy maintenance. In addition to having a high economic value, whitefish is a source of animal protein with a protein content of 24.18% and fat of 0.85% (Hafiludin, 2015).

Milkfish (*Chanos chanos*) is one type of economically important fish because the people of Southeast Asia widely consume it, especially in Indonesia (Fadlon et al., 2018) and is one of the sources of animal protein for the community because it has a good taste of meat at an affordable price with nutritional content such as omega-3 fatty acids in the form of EPA, ERA, and DHA (Kusumawati *et al.,* 2017).

Milkfish farming in Indonesia mostly applies traditional technology and a small part of it has applied semi-intensive technology (Zamroni *et al*., 2015). Whitefish include eaters of vegetation such as moss, klekap, and plankton (vegetable and animal). In the cultivation of whitefish is now used artificial fish food (pellets).

The total milkfish production in 2017 was around 700,894 tons; in 2018 and increased to 873,601 tons (Ministry of Marine Affairs and Fisheries, 2019). The demand for whitefish is always increasing, both for local consumption, bait fish for the tuna fishing industry, and export markets. The need for whitefish for export.

One important influencing factor for milkfish farming is feeding or feed availability. Providing high-quality feed can help increase the growth of whitefish and can reduce the mortality rate in fish. According to Nur (2016), feed is the largest production factor and reaches 50% or more of the total operational costs. Therefore, efforts to improve the nutritional composition and improve the efficiency of feed use need to be carried out in order to increase the production of cultivated products and reduce feed procurement costs. In the manufacture of feed, fish meal is the most widely used ingredient. Fishmeal is one of the best sources of protein for milkfish feed, but the price of fishmeal is relatively expensive. According to Farah (2016) one of the additional alternative feed ingredients as a source of animal protein is gold snail *(Pomecea canaliculata)*. According to Giffari (2018) gold snails have a protein content of around 54.10% while fish has a protein content ranging from 58-68%. Thus gold snail flour can be used as an alternative feed ingredient to reduce or replace fish meal in feed formulations.

2. METHOD

This research was conducted in Randusanga Wetan Village, Brebes Regency for 1 month, from August to September 2021

The design used in this study was a Complete Randomized Design (RAL) consisting of three treatments and one K (control), A, B, and C. Each treatment was repeated three times (Saeful, 2016), explained as follows:

A : 100% Mas Conch Flour
B : Commercial Feed 75% + Gold Conch Flour 25%
C : Commercial Feed 50% + Gold Conch Flour 50%

Each treatment will be carried out as many as 3 times. Data collection is carried out 4 times with a time interval of once every 7 days. The main parameters include absolute individual weight growth, relative growth, daily growth and absolute length growth in whitefish.

Feeding 4% of the total weight of whitefish is given in the first two weeks with a feeding frequency of 2 times per day, then this percentage of feed is then lowered to 3% of the total weight of whitefish in the third week to the last week or eighth week of maintenance, the frequency of feeding remains twice in one day (Malik, 2008). This is supported by the statement of Effendi (2004), the larger the size of the fish, the *smaller the feeding rate*. This feeding percentage is in accordance with the opinion of Ahmad *et al.,* (2002), that the range of feed quantities of 3-4% of the weight of biomass proves most profitable if the frequency of feeding is correct.

Data collection includes growth variables namely absolute individual weight growth, daily growth rate (DGR), relative growth rate (RGR), absolute length growth, *Survival Rate* (SR), and *Food Convertion Ratio* (FCR).

Absolute Individual Weight Growth

Growth is calculated based on the formula in the research of Mangkapa *et al,* (2017), namely:

$$W = W_t - W_0$$

Information:
W= Individual weight growth absolute in weight (grams)
W_t = Final weight (grams)
W_0 = Initial weight (grams)

Daily Growth Rate (DGR)

The daily growth rate is calculated based on the formula used by Mangkapa *et al.,* (2017) namely:

$$DGR = \frac{In\ Wt - In\ W0}{t} x100\%$$

Information:
DGR= Daily growth rate (%)
W_t = Weight of fish on the t-th day (grams)
W_0 = Fish weight at the beginning of the study (grams)
t = Maintenance time (days)

Relative Growth Rate (RGR)

The relative growth rate is calculated by the formula used by Takeuchi (1988):

$$RG = \frac{Wt - Wo}{Wo} \times 100\%$$

Information:
W_t = Weight of milkfish at the end of the study (g)
W_0 = Weight of milkfish at the beginning of the study (g)
RG= Relative Growth (%)

Absolute Length Growth

Absolute length growth is calculated based on the formula according to Zonnelveld *et al.,* (2019) namely :

$$Pm = L_t - L_0$$

Information:
Pm= Absolute length (cm)
L_t = Final Length (cm)
L_0 = Initial Length (cm)

***Survival Rate* (SR)**

The survival rate is calculated based on the formula used by Dewi *et al.,* (2019), namely:

$$SR = \frac{Nt}{N0} x100\%$$

Information:
SR= Fish fry dilution rate (%)
Nt= Number of fish fry at the end of the study (tail)
N0= Number of fish fry at the beginning of the study (tail)

***Food Convertion Ratio* (FCR)**

The calculation of FCR refers to the formula of Tacon (1987) as follows :

$$FCR = \frac{F}{Wt - Wo}$$

Information:
FCR = *Food Conversation Ratio*
Wt = Biomass weight of the test animal at the end of the study (gr)
Wo = Biomass weight of test animals at the beginning of the study (gr)
F = Amount of fish feed consumed during the study (gr)

Data Analysis

The results of the study obtained were analyzed using ANOVA (*analysis of variance).* The ANOVA (*analysis of variance)* test is widely used in experimental research. The principle of the ANOVA test is to compare variations of three or more sample treatments. The ANOVA test also compares the mean value of the treatment (Aprilia *et al.,* 2018). It was then done with the Duncan Test to see the best treatment.

3. RESULT AND DISCUSSION

The results of the study on the addition of gold snail flour (*P. analicula*) to commercial feed against the logging of bendeng fish (*Chanos chanos*) include absolute individual weight growth rate, daily growth rate (DGR), relative growth rate (RGR), absolute length growth, *Survival Rate* (SR), and *Food Convertion Ratio* (FCR)

1. Absolute Individual Weight Growth

The result of absolute individual weight growth in whitefish fry (Chanos chanos) with the influence of additional feeding of gold snail flour (*Pomancea analicula*) with different doses against the logging of Whitefish *(Chanos chanos)* .

Table 1. Absolute Individual Weight Growth

Deuteronomy	**Absolute Weight (gr)**			
	A	**B**	**C**	**K**
1	0,4	1	0,8	0,8
2	0,6	1	0,9	0,6
3	0,5	0,9	0,7	0,7
Sum	**1,5**	**2,9**	**2,4**	**2,1**
Average	**0,5**	**0,97**	**0,8**	**0,7**
±SD	**±0.10**	**±0.06**	**±0.10**	**±0.10**

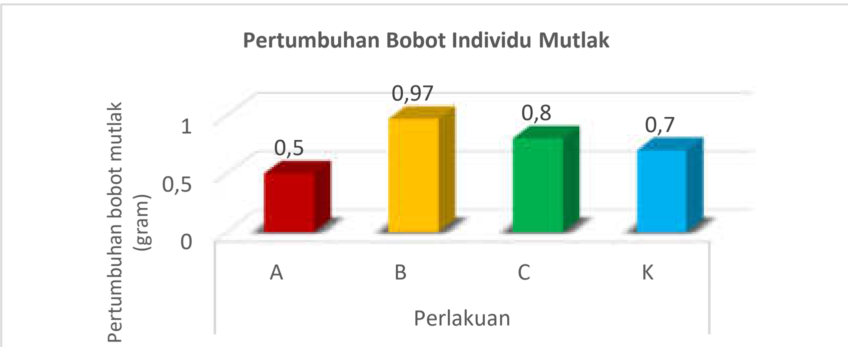

Figure 1 the results of the normality test

Based on the results of the normality test on absolute Individual weight growth data (grams) with the Shapiro-Wilk test, the Sig value was obtained. 1, this shows that the data has a normal distribution and in the homogeneity test produces a Sig. value of 0.931 > 0.05, this indicates that the data is homogeneous. The results of the One Way ANOVA Test produced a Sig. value of 0.002 < 0.01 which shows that it has a very noticeable effect on the growth of the weight of milkfish fry *(Chanos chanos).*

Further tests of the double comparison of Tukey and Ducan showed that treatment B (additional feed of gold snail flour (*Pomacea analicula*) at a dose of 75% commercial feed and 25% gold snail flour) was the best treatment for the growth of absolute individual weight of whitefish fry *(Chanos chanos)* with an average value of 0.97 grams.

2. Daily Growth Rate (DGR)

Daily growth rate of whitefish fry (*Chanos-chanos*) cultivated by additional feeding of goldnail flour *(Pomancea analicula)* at different doses

Table 2 Daily growth rate of whitefish fry (*Chanos-chanos*)

Deuteronomy	Daily Growth Rate (%)			
	A	B	C	K
1	5,7	8,9	7,8	7,8
2	6,9	6,4	5,7	6,9
3	0,7	7,4	7,5	7,4
Sum	**13,3**	**22,7**	**21**	**22,1**
Average	**4,3**	**7,6**	**6,9**	**7,4**
±SD	**±3.29**	**±1.26**	**±1.12**	**±0.45**

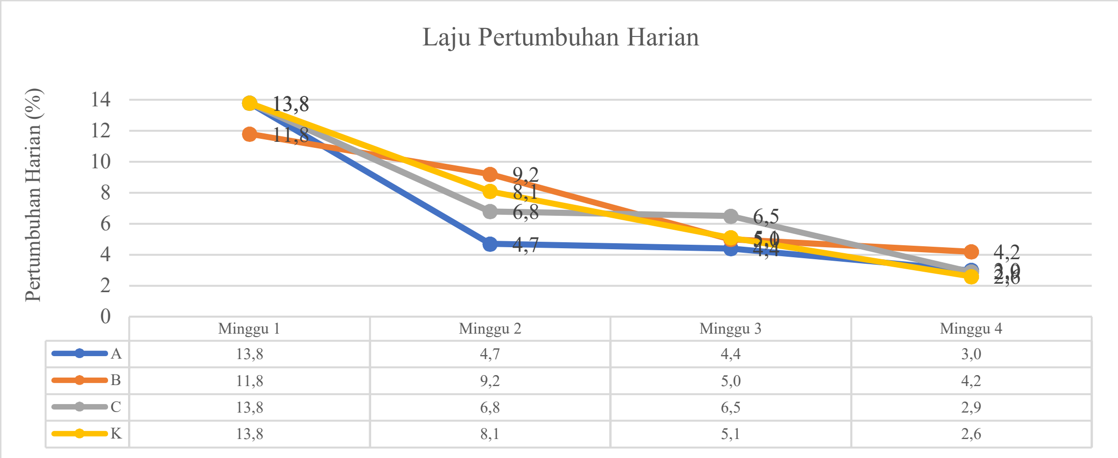

Figure 2 the Normality and Homogeneity Test on daily growth rate (grams) data

In accordance with the results of the Normality and Homogeneity Test on daily growth rate (grams) data (Appendix 5) shows that the data is normal (Sig. 0.630 > 0.05) and has the same variety of data (Homogan) Sig. 0.450 > 0.05. Meanwhile, the One Way ANOVA Test produces a sig value. 0.487 > 0.05 shows that there is no real impact.

3. Relative Growth Rate (RGR)

Relative growth rate (%) in whitefish fry (*Chanos chanos*) cultivated by additional feeding of gold snail flour *(Pomancea analicula)* at different doses

Table 3 Relative growth rate (%) in whitefish fry (*Chanos chanos*)

Deuteronomy	Relative Reef (%)			
	A	B	C	K
1	4	10	8	8
2	6	5	4,5	6
3	5	9	7	7
Sum	15	24	19,5	21
Average	**5**	**8**	**6,5**	**7**
±SD	**±1.00**	**±2.65**	**±1.80**	**±1.00**

Figure 3 Normality Test on relative growth rate data

Based on the results of the Normality Test on relative growth rate data (%) in the Shapiro-Wilk test, a Sig. 1 > 0.05 was obtained, this shows that the data has a normal distribution. The next test is the Homogeneity Test and produces a Sig. value of 0.169 > 0.05 means that the relative growth rate has the same data (Homogeneous). One Way ANOVA Test results, Sig. values 0.280 > 0.05 show that the data has no real effect.

4. Absolute Length Growth

Growth of Absolute Length (cm) of whitefish fry (*Chanos-chanos*) cultivated by additional feeding of gold snail flour *(Pomancea analicula)* at different doses.

Table 5 Growth of Absolute Length (cm) of whitefish fry (*Chanos-chanos*)

Deuteronomy	Absolute Length Growth (cm)			
	A	B	C	K
1	2,1	3,1	2,9	2,6
2	2,5	3,2	3	2,5
3	2,3	3	2,8	2,5
Sum	**6,9**	**9,3**	**8,7**	**7,8**
Average	**2,3**	**3,1**	**2,9**	**2,53**
±SD	**±0.20**	**±0.10**	**±0.10**	**±0.06**

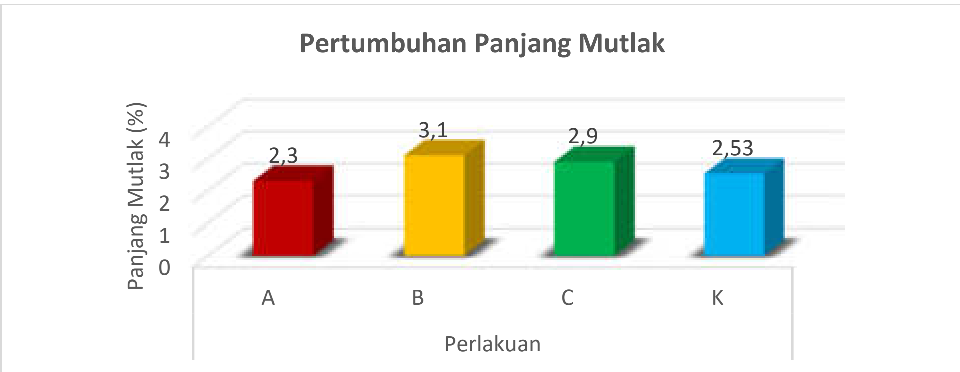

Figure 4 Normality Test on absolute length (cm) growth data

Based on the results of the Normality Test on absolute length (cm) growth data in the Shapiro-Wilk test, a Sig. 1 > 0.05 was obtained, this indicates that the data has a normal distribution. The next test is the Homogeneity Test and produces a Sig. value of 0.494 > 0.05 which means homogeneous data. Have the same variety of data (Homogeneous). The results of the One Way ANOVA Test resulted in a value of 0.000 < 0.01, indicating that the effect is very real.

5.*Survival Rate* (SR)

Survival rate (%) of whitefish fry (*Chanos-chanos*) cultivated by additional feeding of gold snail flour *(Pomancea analicula)* at a dosage.

Table 6 Survival rate (%) of whitefish fry (*Chanos-chanos*)

Deuteronomy	Survival Rate (%)			
	A	B	C	K
1	100%	100%	100%	100%
2	100%	100%	100%	100%
3	100%	100%	100%	100%
Sum	**100%**	**100%**	**100%**	**100%**
Average	**100%**	**100%**	**100%**	**100%**
±SD	**±0.00**	**±0.00**	**±0.00**	**±0.00**

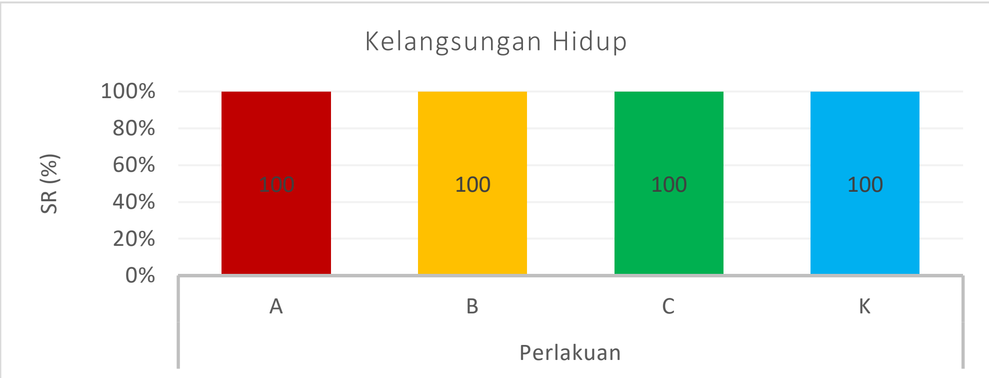

Figure 5 Diagram of Survival rate (%) of whitefish fry (*Chanos-chanos*)

6.*Food Convertion Ratio* (FCR)

*Food Convertion Ratio (*FCR) of milkfish fry (*Chanos-chanos*) cultivated by supplementary feeding of gold snail flour *(Pomancea analicula)* at different doses

Table 7 *Food Convertion Ratio (*FCR(

Deuteronomy	***Food Convertion Ratio* (FCR)**			
	A	B	C	K
1	0,84	0,34	0,42	0,39
2	0,56	0,30	0,37	0,56
3	0,67	0,37	0,48	0,48
Sum	**2,07**	**1,01**	**1,27**	**1,43**
Average	**0,69**	**0,33**	**0,42**	**0,48**
±SD	**±0.14**	**±0.04**	**±0.06**	**±0.09**

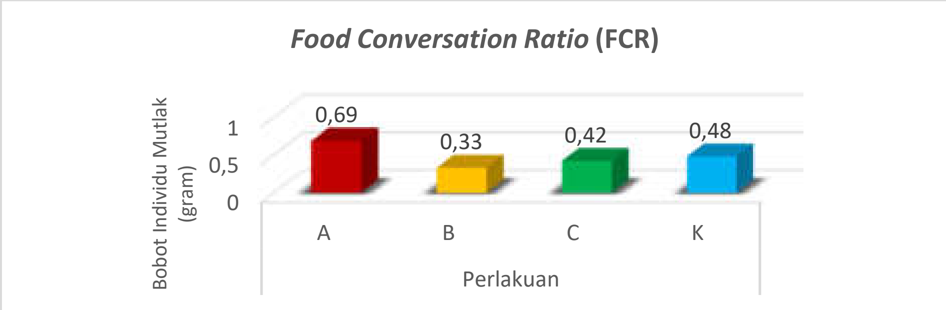

Figure 6 Diagram *Food Convertion Ratio (*FCR

The data from the study from the conversion of Milkfish feed *(Chanos chnaos)* showed that the attributable data was normal with a Sig. value of 0.765 > 0.05 and was homogeneous with a Sig. value of 0.273 > 0.05. The results of the fingerprint test (ANOVA) are presented in Appendix 8. showed that the additional feeding of gold snail flour (*Pomacea analicula*) with different doses in commercial feed had a very noticeable effect (Sig. 0.007 < 0.01) on feed conversion in whitefish.

DISCUSSION

1.Growth

Whitefish growth is best at growth (absolute weight growth, daily growth rate, relative growth rate, and absolute length growth). The study obtained the treatment that produced the best growth for whitefish was in treatment B (75% commercial feed + 25% gold snail flour) with an absolute weight value of 0.97 grams. Growth can be identified by a process of growth in the weight and length of an organism over a certain period of time (Mulqan *et al.,* 2017).

The absolute individual weight of whitefish fry increased during the study. In treatment A (100% gold snail flour supplementary feed) showed an absolute individual weight of 0.5 g, treatment B (25% gold snail flour supplementary feed and 75% commercial feed) the average absolute individual weight was 0.97 g, treatment C showed an average absolute individual weight of 0.8 g, while the control had an average of 0.7 g. So that the addition of additional feed of gold snail flour to commercial feed had an influence on the absolute individual weight of milkfish fry on each treatment. The results of the One Way ANOVA test showed that the absolute individual weight data of milkfish fry was significantly different in each treatment. This is possible because of the significant difference in the composition of the fat and protein content contained in the feed treatment, especially gold snail flour with a total protein content in gold snails of 54% and 2.8% fat (Laboratory of Feed Science and Technology, University of North Sumatra, 2016) given. This is in accordance with the opinion (Prastiwi *et al.,* 2016) protein and fat are nutritional components that are needed by fish fry to grow well. Furthermore, it is said by (Prastiwi *et al*., 2016), protein functions as a source of energy, repairing or maintaining growth tissue and as a support for growth. Fat is one of the largest energy contents that also functions as a source of energy, supporting growth in helping metabolic processes in the body of fish fry.

Obtained Absolute length growth that varies with each treatment. The highest absolute length growth in this study was found in treatment B where the average value was 3.1 cm. This can be caused because the appropriate amount of feed given is also supported by the addition of the appropriate gold snail flour. This is in accordance with the opinion (Saragih, 2018) which states that the growth of fish given different gold snail flour has a very noticeable influence on the growth of length and weight. The increase in fish is also thought to be due to the influence of protein content in gold snail flour with the right dose. Feed with the addition of the right dose of gold snail flour can affect the growth rate of fish length (Umar, 2021).

The highest length growth in treatment B is also thought to be due to the protein content in each treatment is different so that the length growth obtained also has different results. This is in accordance with the opinion (Edo, 2019) which says that the treatment of adding protein levels in all treatments is able to spur the growth of tilapia in terms of increasing the length of the fish's body.

In *the Food Convertion Ratio*, the treatment with the lowest feed conversion is treatment B with an average of 0.33, it can be interpreted that treatment B is the best because the use of feed for fish growth is very efficient, it is in accordance with (Sandri, 2018) which states that the low feed conversion value means that the quality of feed given is good and can be used well by fish, Meanwhile, if the feed conversion value is high, it means that the quality of the feed given is not good.

The daily and relative growth rate increased during the study. However, the One Way ANOVA test showed that the daily growth rate data with the Sig value obtained by Sig. 0.487 > 0.05 and the growth rate relative to the Sig. value of 0.280 > 0.05, which shows that in both the data both daily growth and relative growth have no real difference. This is possible because the size of milkfish fry is relatively small and this is supported by the results of research from Ismi (2007) which states that a smaller body size causes relatively slower fish growth. Another thing that can be a trigger is that the combination of feed mixing in the treatment has not been in a significant range for milkfish feed so that the difference in daily growth data and relative growth between treatments is relatively insignificant. According to Khairuman (2015) the growth rate of fish is influenced by the type and quality of feed that is of good quality suitable for mixing, sufficient amount of feed, favorable environmental conditions and it is certain that the growth rate of fish will be fast.

Feed is a very decisive factor in the efficiency and effectiveness of fish fry growth in each feed contained ingredients such as: proteins, carbohydrates, fats, vitamins, minerals. Therefore, the difference in nutritional content in each feed results in different fish growth as well, this is supported by the statement of Prastiwi *et al.,* (2016) The nutritional content in each feed has advantages in a certain substance but also has disadvantages in other substances.

Based on the proximate tests that have been carried out, gold snail flour has a protein content of 59.44% (the highest compared to protein content in other treatments) but the fat content is only 2.49%, commercial feed has a protein content of 34.31% (low) and fat content is 4.08%, gold snail flour is 25% + 75% commercial feed has a protein content of 43.17% and fat content of 3.81% and gold snail flour 50% + 50% commercial feed has a protein content of 40.25% and fat content of 3, 35%. The utilization of feed protein by fish is not optimal so that an energy source from fat is needed, so that protein can be used more optimally for growth, the total fat content in the feed will determine energy utilization so that the efficient use of fat as an energy source can increase protein efficiency for growth, therefore a balance is needed between total fat and protein (Munisa *et al.,* 2015).

2.*Survival Rate* (SR)

The *Survival rate* (SR) is the percentage of live fish at the end of the study compared to the number of fish at the beginning of rearing. Factors affecting fish survival are stocking density, feeding, disease and water quality that involves temperature, ammonia l, nitrite, dissolved oxygenand water pH. (Fahrizal, 2017)

The survival rate is influenced by biotic factors namely competition, parasites, age, predators, human density and handling, while abiotic factors are physical and chemical conditions in the waters. High density will result in a decrease in water quality, especially dissolved oxygen content and ammonia concentration. Decreased water quality can cause fish stress, even if the quality decline has exceeded the fish tolerance limit, it can result in death (Arif, 2019).

The survival rate of whitefish fry (chanos *chanos)* during the study was 100%. *Survival rate* does not differ markedly in the feed treatment given both K, A, B, and C, it is suspected because the nutritional needs of the feed can be met for each treatment and are supported by good water quality. This opinion is supported by Arif (2019) who said that fish raised in low densities will be more aggressive, while fish raised in high density will be slow in growth due to the high level of competition and the large number of metabolic remains accumulated in water media. The survival rate of whitefish fry during maintenance is relatively good, this is in accordance with the statement (Mulyani *et al.,* 2014) fish survival of more than 50% is classified as good and below 30% is categorized as not good.

3.Water Quality

Water quality during maintenance fluctuates but is still within the normal range which is good for supporting the cultivation of whitefish (*Chanos chanos)*. Water quality is one of the supporters of the growth and survival of fish. Water quality during maintenance can be seen in Appendix 11. Aquatic organisms have a certain temperature range (upper and lower limits) that are favorable for their growth. Rising temperatures lead to faster metabolism and respiration of aquatic animals, resulting in increased oxygen consumption (Monalisa, 2010). The temperature in the milkfish study ranged from 28-33 ºC. The temperature range is still good for milkfish farming because it is still ideal like the temperature in the waters, which is 30-35 ºC (Faisyal *et al.,* 2016).

The magnitude of the acidity of a body of water is the magnitude of the concentration of hydrogen ions contained in the wawaterIn nature, the degree of acidity ranges from 4-9 which is influenced by carbon dioxide and chemical compounds of an acidic nature. Waters with pH below 4 and above 11 will cause death in fish. The pH value in the milkfish breeding medium (*Chanos chanos)* ranges from 7.3-8.5. According to Juniarta *et al* (2016) the optimum pH value for nitrification in the maintenance of whitefish fry under pH conditions ranges from 8-9.

Whitefish can be kept and can still survive in ponds that in the rainy season whose salt content is below 10 0/00 and in the dry season above 30 0/00, but in general whitefish prefer salinity between 20 and 25 0/00 (Munir, 2016) and salinity in this study is 39-40 $^{0}/_{00,}$

According to (Irawan et al., 2021) the good ammonia content for whitefish is <0.1 mg / L and in this study an ammonia value of 0.00-0.185 mg / l was obtained, while the optimal nitrite content was 0.009 - 3.5 mg / L (Juniarta et al., 2016) and in the study a nitrate value of 0.000-0.007 ppm was obtained.

4. CONCLUSION

The treatment has a marked effect on absolute weight growth and absolute length growth rate with the best treatment being B treatment (75% commercial feed + 25% gold snail flour). The treatment had no noticeable effect on the daily growth rate, relative growth rate and Survival Rate. Water quality during research is feasible to carry out milkfish farming.

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