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EFFECT OF PROBIOTICS ADDED MOLASSES IN FEED ON GROWTH AND SURVIVAL OF MILKFISH (*Chanos chanos*)

Pengaruh Probiotik Ditambahkan Molase Pada Pakan Terhadap Pertumbuhan dan Kelangsungan Hidup Ikan Bandeng (*Chanos chanos*)

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ABSTRACT

Chanos chanos is classified as a type of cultured fish with great economic value because it plays an important role in meeting the nutritional needs of the community and contributes in improving the welfare of life. Giving probiotics is one way that can be used to overcome environmental pollution. Probiotics themselves are living microorganisms that function to maintain the stability of the digestive system in the intestine. Molasses acts as a source of nutrients for probiotic bacteria and is expected to support the increase in the effectiveness of its population as bioremediation agents can be more optimal. This study aims to evaluate the effect of the addition of probiotics combined with molasses in feed on the growth and survival rate of milkfish (Chanos chanos). This research was conducted from October 10 to December 7, 2024 at Tadang Palie, Kec. Cempa. Pinrang Regency, South Sulawesi with a duration of 60 days. This research was conducted using a completely randomized design (CRD), which involved four different treatments and each treatment was repeated three times. The results showed that the effect of probiotics added to molasses in feed had a significant effect on the growth of absolute weight, specific, absolute length of milkfish. For absolute weight growth, the highest value was in treatment B (7.42 grams), the highest value of specific weight was in treatment B (9.86), the highest value of absolute length was in treatment B (9.4 cm), while survival and FCR had no significant effect on milkfish. The highest survival rate was found in treatment A (87%), and the best FCR value in treatment B (3.08).

Keywords: Chanos chanos, Growth, Probiotics, Survival

ABSTRAK

Ikan bandeng tergolong dalam jenis ikan budidaya yang bernilai ekonomi besarkarena berperan penting dalam mencukupi kebutuhan gizi masyarakat serta berkontribusi dalam peningkatan kesejahteraan hidup. Pemberian probiotik merupakan salah satu cara yang dapat digunakan untuk mengatasi pencemaran lingkungan. Probiotik sendiri merupakan mikroorganisme hidup yang berfungsi menjaga kestabilan sistem pencernaan dalam usus. Molase berperan sebagai sumber nutrisi bagi bakteri probiotik dan diharapkan dapat mendukung peningkatan efektivitas

populasinya sebagai agen bioremediasi dapat lebih optimal. Penelitian ini bertujuan untuk mengevaluasi pengaruh penambahan probiotik yang dikombinasikan dengan molase dalam pakan terhadap pertumbuhan dan tingkat kelangsungan hidup ikan bandeng (*Chanos chanos)*. Penelitian ini dilaksakan pada tanggal 10 Oktober sampai 7 Desember 2024 di Tadang Palie, Kecamatan Cempa, Kabupaten Pinrang, Sulawesi Selatan dengan lama penelitian 60 hari. Penelitian ini dilaksanakan dengan menggunakan desain Rancangan Acak Lengkap (RAL), yang melibatkan empat perlakuan berbeda dan setiap perlakuan diulang sebanyak tiga kali. Hasil penelitian didapatkan bahwa pengaruh probiotik ditambahkan molase pada pakan berpegaruh nyata terhadap pertumbuhan berat mutlak, spesifik, panjang mutlak ikan bandeng. Untuk pertumbuan berat mutlak nilai tertinggi pada perlakuan B (7,42 gram), nilai tertinggi berat spesifik pada perlakuan B (9,86), nilai tertinggi panjang mutlak pada perlakuan B (9,4 cm), sedangan pada kelangsungan hidup dan FCR tidak berpengaruh nyata pada ikan bandeng. Kelangsungan hidup tertinggi ditemukan pada perlakuan A (87%), dan nilai terbaik FCR pada perlakuan B (3,08).

Kata Kunci: Ikan Bandeng, Kelangsungan Hidup, Pertumbuhan, Probiotik

INTRODUCTION

As a country with thousands of islands, Indonesia has vast opportunities and potential to be developed, one of which is in the development of the fisheries sector. This sector is able to make a significant contribution to state revenue through its production results. In the second quarter of 2012, fisheries cultivation results were recorded at 10.89 million tons, which is 73.28% of the annual target. Meanwhile, the Government is targeting the achievement of aquaculture production in 2013. to increase to 14.8 million tons (Ministry of Maritime Affairs and Fisheries, 2012).

Milkfish cultivation activities in Indonesia have been carried out for a long time by farmers, both with traditional methods and intensive systems. Milkfish (*Chanos chanos* Forskal) is included in the ranks of the main commodities in the fisheries cultivation sector in Indonesia. This species is known to have significant tolerance to a number of environmental conditions, so it is relatively easy to maintain and is in great demand by farmers (Rakhfid et al., 2020).

Feed has a crucial role in supporting the success of fish farming, both in the form of natural and artificial feed. The availability of sufficient and quality feed greatly influences the success of the cultivation process, especially in the growth and development phase of fish. If fish get adequate feed and good nutritional content, this will support accelerated growth and strengthen the fish's immune system against disease and parasite attacks. In addition, the type of feed used also has a major contribution in determining the quality of fish cultivation results (Maloho et al., 2016). This problem is one of the obstacles often faced in fish cultivation activities. Maximum fish development is highly dependent on the provision of appropriate feed. Artificial feed formulated with complete nutritional content can meet the energy needs of fish and help maintain the balance of their nutritional intake (Elrifadah, 2021).

Probiotics are living microorganisms that are used as feed supplements and have a positive impact on health, both in humans, animals, and fish, by maintaining the balance of microflora in the digestive tract. The types of microorganisms classified as probiotics generally come from the lactic acid-producing group, especially Lactobacilli and Bifidobacteria. Probiotics are useful in breaking down metabolic compounds in aquatic environments, so that probiotics can act as bioremediation agents, biological controllers (biocontrol), immune system stimulants (immunostimulants), and support the growth process of cultivated organisms (Seran et al., 2020).

Lactobacillus casei is a bacterium that is able to lower the pH of the environment through the fermentation process of sugar into lactic acid. This more acidic environment then inhibits the development of several types of pathogenic bacteria. In addition, the role of *Lactobacillus casei* in the immune system is reflected in its ability to modulate the immune response, such as increasing phagocytosis activity, stimulating antibody production, and strengthening the secretion of cytokines that function in eliminating pathogenic bacteria (Hardisari et al., 2016). *Saccharomyces cerevisiae* is a type of yeast that is popularly known for its high efficiency in converting sugar into ethanol. This microorganism, which is also popularly known as baker's yeast, has been widely studied regarding its metabolic pathways. The main results of its metabolic activity include ethanol, carbon dioxide (CO_2), and water, although other metabolite compounds are also formed in small amounts. This yeast is classified as a facultative anaerobic organism, which is able to adapt to both oxygen and oxygen-free conditions. Optimal growth of *Saccharomyces cerevisiae* occurs at a temperature of around 30°C and at a pH of 4.0 to 4.5. During the fermentation process, heat is released; without an adequate cooling system, the temperature will increase and can disrupt the continuity of the fermentation process (Khodijah & Abtokhi, 2015).

Molasses is waste produced from the sugar cane production process. As a source of nutrients for probiotic bacteria, molasses is targeted to be able to increase the population of these bacteria so that their effectiveness as bioremediation agents can be maximized. The addition of molasses as a probiotic is done to maximize the performance of probiotics, which function as a carbon source. Carbohydrates are utilized by bacteria and microorganisms as a source of energy and carbon. These two elements, together with nitrogen found in water, will be used in the stages of protein formation that play a role in the creation of new cells (Sartika et al., 2012).

METHODS

Time and Place

This research was conducted on October 12 - December 10, 2024 in Cempa District, Pinrang Regency, South Sulawesi.

Tools and Materials

This research was conducted using various tools and materials. The equipment used includes hapa nets, wooden sticks, fish traps, scissors, cellphone cameras, digital scales, feed containers (jars), thermometers, pH meters, DO meters, refractometers, rulers, and stationery. On the other hand, the materials used include milkfish seeds (nener) with an average length of 0.8 cm and a weight of around 0.02 grams, PF 500 pellet feed, probiotics, and molasses.

Research Design

This research uses a Completely Randomized Design (CRD) method with four treatments, each of which is repeated three times. Samples were taken in full on days 0, 14, 28, 49, and 60. The treatments tested included variations in artificial feeding as follows:

A = Use of 10 mL of EM4 probiotics with 20 mL of molasses in 1 kg of feed.
B = Use of 15 mL of EM4 probiotics with 20 mL of molasses in 1 kg of feed.
C = Use of 20 mL of EM4 probiotics with 20 mL of molasses in 1 kg of feed.
D = Control (without probiotics)

The dose used refers to previous research, namely Linayati et al. (2021), namely the growth rate performance of milkfish (*Chanos chanos*) given feed enriched with probiotics

Preparation of Research Containers

Preparation of media or maintenance containers using nets as maintenance containers. The nets used have a rectangular shape with dimensions of 100 cm x 100 cm and a total of 12 plots. Each waring plot is given a randomly determined treatment code from treatment A1 to treatment D3 that has been made. Furthermore, milkfish seeds with an average dimension of 0.8 cm and a weight of around 0.02 grams, act as test organisms in this study. Before being placed in the research container, the milkfish seeds are acclimatized and fasted for one day. Each research container is filled with 10 milkfish seeds.

Mixing Probiotics and Molasses in Feed

The process of mixing probiotics and molasses in feed through the process of mixing probiotics and molasses into water, and after that the mixture of probiotics and molasses is left for 3 hours in a spray container that has been labeled with treatment after that the feed is sprayed with a mixture of probiotics and molasses into the test feed that will be given to milkfish after the feed has been sprayed then the feed is dried at room temperature without sunlight until dry and after the feed is dry the feed is stored in a jar container that has been labeled with treatment after that it is given to the milkfish test animal.

Maintenance of Test Fish

The fish that became the object of the study were milkfish seeds, with an average size of 0.8 cm in length and 0.02 grams in weight. Before being spread, the fish seeds from the beginning of maintenance to the end of maintenance were acclimatized for 1 day to prevent the fish from experiencing stress. The fish were maintained for 60 days by sampling on days 7, 14, 21, 21, and 60.

Research Parameters

1. Survival

The survival rate of milkfish (*Chanos chanos*) throughout the study, data related to milkfish (*Chanos chanos*) were obtained through calculations using a certain formula (Rakhfid et al., 2020) as follows:

$$SR = \frac{Nt}{No} \times 100$$

Where:
SR : Survival Rate (%)
Nt : Quantity of fish when maintenance ends
No : Quantity of fish at the beginning of maintenance

2. Absolute Length Growth

Absolute length growth can be obtained by calculating it using the Effendi (1979) formula in (Bakti Madjading et al., 2022):

$$L = Lt - L0$$

Where:
L : Absolute length growth (cm)
Lt : Final length (cm)
L0 : Initial length (cm)

3. Absolute Weight Growth

To calculate the absolute weight growth indicator in milkfish (*Chanos chanos*), the following formula was used (Linayati et al., 2021):

$$W = Wt - W0$$

Where:
W : Absolute weight growth (g)
Wt : Fish body weight at the end of the study (g)
W0 : Fish body weight at the beginning of the study (g)

4. Specific Growth Rate

During the study, the daily growth rate of milkfish (*Chanos chanos*) was calculated using a specific formula (Rakhfid et al., 2020) as follows:

$$SGR = \frac{(\text{Ln } Wt - \text{Ln } Wo)}{T} \text{ x } 100$$

Where:
SGR : Specific growth rate (%/day)
W0 : Average fish weight at the beginning of the study (g)
Wt : Average fish weight at the end of the study (g)
T : Maintenance time (Days)

5. Feed Conversion Ratio (FCR)

FCR is a ratio that shows the amount of feed needed. According to Mustofa, Hastuti, & Rachmawati (2018), the feed conversion ratio (FCR) is calculated based on the following formula:

$$FCR = \frac{F}{(Wt + D) - Wo)}$$

Where:
F : weight of feed eaten
Wt : fish biomass at the end of maintenance (g)
D : weight of dead fish (g)
Wo : fish biomass at the beginning of maintenance (g).

6. Water Quality Measurement

The water quality parameters observed include temperature, pH, dissolved oxygen (DO), and salinity. Temperature was measured using a thermometer, pH using a pH meter, DO using a DO meter, while salinity was determined using a refractometer. Temperature and pH measurements were carried out twice a day at 07.00 and 17.00 WITA, while DO and salinity were measured only on days 0, 15, 30, 45, and 60 during the research period.

Temperature is one of the important parameters in aquatic ecosystems because it affects the speed of metabolic processes in fish. Pond temperature measurements can be carried out using a stem thermometer. The measurement procedure is carried out by dipping about three-quarters of the thermometer into the water, then waiting a few minutes until the temperature scale stabilizes. When taking measurements, it is important not to touch the thermometer stem with your hands, because body heat can affect the results of water temperature measurements.

Dissolved oxygen or oxygen solubility is the amount of oxygen dissolved in water. This oxygen source is produced through photosynthesis by phytoplankton or through diffusion from the air into the water. To measure the level of dissolved oxygen, an electronic device called a DO meter can be used. The use of a DO meter to measure dissolved oxygen has proven to be easier and more efficient and is widely used for various types of water such as water with high turbidity and color.

pH is a measure that indicates the level of acidity or alkalinity of a substance, so it is often referred to as the degree of acidity. In fish farming activities, the stability of water pH is

very important because it is one of the main indicators in assessing the quality of water that is suitable for supporting the survival of fish. The pH value can be determined through various methods, such as using litmus paper, pH paper, or digital tools such as pH meters. The neutral pH value is marked with the number 7; if the pH exceeds 7, the substance is alkaline, while if the pH is less than 7, the substance is acidic. The pH scale starts from 0 which indicates the highest level of acidity, and ends at 14 which indicates the highest level of alkalinity.

Data Analysis

The data from the research variables are then processed statistically using the analysis of variance (ANOVA) method to determine whether the treatment given has an effect on the variables studied. In order to identify variations between treatments in more detail, a further test was used in the form of the Duncan test with a confidence level of 95%, the analysis was carried out using SPSS software.

RESULTS

Absolute Weight Growth

Data from observations of total weight growth of milkfish (*Chanos chanos*) given EM4 probiotics mixed with Molasses in feed during the maintenance process during the study are shown in the figure below.

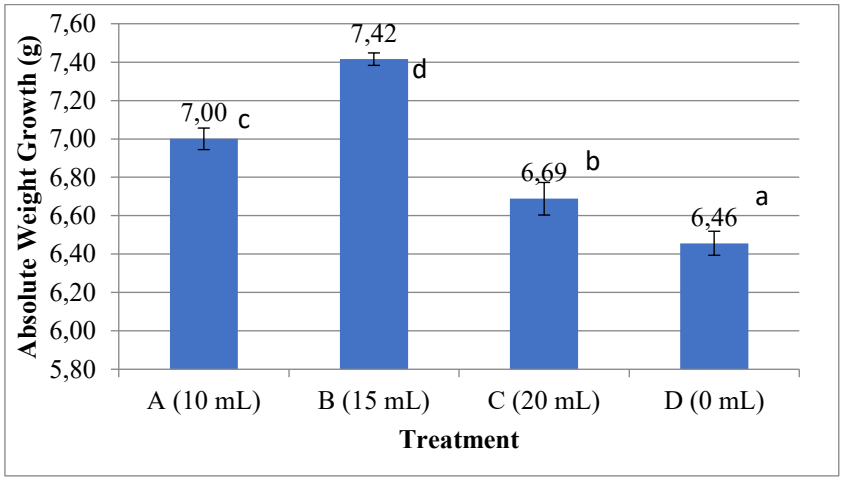

Figure 1. Absolute Weight Growth

Specific Weight Growth

Daily growth rate is a measure used to determine the increase in weight or length of an organism per day. In fish farming, daily growth rate is important for monitoring the health and development of fish. Factors such as probiotic administration, feed quality, environmental conditions, and good cultivation management can affect the daily growth rate of fish. Data on the daily growth rate of milkfish seeds with the effect of probiotics added with molasses in feed during maintenance can be seen in the following figure:

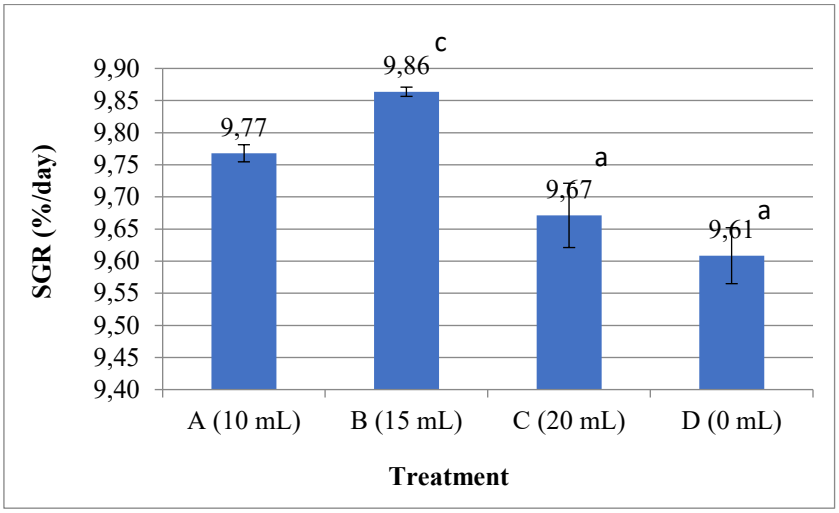

Figure 2. Specific Weight Growth

Absolute Length Growth

The results of observations of absolute length growth of milkfish seeds (*Chanos chanos*) given EM4 probiotics mixed with Molasses in feed during maintenance can be seen in the following figure.

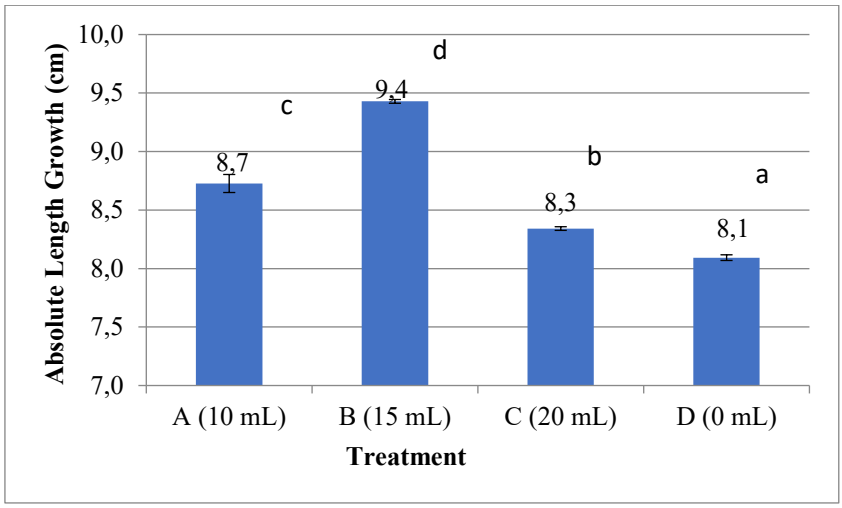

Figure 3. Absolute Length Growth

Survival Rate

The results of observations regarding the survival of milkfish (*Chanos chanos*) seeds with feed supplemented with EM4 probiotics and molasses during maintenance can be presented in the following figure.

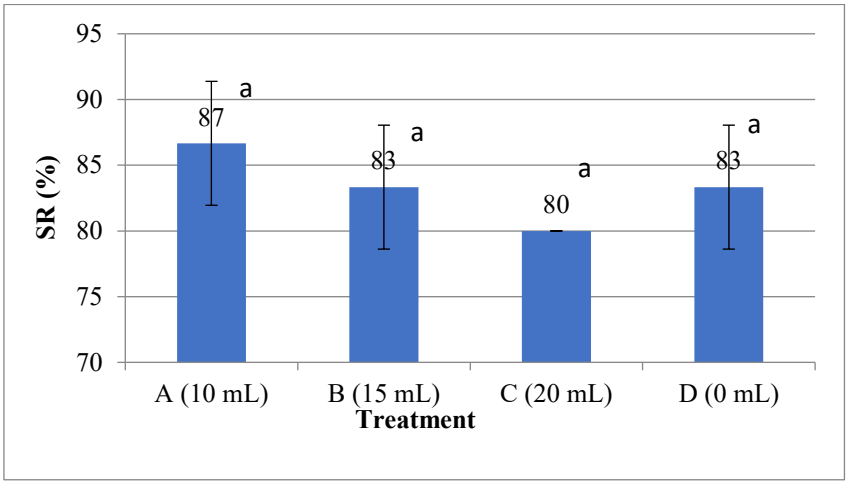

Figure 4. Survival Rate

Feed Conversion Ration (FCR)

The results of observations of the FCR of milkfish (*Chanos chanos*) seeds given EM4 probiotics with a mixture of Molasses in the feed during maintenance can be seen in the following figure.

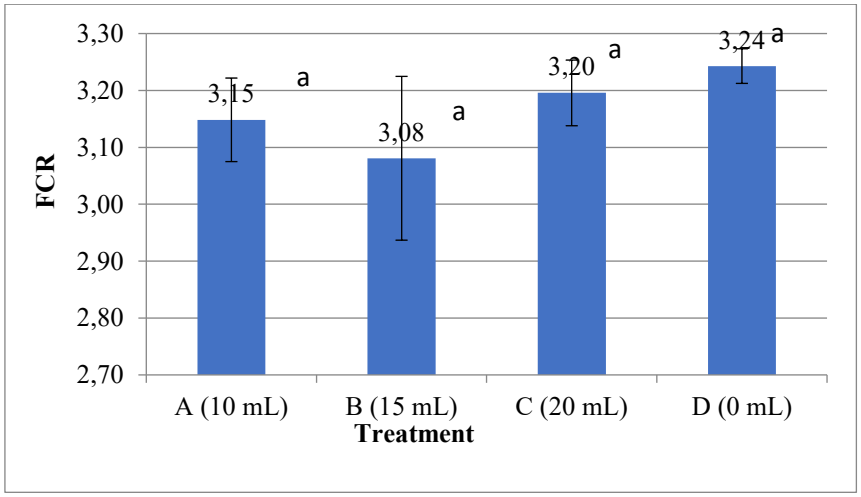

Figure 5. Feed Conversion Ratio

Water Quality

This study observed a number of water quality parameters such as temperature, acidity level (pH), salt content (salinity), and dissolved oxygen content (DO). The range of measurement results for each parameter is shown in the following table.

Table 1. Data on Water Quality Measurements

No.	Time	Water Quality		Optimal Value (SNI 01.6148.1999)
1	07.00 16.00	pH	7.2-8.3 8.2-9.0	6-9
2	07.00 16.00	Temperature (ºC)	28-33 29-37	30-35
3	07.00 16.00	DO (mg/L)	6.2-8.2 7.4-9.2	>5
4	07.00 16.00	Salinity (ppt)	14-25 15-25	5–35

DISCUSSION

Based on the graph in Figure 1, it can be seen that the highest average absolute weight gain in milkfish came from the treatment given probiotics with a dose of 15 mL/kg feed (treatment B), which was 7.42 grams. Furthermore, treatment with a dose of 10 mL/kg (treatment A) resulted in growth of 7.00 grams, followed by treatment of 20 mL/kg (treatment C) of 6.69 grams. The lowest value was recorded in the treatment without the addition of probiotics (0 mL/kg, treatment D), which was 6.46 grams. The results of the analysis using ANOVA showed that the addition of probiotics mixed with molasses in the feed had a significant effect (Sig <0.05) on the absolute weight gain of milkfish when compared to the control treatment. Therefore, further tests were carried out using the Duncan method to determine the most effective treatment. The results of the test showed that all treatments had statistically significant differences between groups.

The higher absolute weight gain in treatment B was most likely due to the addition of EM-4 probiotics mixed with molasses in the feed at a dose of 15 mL/kg. This combination is thought to increase the efficiency of the digestive process so that feed utilization is maximized and accelerates the growth rate of milkfish. The presence of probiotics in feed can increase microbial activity in the digestive tract, where variations in the number of probiotic bacteria affect the acceleration of milkfish growth. According to (Yusapri et al., 2020), the optimal proportion of probiotic bacteria can function efficiently in the fish's digestive system, thereby improving nutrient absorption and encouraging more optimal growth. The research findings show that the addition of EM4 probiotics in feed at a dose of 15 mL/kg has a positive impact on the growth of gourami fish. As the dose of probiotics increases, the number of bacteria that enter and develop in the fish's digestive tract also increases.

Based on the graph in Figure 2, the highest average specific weight growth in milkfish was obtained from the treatment with a probiotic dose of 15 mL/kg (treatment B), which reached 9.86 grams. Furthermore, treatment with a dose of 10 mL/kg (treatment A) reached 9.77 grams, followed by treatment with a dose of 20 mL/kg (treatment C) of 9.67 grams. The lowest value was obtained in the treatment without probiotics (0 mL/kg, treatment D) with a figure of 9.61 grams. The results of the analysis of variance (ANOVA) test showed that the addition of probiotics mixed with molasses in the feed had a significant effect (Sig <0.05) on the growth of the specific weight of milkfish compared to the control group. Therefore, a further Duncan test was carried out to determine the most effective treatment. The test results showed that treatment D was not significantly different compared to treatments A and C, but had a significant difference when compared to treatment B.

This study shows that the provision of probiotics in feed has a significant effect on the specific growth of milkfish, as seen from the statistically significant difference in values. In addition, the addition of probiotics also supports the digestion process so that fish can utilize feed optimally for better growth. This is in accordance with the statement of Mansyur and

Tangko (2008) in (Abdillah & Madinawati, 2016) that the use of probiotics can improve feed quality, improve digestibility, and encourage more optimal organism growth. Furthermore, Mulyadi (2011) in (Anwar et al., 2016) bacterial activity in the digestive tract of cultivated organisms can experience dynamic changes when new microorganisms enter through feed or water media, causing an imbalance between existing and newly formed bacterial communities. This balance allows probiotic bacteria to act as antagonists against pathogenic bacteria, thereby increasing the ability of the shrimp digestive tract in the digestion process and absorption of nutrients from feed.

Based on the graph in Figure 3, it shows that the average value of the absolute length growth of milkfish is most optimally achieved when given probiotics as much as 15 mL/kg of feed (treatment B), which is 9.4 cm. Furthermore, the absolute length growth at a dose of 10 mL/kg (treatment A) reached 8.7 cm, followed by a dose of 20 mL/kg (treatment C) of 8.3 cm, and the lowest in the treatment without probiotics (0 mL/kg or treatment D) with a value of 8.1 cm. The results of the analysis of variance (ANOVA) showed that the addition of probiotics mixed with molasses in the feed had a significant effect (Sig <0.05) on the growth of the specific weight of milkfish when compared to the control group. Therefore, a further Duncan test was carried out to determine the most effective treatment, which revealed that treatment D was significantly different compared to treatments A, B, and C.

Showing that the absolute length in each treatment produced a different absolute length. According to Nazar (2018) in (Susilawati et al., 2023) the increase in fish length is usually in line with the increase in body weight. If the fish are able to utilize the feed given optimally, then their growth in length will increase. In the study (Noviana et al., 2014), it was stated that the low number of bacteria in the control treatment resulted in the absence of an increase in digestive enzyme activity. This is likely due to the absence of additional bacteria that function to help the digestion process.

Based on the graph in Figure 4, it can be seen that the highest survival rate was achieved in treatment A with a percentage of 87%, followed by treatments B and D which each reached 83%. Meanwhile, treatment C showed the lowest survival value of 80%. The results of the analysis of variance (ANOVA) indicated that the variation in probiotic doses in treatments A, B, C, and D did not have a significant effect on the survival of milkfish seeds, with a p value of 0.418 (P> 0.05). Therefore, the addition of probiotics did not have a significant effect on the survival rate of milkfish seeds.

The findings of this study indicate that the addition of probiotics mixed with molasses in feed does not have a significant impact on the survival of milkfish seeds because the survival rates in the four treatments are relatively similar. This condition is thought to be caused by the research environment that does not support the needs of milkfish seeds, especially due to weather changes that cause stress to fish and decreased appetite. This is in accordance with what was stated by (Subkhi Mahmasani, 2020) that the survival of an organism is influenced by various factors, both biotic and abiotic. Biotic factors include interactions between individuals such as competition, population density, age, and the ability of organisms to adapt to their surroundings. While abiotic factors include physical and chemical conditions of the environment, such as temperature, dissolved oxygen concentration, and acidity level (pH). Thus, the addition of probiotics is expected to be able to increase the survival of milkfish more optimally.

Based on the graph in Figure 5, the best average value of Feed Conversion Ratio (FCR) of milkfish was found in the treatment with a dose of 15 mL/kg (treatment B), which was 3.04, followed by a dose of 10 mL/kg (treatment A) with a value of 3.10, and a dose of 20 mL/kg (treatment C) of 3.14. The highest FCR value was found in the treatment without probiotics (0 mL/kg, treatment D), which was 3.19. The results of the analysis of variance (ANOVA) showed that variations in probiotic doses in treatments A, B, C, and D did not have a significant

impact on the survival of milkfish seeds, with a significance value of 0.363 (Sig> 0.05). Therefore, the survival rate in each treatment did not show a statistically significant difference.

It is suspected that the increase in feed quality due to the addition of probiotics contributes to a decrease in the Feed Conversion Ratio (FCR) value. According to Linayati et al. (2021) a small feed conversion value indicates that the feed has good quality, while a large conversion value indicates that the feed is used less efficiently. Probiotics play an important role in increasing the efficiency of feed utilization by producing enzymes that help the digestion process. This is in accordance with the opinion of Doloksaribu et al. (2020) Probiotics help the digestion process by producing enzymes that break down food while inhibiting the development of pathogenic microorganisms in the intestinal tract. The enzymes produced include amylase, cellulase, and protease. Amylase helps break down carbohydrates into simple sugars, cellulase breaks down cellulose into more easily absorbed glucoside compounds, while protease is responsible for converting protein into amino acids. Nutrients that have been broken down into simple forms will be more easily absorbed by the body.

Feed plays a crucial role in supporting fish growth. Quality feed must meet the biological nutritional needs of fish appropriately. The ideal feed is one that can provide nutrients in balanced proportions according to the needs of the fish, has the right nutritional content, is given at the right time, and in the right dose in order to produce maximum growth (Mulyana1 et al., 2019). The research findings revealed that treatment A with the use of probiotics produced better efficiency than other treatments.

During the study, water quality was measured twice a day, namely in the morning and evening. The parameters observed included temperature, pH, salinity, and dissolved oxygen (DO) levels. Temperature measurements in the pond showed a range of 28–33°C in the morning and 29–37°C in the afternoon, which is still an ideal condition for milkfish cultivation (Andria & Rahmaningsih, 2018). Rapid temperature changes above 10°C can cause fish death. The Directorate General of Aquaculture (2010) in (Seran et al., 2020) stated that the optimal temperature for the survival of milkfish seeds is in the range of 27–30°C. When the temperature drops to 15–20°C or rises above 35°C, its physiological condition begins to be disturbed. Milkfish activity will stop completely if it is in an environment with a temperature below 6°C or above 42°C.

Salinity measurements during the study showed values ranging from 14-25 ppt in the morning and 15-25 ppt in the afternoon. This salinity range is suitable for milkfish cultivation. This is in line with the statement of Suyanto and Mujiman (2006) in Sustianti et al. (2014) which states that the ideal salinity level for maximum growth of milkfish and shrimp is in the range of 15 to 25 ppt. In addition, according to Syahid et al. (2006), milkfish can grow optimally in a salinity range of 15 to 35 ppt.

During the research in the ponds of Tadang Palie Village, Cempa District, Pinrang Regency, the pH value of the water measured in the morning was 7.9 and in the afternoon around 8.7, still included in the safe category for the life of milkfish. It should be noted that low pH can increase the levels of heavy metal solutions in water, and vice versa. According to Odum (1996), the ideal pH value for milkfish cultivation is in the range of 6 to 9. Meanwhile, the dissolved oxygen (DO) levels measured during the study were 7.2 mg/L in the morning and around 9.1 mg/L in the afternoon, which still supports the living conditions of milkfish. This is in line with Hardjowigeno and Widiatmaka (2001) in (Anwar et al., 2016) who stated that the dissolved oxygen (DO) value needed by milkfish is more than 3 mg/L. Dissolved oxygen (DO) levels are vital for the success of fisheries cultivation. The solubility of oxygen in water is influenced by several factors, including temperature, salinity, organic matter concentration, and water clarity. If DO levels are too low, fish growth can be disrupted and potentially cause death (Lestari, 2016) in (Irawan, 2021).

CONCLUSION

From the study examining the impact of adding probiotics to feed on the growth and survival rate of milkfish (*Chanos chanos*), it can be concluded that:

1. The addition of probiotics combined with molasses to feed has a significant effect on absolute weight gain, specific growth rate (SGR), and absolute length gain of milkfish (*Chanos chanos*).
2. The best dose of probiotics mixed with molasses is 15 mL/kg with an absolute growth value of 7.42 g, SGR 9.86%/day and an absolute length value of 9.4 cm.

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