THE EFFECT OF FERMENTED TARO FRONDS (*Colocasia esculenta*) ON THE GROWTH PERFORMANCE AND SURVIVAL RATE OF MILKFISH (*Chanos chanos*)

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Abstract

Taro fronds (Colocasia esculenta) are a natural ingredient that is abundantly available with sufficient nutritional content to be used as a feed ingredient. The research aims to determine the effect of fermented taro fronds (C. esculenta) on the growth and survival rate of milkfish (Chanos chanos) which was carried out at the Oesapa Pond Hatchery Unit. Milkfish (C. chanos) were distributed to experimental units according to procedures using a Completely Randomized Design (CRD) with four treatments and three replications. The treatments tested included Control (100% commercial feed), P1 (addition of 5% fermented taro fronds), P2 (8% addition of fermented taro fronds) and P3 (10% addition of fermented taro fronds). The results of the study showed that there had been an increase in absolute growth of 20.93 g, survival rate of 100% and a specific growth rate of 2.23% g/day. However, ANOVA showed that treatment had no significant effect on absolute weight, survival rate ratemand specific growth rate.

Keywords: Milkfish, taro fronds, fermentation, growth performance and survival rate

Introduction

Feed is one of the factors causing fish growth to decline in aquaculture activities. This causes slow fish growth so it is necessary to add natural raw materials to their feed. Feeding to farmed fish must be of high quality, high nutritional value and that the fish can consume continuously so that it can have an impact on optimal growth and production (Kordi, 2009). A natural raw material that has the potential to maintain or increase growth is the use of taro fronds because they contain sufficient nutrients.

The nutritional content of taro meets the requirements for the growth of animals and fish. Therefore, taro fronds can be used as raw material for milkfish feed formulations. The use of raw materials that are natural and easy to obtain can reduce the total costs incurred as production costs and increase the income of milkfish farmers. The reason for choosing taro frond material was due to its high nutritional content. The nutritional content of taro fronds is 18.2% crude protein, 21.7% crude fiber, and 15.4% ash. The crude fiber factor from the midrib may be a limiting factor because it reduces the digestibility of feed. So before use, taro fronds must go through a processing process (Hang and Preston, 2010). The use of fermented taro fronds can increase protein nutritional levels (Santoso and Hendriawan, 2012). Therefore, fermentation needs to be carried out to reduce the crude fiber content and increase the value of other nutrients, such as protein, fat and carbohydrates.

Fermentation is defined by Suhenda et al., (2010) as a biochemical process that is able to simplify complex carbohydrates, proteins and fats so that the nutritional content of the ingredients is higher than the original ingredients. Starting from this, research will be carried out with the aim of knowing the effect of giving fermented taro fronds (*C. esculenta*) on the growth and survival rate of milkfish (*C. chanos*) and to find out the best dose of fermented taro fronds (*C. esculenta*) on growth and survival rate milkfish (*C. chanos*).

Materials & Methods

Time and Location

This research was carried out for 40 days at the Tambak Oesapa Barat Fishery Hatchery UPT, Kelapa Lima District, Kupang City.

Tools and Materials

The tools used consisted of analytical scales, thermometers, pH-meters, refractomoters, jerry cans, meat grinders, machetes and scissors, warings, wood, sieves, rulers and cameras. The ingredients used are milkfish, F-99 fish feed, taro fronds, EM-4, water sugar, tapioca flour and water.

Experimental Design

In this study, the experimental method used was a Completely Randomized Design (CRD), namely with 4 treatments and 3 replications including control (100% commercial feed), P1 (5% fermented taro fronds), P2 (8% fermented taro fronds), P3 (fermented taro fronds 10%).

Preparation of Test Feed

Test feed manufacturing begins with the preparation of raw materials for fermented taro fronds. Chopped taro fronds were fermented with EM4 (*Effective Microorganism 4*) for 7 days. The steps are to prepare probiotics, namely 6% EM4 probiotics, add 3% sugar, 20% water and 1 kg of chopped taro fronds, then stir until evenly mixed and leave for ± 7 days.

Commercial feed is ground, sifted to obtain fine raw materials so that when molding the pellets they are compact and do not break easily. Add the fermentation product according to the treatment to the flour and add 5 g of tapioca flour adhesive. Then all the raw materials are mixed evenly, then the feed molding process is carried out. The molded pellets are cut into pieces according to the mouth opening of the milkfish and then dried. The pellets produced are sinking pellets. The test feed was given twice a day with a frequency in the morning at 08.00 AM and in the afternoon at 05.00 PM for 40 days.

Measured Parameters

Parameters measured during this research include absolute fertility, survival, growth rate and water quality. Absolute growth is carried out every 1 week for 40 days, calculated using the formula (Weatherley 1972), namely:

$$W = Wt - Wo$$

Meanwhile survival rate is the value of the ratio between the number of test fish at the end of the study and the end of the study and uses the formula (Effendie 1997), namely:

$$SR=Nt/No\times100\%$$

The growth rate carried out every 1 week for 40 days is calculated using the formula Zenneved, et al., (1991) is:

$$SGR= Ln\ wt-Ln\ wo/t\times100\%$$

Data analysis

The data from this research were analyzed using variance analysis (ANOVA).

Results and Discussion

Absolute Growth of Milkfish (Chanos chanos)

Absolute growth refers to the increase in the absolute physical size of a fish over a certain period of time, usually in the form of length or weight. Research on the absolute growth of fish helps in managing aquaculture and planning effective management strategies. Factors such as the availability of food resources, water temperature, environmental quality, and interactions between individuals can influence the absolute growth of fish. Data on the absolute growth of milkfish in this study can be seen in Figure 1.

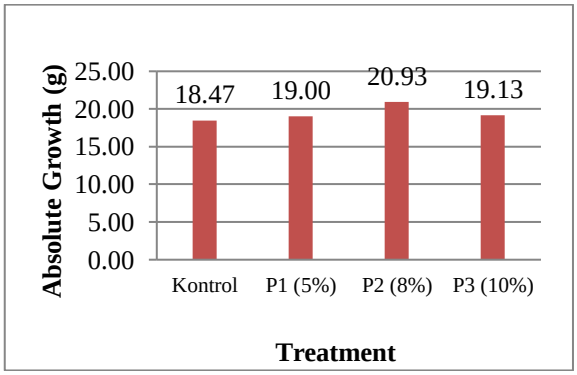

Figure 1. Absolute growth graph of milkfish

The absolute growth in the graph above shows that milkfish has increased in each treatment compared to the control. The highest growth of milkfish occurred in P2 at 20.93 g, followed by P3 at 19.13 g, P1 at 19.00 g and lastly followed by the control at 18.47 g. The results of statistical tests using variance (ANOVA) showed that the treatment did not show a significant effect ($p > 0.05$) on growth.

According to Prihadi (2011), the speed of growth of aquatic organisms can occur if

the amount of protein available in food is higher than requirements. According to Mashuri et al. (2012), that nutritional levels in feed that are lower than fish requirements can have the effect of causing symptoms of nutritional deficiency which ultimately results in slowed fish growth. According to research by Suhenda et al. (2003), the high growth rate of milkfish (*C. chanos*) after consuming feed containing fermented taro fronds is influenced by the fish's digestibility.

Survival Rate of milkfish (Chanos chanos)

The value of fish survival parameters is an important factor in understanding and maintaining fish populations in waters. This parameter refers to the conditions necessary for fish to survive and maintain a healthy population. One of the main factors that influences the survival parameter values of fish is the availability of food. The survival of milkfish (*C. chanos*) during the research can be seen in Figure 2. below.

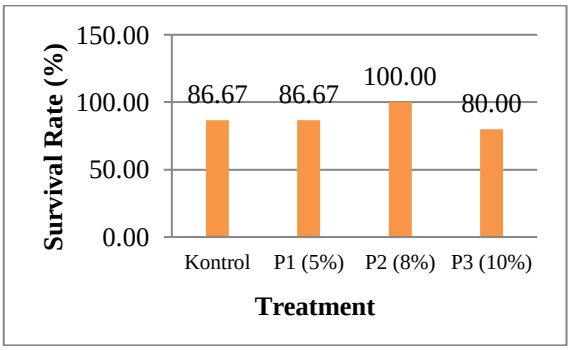

Figure 2. Survival Rate Graph of Milkfish

Based on the data shown in Figure 2, the highest survival rate for milkfish until the end of the study varied and was highest in P2 (100%). The results of analysis of variance (ANOVA) showed that there was no significant effect (p>0.05).

The high fish survival rate is thought to be due to the addition of fermented taro fronds to the feed provided which is sufficient for fish survival and the fish rearing media is still within the optimal range. According to Effendi (2003), survival rate is the percentage of the number of fish that live during the cultivation period to the number of fish that die. Providing nutritious food according to fish needs can increase survival (Priyadi, 2010). Yusriman and Heltonika (2010) stated that the survival rate of a fish population is influenced by biotoxic factors including competition, parasite attacks, fish age, the presence of predators, population density and handling. Furthermore, it is said that the abiotic factors that can influence the survival of fish populations are the physical and chemical properties of waters, including temperature, dissolved oxygen and pH.

Specific Growth Rate of Milkfish

Specific growth of fish is an important parameter in the world of aquaculture and fisheries biology. It refers to the relative growth rate of a fish species over a certain period of time. One of the factors that influence the specific growth of fish includes the nutrition of the feed consumed. The average specific growth value of milkfish in each treatment can be seen in Figure 3. below**.**

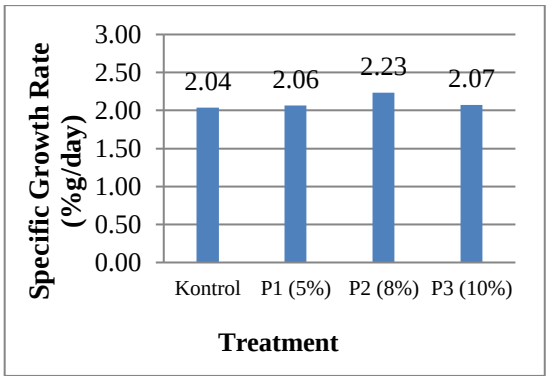

Figure 3. Specific Growth Rate Graph of Milkfish

The specific growth rate of milkfish was highest in P2 with 2.23%g/day, and the lowest in the control without fermented taro fronds. The results of analysis of variance (ANOVA) showed that there was no significant effect (p>0.05).

Protein is a nutritional unit in food that plays an important role in determining fish growth. The research results obtained showed that the specific growth rate of milkfish (*C. chanos*) in each treatment showed high values. According to Tarigan (2014), the quality of a species given to farmed fish can influence growth. According to Anggraeni and Nurlita (2013), the growth of cultivated fish is largely determined by the nutritional levels of the feed ingredients used, especially protein content. This is in accordance with the opinion of Agus et al., (2010) who stated that the protein content of a food ingredient is an important element and is needed to stimulate growth. Apart from that,

water quality is also a factor that influences the success of aquaculture businesses. According to Prayogo (2014), in aquaculture businesses such as milkfish, handling water quality is highly recommended because water is one of the factors that determines the success of cultivation, such as in cultivating milkfish (*C. chanos).* Handling water quality in aquaculture aims to avoid cultivating fish to avoid disease and optimize metabolic processes in the body.

Conclusion

The addition of fermented taro fronds (*C. esculenta*) mixed into the feed did not have a significant effect on the growth rate and survival rate of milkfish (*C. chanos*). The highest growth and survival of milkfish (*C. chanos*) was obtained in the treatment of adding 8% taro fronds to the feed with an absolute growth value of 20.93 g, survival of 100% and a specific growth rate of 2.23%g/day.

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