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THE IMPACT OF THE ADDITION OF ENZYMES TO FEED ON THE GROWTH PERFORMANCE OF VARIOUS TYPES OF FISH

(Studies of various studies that have been conducted)

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ABSTRACT

Utilization of enzymes for reactions that occur outside the cell is widely applied in fisheries activities. This article aims to find out the impact of the addition of enzymes to feed on the performance of the organization of various types of fish (Catfish, Tilapia, Gurame Fish, Baung Fish, Tiger Grouper Fish, Goldfish and Tawes Fish). Based on the above exposure, it can be concluded that the addition of enzymes to feed has a positive impact on growth performance (*specific growth rate*, *food conversionr ratio* and *protein efficiency ratio*) of various types of fish (Catfish, Tilapia, Gurame Fish, Baung Fish, Tiger Grouper Fish, Goldfish and Tawes Fish) studied.

Keywords: *specific growth rate*, *food conversion ratio*, *protein efficiency ratio.*

INTRODUCTION

Enzymes are proteins that have biocatalytic activity. Biocatalyst activity works by speeding up biochemical reactions, not undergoing biophysical changes during the reaction, but changes occur again after the reaction is completed. Enzymes are functional units of cell metabolism. Enzymes work in an orderly order, catalyzing hundreds of gradual reactions that decompose nutrient molecules, reactions that store and alter chemical energy and that make

macro-nutrient cells of simple precursors. Enzymes accelerate specific chemical reactions without the formation of byproducts and work on solutions with specific temperature and pH states. Enzyme activity can be influenced by several factors, such as enzyme concentration, substrate concentration, temperature and pH (Pelczar and Chan, 2005).

Enzymes can be obtained from living things such as animals, plants and microorganisms. The utilization of enzymes for reactions that occur outside the cell is widely applied in the industrial world such as the food industry, detergents, tanning, cosmetics, and others (Moon and Parulekar, 1993). The utilization of enzymes can be done directly using insulated enzymes or by utilizing microorganisms that can produce the desired enzymes. In the field of fisheries, especially aquaculture enzymes can be used in various ways, one of which is the use of enzymes in fish feed, to improve the quality of feed. This article aims to find out the impact of the addition of enzymes to feed on the performance of the organization of various types of fish (Catfish, Tilapia, Gurame Fish, Baung Fish, Tiger Grouper Fish, Goldfish and Tawes Fish).

Various Types of Enzymes Used For Fish Feed Addition

Papain enzyme is an exogeneous enzyme derived from papaya fruit that has the function of breaking down proteins in the feed so that proteins can be more easily absorbed by the fish body and will increase the digestibility of the feed. Papain enzyme is a proteolytic enzyme that works to break down proteins into amino acids (Darmodaran 1996). Hasan (2020), stated that the addition of papain in artificial feed can increase protein retention, feed efficiency, and daily growth rate of gourami. Papain is expected to be able to increase the utilization of feed protein for growth. The addition of papain enzymes to feed is done to be able to utilize protein optimally and more optimally in cultivars.

Probiotics are additional microbes that benefit the host through increasing the nutritional value of feed, response to disease or improving environmental quality. Generally, probiotic bacteria are made up of nitrifying bacteria or heterotrophic bacteria. The use of probiotics is an effort made to improve the ability to digest feed with the addition of microorganisms. Microorganisms contained in the feed will release food digestive enzymes, regulate the microbial environment in the intestines, block intestinal pathogenic microorganisms. This probiotic bacterium has properties that can secrete the enzymes protease, lipase and amylase (Jusadi *et al.* 2004). The advantages of using probiotics are because probiotics modify or associate with the host, guarantee improvements in feed use or improve their nutrition, improve the host's response to disease and improve the quality of its environment (Rahmawan 2014).

The enzyme bromelin can help dissolve the formation of mucus and also accelerate the removal of fat through the kidneys. Bromelin also has citrate and malic acids that are important and necessary to improve the process of removing fat and manganese and become an essential component of certain enzymes necessary in protein and carbohydrate metabolism (Winastia 2011).

Some Roles of Enzyme Addition to Fish-Made Feed

To improve the low growth rate in larvae fed artificially, the addition of enzymes to the feed can be considered as one solution. The availability of digestive enzymes will affect the effectiveness of enzymes in digesting a given feed. The addition of multienzymes to the feed breaks down proteins into amino acids and peptides; fat becomes fatty acids, triglycerides and cholesterol; Carbohydrates can turn into glucose stored in the form of glycogen. By breaking down these nutrients, it will increase the availability of fatty proteins and carbohydrates in the feed. Furthermore, some research results also suspect that the addition of multienzymes can increase the utilization of artificial feed by fish. The addition of enzymes to artificial feed can promote growth by increasing nutrient digestibility in rainbow trout (*O. mykiss*) (Drew et al. 2005, Farhangi & Carter 2007), improving digestive enzymes in tilapia (*Oreochromis niloticus*) (Lin *et al.* 2007), improving intestinal structure development in broiler chickens (*Gallus domesticus*) (Mathlouthi *et al.* 2002) and intestinal health in grass carp (*Ctenopharyngodon idella*) (Zhou *et al.* 2013).

Test Results of Adding Enzymes to Feed to Fish Growth:

1. On Catfish (Yildirim and Turan 2010)

Based on research conducted by Yildirim and Turan (2010) the addition of enzymes to catfish feed (*Clarias gariepinus*) in the form of Farmazyme, which is a complex enzyme containing fungal *xylanase, β-glecanase, pentosonase, β-amylase, fungal β-glecanase, hemicellulase, pectinase, cellulase, and cellubiase*. As a result, the administration of the enzyme at a dose of 0.75 g / Kg has a significant effect on *the specific growth rate* (SGR), *food conversion ratio* (FCR), and *protein efficiency ratio* (PER) of catfish (*Clarias gariepinus*).

2. On Tilapia (Arafat et al, 2015)

Research by Arafat *et al*. (2015) based on analysis of variance (ANOVA) at the level of 95% and BNT (Smallest Real Difference) 5% $p<0.05$ value which means there is a significant difference in the treatment of feeding containing 26% protein without the addition of enzymes and feeding treatment containing 32% protein plus enzymes at a dose of 0.5 g / kg. Specific growth rate, food conversion ratio and protein efficiency ratio in

feeding treatment containing 26% protein without the addition of consecutive enzymes of 4.38; 3.7 and 1.12, while the SGR, FCR and PER values in the feeding treatment containing 32% protein plus enzymes at doses of 0.5 g / kg respectively amounted to 5.03, 6.3 and 0.48.

3. On the Gurame Fish (Mareta *et al,* 2017)

Based on research by Mareta et al. (2017) on the influence of papain enzymes and probiotic enzymes, it has a real influence (P<0.05) on feed utilization efficiency (EPP) and protein utilization ratio (PER). Papain is able to increase the digestibility and absorption of protein by fish because of the feed consumed. Probiotics are also able to increase EPP and PER because of the content of microorganisms that are able to produce amylase enzymes, lipases, proteases so that the nutrients in feed can be utilized optimally in the digestion of fish.

4. On Baung Fish (Prabarini *et al.* 2017)

Research design used by Prabarini *et al.* (2017) is a complete random design with 4 treatments and three repetitions namely A (without addition of 0%), B (enzyme addition 0.5%), C (enzyme addition 2.25%), and D (4% enzyme addition). The results showed that the addition of enzyme composition by 2.25% gave the best influence on the growth of baung fish with absolute growth of 11.06 grams, daily growth of 0.28 grams / day, and feed conversion rate of 1.79. and a 100% survival rate.

5. Tiger Grouper Fish (Rachmawati and Sudaryono, 2017)

Rachmawati and Sudaryono (2017) stated that papain contained in commercial feed is able to increase the protein content in grouper fish. These proteins can increase energy supply beyond the need for body maintenance and other body activities. Then it can be used for growth. Proximate test results with the administration of 5% enzymes are able to produce a protein content of 53.15%, while for enzymes 3% produce protein 49.66% and enzymes 4% produce protein 51.42%. According to Hasan (2020), the addition of papain enzymes in artificial feed was able to increase protein retention, food efficiency, feed consumption and daily growth rate.

6. Goldfish (Yulyanah *et al,* 2017)

The results of research reported by Yulyanah *et al.* (2017) showed that papain enzymes have a real effect (P<0.05) on protein efficiency ratio (PER) and feed utilization efficiency (EPP). Probiotics have a noticeable effect (P<0.05) on protein efficiency ratio (PER) and feed utilization efficiency (EPP). A factor that affects the growth of fish more is the addition of probiotics. The treatment of the dose of the enzyme papain 0.75 g / kg of feed and probiotics 1 mL / L (A3B1) is the best treatment on goldfish EPP (*C. carpio)* because the efficiency value of feed utilization in such treatment is the highest compared to other treatments and is suspected to be the optimal dose for feed utilization for

goldfish. Probiotics contain beneficial microbes and provide an ideal aquatic ecosystem, while papain enzymes have proteases that are useful for protein decomposition so that the combination of the two factors, namely papain and probiotics, makes the digestive process better and goldfish growth increases.

7. Tawes Fish (Wulandhari *et al*, 2017)

Wulandhari *et al.* (2017) stated that the results of the analysis of various RGR data in tawes fish (P. javanicus) with the addition of probiotics to the feed showed a real influence result ($P<0.05$). This is thought to be because fish fed with probiotics experience better absorption and utilization of feed compared to treatment without probiotics. The addition of probiotics will affect the appetite of tawes fish to be higher. The role of probiotics in feed is able to optimize the work of enzymes contained in the digestive tract of fish so that these enzymes work optimally in the process of absorption of feed.

CONCLUSION

Based on the above exposure, it can be concluded that the addition of enzymes to feed has a positive impact on the performance of growth (*specific growth rate, food conversion ratio* and *protein efficiency ratio*) of various types of fish (Catfish, Tilapia Fish, Gurame Fish, Baung Fish, Tiger Grouper Fish, Goldfish and Tawes Fish) studied.

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