

UTILIZATION OF FERMENTED TOFU WASTE AS ADDITIONAL FEED ON THE GROWTH OF TILAPIA (*Oreochromis niloticus*)

PEMANFAATAN AMPAS TAHU TERFERMENTASI SEBAGAI PAKAN TAMBAHAN TERHADAP PERTUMBUHAN IKAN NILA (*Oreochromis niloticus*)

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ABSTRAK

Biaya pakan komersil yang tinggi adalah permasalahan yang banyak dihadapi oleh pembudidaya ikan yang mengakibatkan keuntungan yang diperoleh menjadi lebih rendah. Oleh karena itu dibutuhkan pakan tambahan lain dengan harga yang relatif murah namun tidak menghambat pertumbuhan ikan hingga panen. Ampas tahu yang memiliki protein kasar sebesar 21,66% sehingga dapat memenuhi nutrisi kebutuhan ikan, namun ampas tahu juga memiliki serat kasar sebesar 20,26% sehingga ampas tahu perlu difermentasi dengan probiotik karena probiotik dapat memecah komponen yang tidak tercerna dan meningkatkan pencernaan sehingga penggunaan pakan menjadi lebih efisien dan pertumbuhan menjadi lebih optimal. Tujuan penelitian ini adalah untuk mengetahui pengaruh ampas tahu yang difermentasi dengan probiotik sebagai pakan tambahan untuk meningkatkan pertumbuhan pada ikan nila (*Oreochromis niloticus*). Penelitian ini dilaksanakan pada bulan September – Oktober 2020. Penelitian ini menggunakan dua perlakuan yaitu P0: Kontrol (pakan komersil) dan P1: penggunaan 50% pakan komersil dan 50% pakan tambahan berupa ampas tahu yang difermentasi dengan probiotik. Parameter yang diamati adalah pertumbuhan, efisiensi pakan, dan kelangsungan hidup ikan nila. Hasil penelitian menunjukkan bahwa perlakuan P0 menghasilkan pertumbuhan panjang mutlak dan bobot mutlak masing-masing sebesar 0,76 cm dan 0,64 g, efisiensi pakan 43,43%, dan kelangsungan hidup ikan nila sebesar 88%, sedangkan P1 menghasilkan pertumbuhan panjang mutlak dan bobot mutlak masing-masing sebesar 1,11 cm dan 1,3 g, efisiensi pakan 82,12%, dan kelangsungan hidup ikan nila sebesar 84%.

Kata Kunci: ampas tahu, fermentasi, ikan nila, pakan tambahan, probiotik.

ABSTRACT

The high cost of commercial feed is a problem that many fish farmers face which results in lower profits. Therefore, it needs additional feed others with a relatively cheap price, but do not inhibit the growth of fish to harvest. Tofu waste has the crude protein of 21.66% so that it can meet the nutritional needs of fish, but tofu waste also has the crude fiber of 20.26% so that tofu waste needs to be fermented with probiotics because probiotics can break down

*undigested components and increase digestibility so that the use of feed become more efficient and growth becomes more optimal. The purpose of this study was to determine the effect of tofu waste fermented with probiotics as additional feed to increase growth in tilapia (*Oreochromis niloticus*). This research was conducted from September – October 2020. This study used two treatments, namely P0: Control (commercial feed) and P1: the use of 50% commercial feed and 50% additional feed in the form of tofu waste fermented with probiotics. Parameters observed were growth, feed efficiency, and survival of tilapia. The results showed that the P0 treatment resulted in absolute length and absolute weight growth of 0.76 cm and 0.64 g, respectively, feed efficiency 43.43%, and tilapia survival of 88%, while P1 resulted in absolute length growth and absolute weights were 1.11 cm and 1.3 g, respectively, feed efficiency was 82.12%, and tilapia survival was 84%.*

Keywords: *additional feed, fermentation, tilapia, tofu waste, probiotics.*

INTRODUCTION

Tilapia (*Oreochromis niloticus*) is a freshwater fish that is very popular with the community so that the production of tilapia aquaculture increases. According to the Ministry of Maritime Affairs and Fisheries (2018), national tilapia production has increased every year, recorded production in 2016 of 1,114,156 tons, while in 2017 it increased to 1,265,201 tons. Production until the third quarter of 2018 reached 579,688 tons. Until now, tilapia cultivation in Indonesia, especially in South Sumatra, is very promising and has high demand from the public because of its texture and thick meat.

Problems experienced by many fish cultivators include the high cost of commercial feed so that at the time of harvesting the farmers get lower profits (Agustono *et al.*, 2009). The feed used should be following the needs of the fish, have balanced nutrition and good quality, and have a relatively low price. The use of local raw materials as alternative materials has been widely used, one of which is in the study of Amin *et al.*, (2020). According to Tribina (2012), one of the alternative vegetable protein sources that can be used as a substitute for animal flour protein sources is tofu waste because it is easy to obtain, relatively inexpensive, and does not contain toxins.

Tofu waste contain nutrients including 4.9% water content, 17.4% protein, 5.9% fat, 67.5% carbohydrates, 4.3% minerals, 19% calcium, 29% phosphorus, 4% iron, vitamin B 0.2% (Suprapti, 2006). Based on Tribina's research (2012), the use of tofu dregs as red tilapia feed significantly resulted in optimum growth and the best feed conversion of 4.47% of biomass/day (44.7 g/1 kg fish/day). In addition, Prihatini (2017) reported that feed added to tofu dregs fermented with probiotics resulted in the growth of tilapia by 26.65% compared to commercial feed without tofu dregs, which was 15%. Based on research by Hartami & Rusydi (2016), the combination of tofu dregs and pellet feed resulted in catfish growth of 65%. Mukti *et al.*, (2021) added that the fermented bran tofu waste can be used as a combination feed with commercial feed for catfish.

the nutrition of tofu dregs as additional feed can be increased by fermentation method using probiotics. Probiotics are live microorganisms in the form of bacteria or fungi that are in the digestive system. The addition of probiotics has a beneficial effect because it can break down undigested components with enzymes capable of lysing amylase and protease (Prihatini, 2017). Probiotics are used in feed to increase the digestibility of feed so that the use of feed is more efficient.

According to Efendi & Sitanggang (2015), the nutritional content of fermented tofu dregs has a crude protein content of 21.66%, crude fat 2.73%, crude fiber 20.26%, Ca 1.09%, and P 0.88%, with metabolic energy of 2.839 Kcal/kg.

Currently, there are still many farmers who use commercial feed so that production costs are high. Therefore, it is necessary to research the use of tofu dregs fermented with probiotics so that this research is expected to add insight to cultivators by utilizing tofu dregs fermented with probiotics on the growth of tilapia (*Oreochromis niloticus*).

METHOD

Place and Time

This activity was carried out in August - September 2020 in Tanjung Alai Village, Kandis District, Ogan Ilir Regency.

Tools and Materials

The tools used in this research include waring, filter, scale, aerator, aeration hose, basin, siphon hose, thermometer, pH meter, and jar. Meanwhile, the materials used include tilapia, pellets, tofu dregs, and probiotics.

Research Design

This research was conducted with two treatments:

P0: control (using 100% commercial feed)

P1: the combination of commercial feed and fermented tofu dregs (50%: 50%)

Method

Container Preparation

The container used is a fishing net measuring 100x50 cm², with 2 units, namely one unit for controlling fish without the use of additional feed and the other unit for treatment with additional feed. Waring is placed in a round pool with a diameter of 2 m. Before use, the pool is cleaned first by brushing, after that the pool is rinsed using

clean water. After the pool is clean and dry, the net is installed in the pool and then filled with water as high as 50 cm. The pond is then aerated and then left for a day and night. This is useful so that the water in the aquarium has sufficient oxygen. Aquarium preparation is done one day before maintenance activities take place.

Tofu Dregs Fermentation with Probiotics

1 kg of tofu dregs that have been prepared are squeezed first so that the water content in the tofu dregs is reduced then put into a jar, then 1 ml of EM-4 probiotics and 10 ml of water are added, then mix all the ingredients well. Once homogeneous, close the jar tightly and then store it for 3 days until the fermentation process occurs naturally. The results of the fermentation are then checked and if hyphae are formed, the tofu dregs can be molded into pellets, then dried in the sun. If the pellets are dry, they are stored in a dry and closed container (Prihatini, 2017).

Tilapia Fish Maintenance

The fish used are 1-3 cm in size, for good growth results, the stocking density of fish in each fishing net is 25 m⁻² (Pangestika *et al.*, 2017). The prepared fish seeds were acclimatized in advance for 30 minutes until the fish were transferred to a new environment. After acclimatization, the fish will be adapted to the feed for 7 days, then fasted for one day and then the weight and length are measured.

During rearing the fish were fed as much as 3% of the bodyweight of the fish with the frequency of feeding 2 times a day at 08.00 a.m and at 4 p.m. Commercial feed and supplementary feed were given in a ratio of 50% commercial feed and 50% additional feed in the form of tofu dregs that had been fermented with probiotics. To be effective, supplementary feeding is given 1 hour before a commercial feed (Mukti *et*

al. 2020). Fish maintenance was carried out for 30 days. Fish that die during the rearing period will be weighed. Sampling was carried out once a week to determine the growth of fish. Water quality measurements in the form of temperature and pH were carried out every morning.

Parameters

Absolute Weight Growth

Fish weight growth during rearing is calculated using the following formula:

$$W = W_t - W_0$$

Information:

W = growth in absolute weight of fish (g)

W_t = fish weight at the end of maintenance (g)

W₀ = fish weight at the beginning of maintenance (g)

Absolute Length Growth

Fish length growth during rearing is calculated using the following formula:

$$L = L_t - L_0$$

Information :

L = absolute length growth of fish (cm)

L_t = length of fish at the end of maintenance

(cm)

L₀ = length of fish at the beginning of rearing (cm)

Feed Efficiency

Feed efficiency (EP) is calculated using the formula:

$$EP = ((W_t + W_d) - W_0) / F \times 100\%$$

Information:

EP = feed efficiency (%)

W_t = final fish biomass (g)

W₀ = initial fish biomass (g)

W_d = dead fish biomass (g)

F = amount of feed given (g)

Survival

Fish survival was calculated using the formula:

$$\text{Survival} = N_t / N_0 \times 100\%$$

Information:

N_t = number of fish alive at the end of maintenance (fish)

N₀ = number of fish at the beginning of maintenance (fish)

RESULT AND DISCUSSION

The absolute growth, feed efficiency, and survival of tilapia are shown in Table 1.

Table 1. Absolute growth, feed efficiency, and survival of tilapia

Treatment	Absolute length growth (cm)	Absolute weight growth (g)	Feed efficiency (%)	Survival (%)
P0	0.76	0.64	43.43	88
P1	1.11	1.30	82.12	84

Based on Table.1. The absolute growth of both weight and length of fish treated with additional feed had a better response than control fish. Tofu pulp has a

relatively high protein content of about 23.55% and has a crude fiber content of about 16.53% (Lukito and Prayugo, 2007).

Tofu dregs fermentation using probiotics can reduce the crude fiber content of tofu dregs. Based on research by Tifani *et al.*, (2010), the crude fiber content of tofu dregs fermented using EM4 can decrease until its content reaches 5.34%. Microbes in probiotics have an improved role in the fermentation process by breaking down materials that are difficult to digest by cultured fish. In addition, probiotics in fermentation function to detoxify toxicants in the feed ingredients used and increase protein content and increase digestibility. Good bacteria in the feed that is given probiotics when they enter the digestive tract of fish can live and multiply so that these bacteria secrete digestive enzymes such as protease and amylase (Prihatini, 2017).

The feed efficiency value was obtained from the comparison of the total weight of the fish with the amount of feed consumed during the rearing period. A large feed efficiency value indicates the more efficient fish use the feed consumed for their growth. Feed efficiency in additional feed treatment had a higher value of 82.12%, while the control value of feed efficiency was 43.43%. This is because the supplementary feed is thought to have a low nutritional value of crude fiber and high protein value which causes the feed to be easier to digest and grow faster so that the use of feed can be less compared to fish reared without additional feed.

Based on research by Tifani *et al.*, (2010), tofu waste that has been fermented with EM4 can have a crude fiber content of 5.35%, research by Effendi and Sitanggang (2015) shows that the protein content in fermented tofu waste is 21.66%. Thus, the additional feed given has a fairly good quality because the feed contains probiotics that can increase the digestibility of feed so that the use of feed becomes more efficient (Iskandar and Elridafah, 2015).

The survival of tilapia during rearing had a yield of 88% in the control and 84% in the treatment, this indicates that the

survival of the fish in the control was higher than that of the fish fed the treatment. Based on BSN (2009), the survival of fish using fishing nets with an initial length of 3 cm states that the minimum survival of tilapia is 80% so that in this field practice the survival of tilapia has a good value. Inadequate stocking densities during rearing can be a factor in fish mortality.

The water quality of the tilapia rearing media during maintenance can be seen in Table 2.

Table 2. Water quality

Parameters	Value	Optimum (BSN, 2009)
Temperature (°C)	26,9- 28,4	25,0 – 32,0
Ph	6,9- 7,4	6,5 - 8,5

Water quality during rearing tilapia in the form of temperatures ranging from 26.9 to 28.4 °C and pH ranging from 6.9 to 7.4. The temperature and pH during maintenance met the category of good water quality because the optimum temperature range for tilapia based on BSN (2009) was 25-32 °C and for pH 6.5-8.5.

According to Arifin (2016), temperature affects the survival of fish, temperatures below 21 °C can make it easier for fish to get sick, low temperatures can cause fish appetite to decrease until death occurs. According to Monalisa and Minggawati (2010) stated that at pH 5 fish can still survive but the growth of these fish is not optimal.

CONCLUSION

Additional feeding in the form of tofu dregs fermented with probiotics affected the growth and efficiency of tilapia feed. Absolute length growth, absolute weight, fish feed efficiency with the use of additional feed resulted in absolute length growth, absolute weight, fish feed

efficiency were 1.11 cm, 1.30 g, and 82.12%.

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