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THE ADDITION OF FERMENTED LEMNA SP. AGAINST PHYSICAL QUALITY OF FEED AND FEED RESPONSE OF FISH

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ABSTRACT

This study aims to determine the effect of the addition of fermented lemna flour to the physical quality of feed and the response of some fish to feed. This research was conducted in April to June 2018 at the Aquaculture Laboratory, while the physical testing of feed was carried out at the Fish Nutrition Laboratory of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. The treatment given is the difference in the amount of lemna flour fermented in feed (0%, 30%, 40%, 50%, and 60%). Data on the physical quality of feed and fish feeding responses were analyzed descriptively. The parameters during the study were feed flavor, feed color and texture, and feed response. The difference in flavour of feed during the study is closely related to the flavour of Lemna sp. as a source of vegetable protein, the higher the administration of lemna flour the higher the flavour of lemna. The more Lemna sp flour. fermented products added to feed, the more green color of the feed produced and the rather hard texture. Addition of Lemna sp. the higher in feed affects the increase in feed intake time by fish.

Keywords: feed quality, fish, *Lemna* sp., Feed response.

1. INTRODUCTION

Feed is one of the important components in fish farming activities. On the one hand, the feed is a source of material and energy to sustain the survival and growth of fish but on the other hand, feed is the largest component (50% - 70%) of production costs. *Lemna* sp. better known as weeds in water which tend to be difficult to control (Said 2006). Lemna sp. can be used as an alternative food source based on vegetable ingredients, especially for freshwater fish feed such as Barbonymus goniono Bleeker, Osteochilus vittatus, and carp. But it is possible to use herbivorous fish such as nile tilapia, and catfish. The disadvantage of forage

feed is the high crude fiber content. The crude fiber content contained in Lemna sp. is 23.06% (Handajani 2010).

One effort that can be done to overcome the high crude fiber content is fermentation technology. Fermentation can lead to improvements in the properties of raw materials in addition to increasing digestibility and also causing flavors and flavours that are preferred by livestock, including fish (Abun 2010). Evaluation of the results of processing feed ingredients can be done by physical, chemical and biological testing. Improving the quality of feed ingredients can be demonstrated by improving nutritional quality, appearance, flavor, and response of fish to feed. This study aims to evaluate the physical quality of Lemna sp. fermented products as feed ingredients and their response to some freshwater fish.

2. METHODS

2.1. Place and time

This research was conducted from April to June 2018 at the Aquaculture Laboratory of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. Measurement of physical parameters was carried out at the Nutrition Laboratory, while measurements of fish responses to feed were carried out in the Aquaculture Laboratory.

2.2. Tools and materials

The tools used in this study are aquariums as a medium for the maintenance of test fish, small containers as a place for lemna fermentation, weighing scales for feed, aeration installation for oxygen supply in aquariums, trays for drying feed, and pellet printing machines. The materials used are test fish including tilapia, catfish, and carp, *Lemna* sp. as a mixture of feed ingredients, liquid probiotics as fermentation material, and commercial feed of the Hi-Pro-Vite 781 brand as test fish feed.

2.3. Research Procedures

2.3.1. Fermentation of *Lemna* sp.

Lemna sp. fermented using commercial liquid probiotics which were previously activated first by mixing into the water with a ratio of 1: 100. Next, Lemna sp. mixed evenly with probiotic solutions that have been activated with a ratio of 50 milliliters to 1000 grams of *Lemna* sp (Zidni *et al*, 2016). Lemna sp was then incubated at 29ºC for seven days (Handajani 2007) until a typical sour odor of fermentation appeared. Next is *Lemna* sp. removed, dried by drying directly in the sun for 4-5 days and pressed.

2.3.2. Feed Production

Lemna sp. Flour fermented 30.40.50 and 60% mixed with powdered commercial food, carboxymethyl cellulose (CMC) added as much as 2%, then printed into pellets.

2.3.3. Research Parameters

The parameters observed included the physical quality of the feed (flavor, color, and texture), and the response of eating fish to the test feed. Testing of flavor, color, and texture is carried out by trained panelists. Feed response is done by calculating the time between the feed put into the cultivation medium until consumed by fish. The research data are analyzed descriptively.

3. RESULTS AND DISCUSSION

3.1. Feed Flavour

Addition of *Lemna* sp. fermented in fish feed gives a different flavor from control feed (commercial feed) (Table 1).

Table 1. Scoring of the flavor of commercial feed and feed with *Lemna* sp. fermentation

Treatment	The distinctive Flavour of Lemna Fermentation	Typical Flavour of Commercial Feed
Control	-	5
30%	3	2
40%	3	1
50%	4	2
60%	4	2

Description: Figures 1-5 show scores feed flavor density, the higher numbers indicate more concentrated scent contained in the feed.

The difference in the flavor of feed, in this case, is closely related to the flavor of *Lemna* sp. as a source of vegetable protein that has a different flavor from animal protein. Vegetable protein does not have a strong flavor like animal protein, such as fish flour, blood flour or trashy fish flour. Lemna sp. the fermented has the flavor of leaves, as well as forage feed such as taro leaves, Azolla or Kayambang. Based on its structure, animal protein is an amino acid bond with a long chain, while vegetable protein is mostly a short-chain amino acid bond, so animal protein will be more easily digested by the body compared to vegetable protein. According to Mudjuman (2008) states that the smell and taste of artificial feed should be close to the smell and taste of natural feed, which is usually eaten by fish. Thus the pellet made has fulfilled the criteria for odor, namely natural odor (fish meal).

3.2.Feed Color and Texture

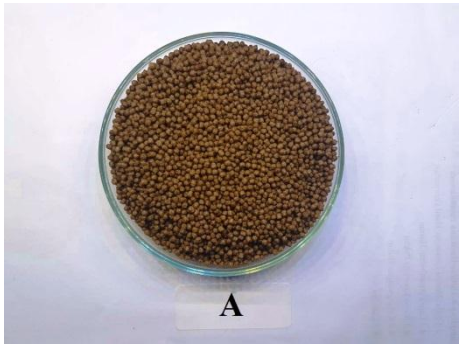
Color testing and texture of feed using *Lemna* sp. fermentation results can be seen in Table 2. Addition of *Lemna* sp. fermented products in artificial feed change the color and texture which increases with the number of additions made.

Table. 2. Color and Texture of Feed with Additional *Lemna* sp. Fermentation Results

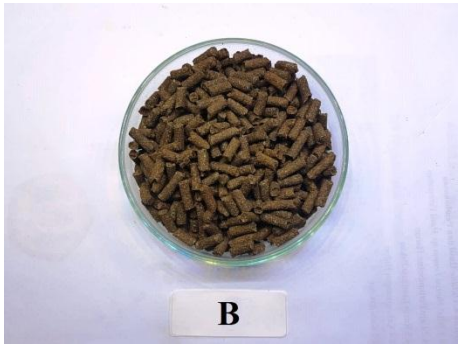
Treatment	Color	Texture
Control	Light Brown	soft texture
30%	Brown	soft texture
40%	Brown	soft texture
50%	Brown	soft texture
60%	greenish brown	soft over hard

Lemna sp. is a macrophyte that grows on the surface of the water and photosynthesis for its energy formation. Lemna sp. contains chlorophyll which is green, which does not disappear when passing through the fermentation process. This is shown in fermented products that are still dark green. Likewise, when mixed with other ingredients, the fermented Lemna sp contributes its chlorophyll in feed products, so that the feed becomes green. The intensity of the green color that appears in the feed will depend on the number of fermented lemna products added. The more fermentation sperm is added to the feed, the greener the feed color will be. This is indicated by the 60% giving rate of fermented yields of green colored feed which is brighter than other treatments (Figure 1). For the color of the pellet, it turns out that the results obtained are close to the color of the pellets that are usually sold / commercial, namely brownish. However, there is a slight change in color between the pellets mixed with the fermented lemna and not.

Pellets mixed with fermented lemna flour tend to be darker in color than those not coated and this is due to the content of the glue that absorbs and covers the surface of the pellet. There are several types of fish that are selective of the feed given and these traits appear to be related to the attractiveness of feed, including those affected by smell, taste, and color (Mudjiman, 2008, Stradmeyer *et al* 1998).



Commercial feed (Control)



30% fermented *Lemna* sp. meal

40% fermented *Lemna* sp. meal

50% fermented *Lemna* sp. meal

60% fermented *Lemna* sp. meal

Figure 1. The color of feed in various additional *Lemna* sp. fermented products

Similarly with texture, feed with an additional 60% of *Lemna* sp. fermented has a harder texture compared to other treatments. This is in line with the addition of tapioca flour by 10% having and higher hardness than fish pellets on the market (Fathia, 2016). The texture quality of fish feed is caused by the use of raw materials with forage flour which has a coarser texture than other flour. According to Aslamyah (2009), the texture of feed can be seen from the surface of a smooth, fibrous or perforated feed. This is influenced by the fineness of the raw material, the amount of fiber, and the type of binder used. the finer the feed, the better the quality, because fine food facilitates the digestion process of fish.

3.3. Feed Response

Feed response is one indicator of the quality of fish feed. The level of fish preference shows the palatability of feed, and one of them can be measured through the time is taken until the fish eat the feed given. Feed consumption is influenced by the palatability of feed given (Halver, 1989). Table 3 shows that the addition of *Lemna* sp. the higher in feed affects the increase in feed intake time by fish.

Table 3. The response of various types of fish to feed with *Lemna* sp. fermentation

addition of lemna (%)	Feed Response (Seconds)		
	Nile tilapia	striped catfish	giant gourami
Control	0.79	2.93	1.80
30	0.73	3.20	1.37
40	0.51	3.60	1.28
50	0.72	4.33	1.20
60	0.57	4.57	1.13

Chemicals that diffuse from food into water will stimulate fish chemosensory cells. Fish-eating habits are strongly influenced by the mixture of chemicals contained in feed so that the common sensory cells in fish must be stimulated to give a response to feed. Eating behavior in fish shows that Olfactory (sense of smell) and gustatory (sensory taste) are sensitive to food ingredients that are similar to fish food. Olfactory is a sense of the distance, while the gustatory is a sense of short range. Olfactory plays a role in giving signals to approach food, while gustatory plays an important role in the decision to accept or reject food (Houlihan et al 2000; Michael 2006).

The response of fish to feed decreases as the addition of Lemna sp results fermented into a feed. This is related to the green aroma that fish don't like. Babo et al. (2013) stated that the taste and aroma of forage feed were less favored by fish, thus reducing fish appetite and appetite, and in turn had an impact on low growth. In contrast to animal-based feed, several studies have shown that the addition of attractants in the form of animal protein sources in feed can accelerate feed consumption time, increase fish growth, increase survival, and speed up production time (Izquierdo, 2001; Gammanpila et al 2007; Hepher, 1990).

4. CONCLUSION

The more fermented *Lemna* sp. meal products added to feed, the more green color of the feed produced and the rather hard texture. Addition of *Lemna* sp. the higher in feed affects the increase in feed intake time by fish.

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