The Effect of Adding Synbiotics Into Commercial Feed Towards Protein Retention and Fat Retention of Dumbo Catfish (Clarias sp.)

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Abstract. Quality feed is required in order to increase dumbo catfish production. Feed is one of the important components that affect the production activities, thus requiring effective and efficient management, one of which is by adding synbiotics. Synbiotics is a conventional ration development conducted by combining probiotics and prebiotics given at the same time. The term synbiotics is used for products containing both probiotics and prebiotics in one medium. The amount of nutrient that can be absorbed from feed to be stored in fish’s body is described with retention value. This is an experimental study with Completely Randomized Design consisting of 4 treatments and 5 replications with different doses, i.e. P0 (without synbiotics), P1 0.5 dose (0.25 ml of probiotics + 0.0125 gr of prebiotics), P2 1 dose (0.5 ml probiotics + 0.0250 gr prebiotics), P3 2 doses (1 ml probiotics + 0.0500 gr prebiotics). Data analysis was processed using ANOVA (Analysis of Variant) and then proceeded with Duncan Multiple Test. The best protein retention result was found in P2.

Keywords: Dumbo catfish, Synbiotics, Retention.

1. Introduction

Dumbo catfish (Clarias sp.) is one of Indonesia’s freshwater fisheries commodities with prominent economic value. This kind of fish is potential to be cultivated commercially due to its rapid growth rate. Demands on dumbo catfish shows significant increase each year. According to data from Marine and Fisheries Ministry (2016), dumbo catfish production has reached 337,577 tons in 2011 and has increased to 722,623 tons in 2015. This implies that dumbo catfish is one of the commodities favored by societies.

Quality required is required to increase dumbo catfish production. Feed is one of the important components that affect production activities, thus requiring effective and efficient management, one of which is by adding synbiotics. Synbiotics is a conventional ration development conducted by combining probiotics and prebiotics given at the same time (Winarno, 2003). The term synbiotics is used for products containing both probiotics and prebiotics in one medium.

The amount of nutrients that can be absorbed from feed to be stored in fish’ body is described with
retention value. According to Lovell (1989), retention values of protein and fat indicates the use of feed nutrient that has been digested by the fish’s body, absorbed and stored to generate energy.

Protein retention is the amount of protein stored in the form of tissues in a fish’s body divided by the amount of protein in the consumed feed. Fat retention is the amount of fat stored in the form of tissue in a fish’s body divided by the amount of fat in consumed feed (Hariati, 1989).

There has not been many studies on synbiotics addition into commercial fish feed. Therefore, it is important to conduct a study on the effect of adding synbiotics into commercial feed towards protein and fat retention of dumbo catfish (Clarias sp.).

2. Methods
2.1. Time and place
This study was conducted from March to April 2018 at Wet Laboratory of the Faculty of Fisheries and Marine Universitas Airlangga, Surabaya. Proximate analysis was conducted at Feed Laboratory of the Faculty of Veterinary Universitas Airlangga, while analysis of bacterial counts was conducted at Biological Service Unit of Faculty of Science and Technology Universitas Airlangga.

2.2. Tools and materials
The tools used were 20 aquariums in the size of 20 cm x 30 cm x 35 cm, aeration hoses, aeration stones, aeration blower, landing nets, digital scale, pH paper, thermometer, DO test kit, ammonia test kit, siphon tools, trays, scalpels and sprayers.

The test fish were dumbo catfish (Clarias sp.) with the size of 5-8 cm obtained from Mina Usaha Farmers, Cemeng, Bakalan Sidoarjo. There were four treatments and five replications. Each aquarium was filled with 10 fish and thus 200 fish were required for this study.

Feed ingredients used in this study was commercial feed containing 32% of pallet combined with commercial probiotics containing bacteria Bacillus sp., Bifidobacterium and Lactobacillus sp. and commercial prebiotics containing oligosaccharides.

This study was prepared by cleaning all tools to be used. The tools were maintenance aquarium sized 30 cm x 30 cm x 35 cm. Prior to the use, the aquariums were given chlorine and were left for 1 x 24 hours, rinsed clean and then dried out. After aquarium filled with water, they were aerated for 1 x 24 hours to increase dissolved oxygen and get rid of undesirable chemical materials that might be in the aquariums.

Dumbo catfish were maintained for 30 days in the aquariums with density of 1 fish per liter. Before put into the aquariums, dumbo catfish were acclimatized first to avoid stress and for the fish to be able to adapt with their new environment.

This study began with proximate analysis on the meat of dumbo catfish before treated with synbiotics in order to know if adding synbiotics affects protein and fat retentions of dumbo catfish.

The probiotics and prebiotics used in this study were the products of PT Centra Biotech Indonesia. The next step of this study was mixing probiotics and prebiotics according to the specified doses and then left for 1 x 24 hours. It was then added with water according to the dose as specified in the packaging. Synbiotics was sprayed into commercial feed and then was aerated for 15 minutes (Sari, 2012). To find out the amount of bacteria in the synbiotics, bacterial count analysis was conducted at Biological Service Unit of Faculty of Science and Technology Universitas Airlangga.

The feeding was carried out three times a day, in the morning, afternoon, and evening, with the dose 10% of total body weight. It is in accordance with a statement from Sunarma (2004) that the feed dose for catfish with the length of 5-8 cm is 10% of the total body weight.

During maintenance, siphon tools were used three times a day to clean feed leftovers and dirt. This is in order to keep the water quality in the maintenance media good and non-toxic.

The measurement of quality of water such as temperature, DO, pH, and ammonia in the aquariums were controlled once a week. The water quality was measured in order to know if the condition of water in the aquarium is optimum for dumbo catfish. Catfish’s bodyweights were weighed one in seven days in order to know the growth rate and to determine the amount of feed to be given. At the
end of the maintenance, the fish were dissected and the meat was taken to be analyzed for the protein and fat content and then the protein and fat retention was calculated.

3. Result and discussion

3.1. Protein retention

| Treatment | Protein Retention (%) ± SD   |
|-----------|------------------------------|
| P0        | 15.34a ± 1.06                |
| P1        | 17.04b ± 1.41                |
| P2        | 18.73c ± 0.77                |
| P3        | 17.64bc ± 0.99               |

Description: P0 (without synbiotics). P1 0.5 dose (0.25 ml of probiotics + 0.0125 gr of prebiotics). P2 1 dose (0.5 ml of probiotics + 0.0250 gr of prebiotics) and P3 2 doses (1 ml of probiotics + 0.0500 gr of prebiotics). Different superscripts within the same column indicates a significant difference (p<0.05).

The result of Analysis of Variants (ANOVA) calculation indicated a highly significant difference (p<0.01) towards dumbo catfish’s retention values of protein and fat. Thus, Duncan further testing was conducted to determine if there is any difference between treatments. The result of Duncan further testing showed that the highest protein retention value was in P2 with 18.73%. It is far different from those in P0 (15.34%) and P1 (17.04%), but not much different from that of P4 (17.64%).

The average protein retentions in P1, P2, and P3 were 17.04%, 18.73% and 17.64% respectively. It indicates that the addition of synbiotics is able to increase protein retention value, which is in line with a study by Faradiba (2015) reporting that adding probiotics without prebiotics resulted in increased protein retention by 4.76% in parrotfish. Synbiotics is allegedly able to stimulate digestive enzymes activities in small intestines and to compete with pathogenic bacteria in nutrition utilization, thus reducing the chance of pathogenic bacteria to breed (Winarno, 2004).

The result of this study on adding synbiotics into commercial feed showed that the best protein retention result was in P2 with 1 dose of synbiotics (0.5 ml of probiotics + 0.0250 gr prebiotics). This is in line with a study by Sari (2012) reporting that adding 1 dose of synbiotics is able to increase daily growth rate in catfish. According to Hartono et al. (2016), it is because oligosaccharide content in prebiotics can be used by bacteria *Lactobacillus* and *Bifidobacterium* to create low-pH condition where pathogenic bacteria cannot grow and breed.

The highest increase of retention value in P2 is allegedly due to synbiotics’ performance that stimulates probiotics bacteria in digestion, causing them to work optimally to increase nutrient availability through protein hydrolysis into simpler substance, i.e. amino acid. It eases metabolism process because the protein absorption is assisted by protease enzyme. This corresponds with a statement from Putra (2010) that synbiotics is able to activate protease enzyme in fish digestion. Therefore, the protein in the feed can be absorbed better by intestines to be used by the body and the utilization of the feed becomes optimum.

The low protein retention in P0 might be due to reduced number of non-pathogenic bacterial colonies because they lose in the competition with pathogenic bacteria (Hartono et al., 2016). This is in line with the argument from Askur (2011) that probiotic bacteria will compete for nutrients with pathogenic bacteria, in which if probiotic bacteria do not get sufficient amount of nutrient, an extreme change will occur in the digestion, causing probiotic bacteria to be washed-out rapidly (Lisal, 2005). This may inhibit nutrient absorption process due to the pathogenic bacteria in the digestive tract.
3.2. Fat Retention

| Treatment | Fat Retention (%) ± SD |
|-----------|------------------------|
| P0        | 3.91 ± 1.45            |
| P1        | 5.14 ± 1.27            |
| P2        | 6.31 ± 2.20            |
| P3        | 5.71 ± 1.30            |

Description: P0 (without synbiotics), P1 (synbiotics 0.5 dose), P2 (synbiotics 1 dose), P3 (synbiotics 2 doses).

The result of statistical test showed that adding synbiotics into commercial feed did not result in significant difference (p>0.05) towards fat retention of dumbo catfish. Fat retention in P1, P2, and P3 increased compared to control treatment.

The result of statistical test showed that adding synbiotics into commercial feed did not result in significant difference (p>0.05) towards fat retention of dumbo catfish. The data in Table 5.2 indicates that fat retention in P1, P2, and P3 increased compared to control treatment. This is also supported by a study conducted by Faradiba (2015) where adding probiotics without prebiotics resulted in fat retention value of 5.07% in parrotfish.

The low difference of fat retention value between treatments is suspected to be caused by high content of protein in feed (32%), leading to higher energy required for metabolism process. The amount of fat used to generate energy is probably much greater than the fat stored in the body. This corresponds with the argument from Komariyah (2009) that fat can serve as protein-sparring effect, which means that fat functions to replace protein as the energy source, causing the use of protein to be optimized for the growth.

3.3. Water Quality

| Parameter        | Result |
|------------------|--------|
| Temperature (°C) | 27-28  |
| pH (ppm)         | 6-7    |
| DO (mg/l)        | 4-6    |
| Ammonia (mg/l)   | 0.5    |

The parameter of water quality measured in this study included temperature, pH, salinity, dissolved oxygen (DO) and ammonia. The temperature of maintenance water in this study was around 27-28°C. It is supported by a statement from Sunarma (2004) that the temperature for dumbo catfish is around 22-34°C. The measurement result for pH showed the range of 6-7. According to Sunarma (2004), good acidity for the growth of dumbo catfish is around 6-9. Dissolved Oxygen (DO) in this study ranged between 4-6 mg/l, which is considered optimum for dumbo catfish. It is in line with the argument of Sunarma (2004) that the ideal dissolved oxygen level in the water for the growth of dumbo catfish is >1 mg/l. The result of ammonia measurement in this study was 0.5 mg/l, indicating that the ammonia
level is good for dumbo catfish maintenance. This corresponds with Wijanarko (2002) that the ideal ammonia level for dumbo catfish is >1 mg/l.

4. Conclusion and suggestion
From the result of this study on the effect of adding synbiotics into commercial feed towards protein and fat retentions of dumbo catfish (Clarias sp.), it can be concluded that the adding of synbiotics into commercial feed gives a significant effect towards protein and fat retentions of dumbo catfish (Clarias sp.).

Based on the result obtained in this study, it is suggested to conduct a further study on the effect of adding synbiotics into the other parameters in fisheries.

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