Global Scientific JOURNALS

GSJ: Volume 9, Issue 11, November 2021, Online: ISSN 2320-9186

www.globalscientificjournal.com

REVIEW ARTICLE : UTILIZATION OF FISH INNARDS FOR SILAGE

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ABSTRACT

Fish innards can be processed into silage in the form of flour. This silage flour can be used as a substitution of fish meal in the manufacture of fish feed. This article aims to inform the proximal characteristics of silage flour from fish innards. Based on the literature study obtained information that the proximal characteristics of silage flour from fish innards are as follows: Protein contents ranges from 40.92% to 54.17%, Fat content ranges from 14.27% to 24.17%, Mineral content ranges from 2.51% to 5.51% and the content of coarse fiber ranges from 2.34% to 4.57%.

Keywords : *Subsitution, fish feed, characteristics, flour.*

INTRODUCTION

Fishing processing activities cause byproducts in the form of waste. Waste is processed waste or waste generated from a production process both from industry and from domestic (household) that has no economic value. According to Hikamah and Mubarok (2012), waste is a substance, energy or component that can degrade the quality of the environment. Generally waste (pollutants) can be in the form of solids, liquids and gases. Discarded fishery waste is usually in the form of offal, skin, bones, fins, blood and water leftover production. According to Hossain and Nature (2015), fish innards contain 14.01% protein, 20% lipids, 4.75% ash content, 60.62% water content.

The innards of this fish are widely discarded because it is considered that it can no longer be processed. Though the innards of this fish has a high protein content so that it can be used as an alternative feed material. Fish innards can be processed into silage, then dried so that it is floury.

Fish silage flour can be used as a subsitution material or substitute for fish flour. Fish silage flour has characteristics that meet for feed ingredients. Characteristics in a good feed must have easy-to-digest, easy-to-obtain properties, relatively cheap prices and have high enough protein levels to have an effect on the optimal growth of individual fish. Currently to meet the availability of feed has difficulty because the raw material of feed that is fish flour has a fairly expensive price so that it can have an impact on the price of rations. The purpose of this article is to inform the proximal characteristics of silage flour from fish innards.

The process of making fish silage flour from fish innards

Fish silage or fish silage flour is one of the alternative products that can be developed in processing fish processing waste by fermenting to meet the needs of fish flour in Indonesia. Fish waste is processed silage first to overcome premature decay, due to the high activity of microorganisms in fish innards. 4 kg of fish silage can replace 4 kg of fish meal, based on the results of research by the Center for Agricultural Research and Development, (Sumarsih et al., 2010). From the results of research conducted by Herizon (2006), that the optimum level of silage of patin fish innards (*Pangasius hypothalamus*) to produce the best growth is 25% of the total protein contribution of fish meal. From the results of research Ramasubburayan et al. (2013) that fish silage with a mixture of 2% formiat can increase the weight and growth of goldfish significantly.

The process of making fish ceilings is carried out in two stages, namely cleaning fish innards then milling and the second stage is mixing or homogenizing the results of the mill with probiotic fish ceiling making materials (*Lactobacillus casei* and *Saccharomyces cerevisiae*) plus molasses in accordance with their respective treatments. Cleaning of fish innards aims so that the number of bacteria in the body of fish can be reduced, because in the innards of fish there are more bacteria. Fish quickly become rotten and damaged if left alone in the open air (about 5-8 hours after the fish is caught). This is because all decay processes require water, while 80% of a fish's body is made up of water. With shrinkage or depleted moisture content, the crushing bacteria will no longer be active. The required water content limit is 30% to 40% so that the development of crushing bacteria can be

hampered so that fish can be maintained to remain in a durable state. After grinding then mixed with the addition of probiotics plus molasses according to treatment. The use of probiotics and molasses is probiotics as much as 1 ml for 1 kg of fish offal and molasses by 20% and 30%. The use of probiotics as much as 1 ml based on the recommended use on the probiotic label used. After mixing the silage-making material with the innards of the fish, then the silage is fermented for 7 and 14 days in a sealed container. According to Supriyati et al (1998), fermentation for 3 days using *aspergillus niger* type can increase coarse protein (PK) levels and dry material digestible value (KBK) in vitro with dry material loss (BK) which at least then Suharto (1997) stated the length of fermentation in the manufacture of fish silage for 7 days while the length of fermentation of fish silage making is for 14 days. In addition, stirring is done 3 times a day for the first 3 days and 1 time a day after 3 days. Stirring is done to homogenize silage during the hardening process. According to Suharto (1997), stirring is done 3-4 times in the first 3 days and after that stirring is done 1 time a day. The harvest of fish silage is done on the 7th and 14th days. Silage is harvested into a plastic container and then put in a refrigerator before chemical, biological and physical testing. The purpose of this is so that the reactions that occur in silage both biologically and chemically stop.

Making Silage Flour mixed with Hyacinth (Jayanti, 2018)

The process of making silage flour according to Hossain and Alam (2015) that has been modified is as follows.

1. Waste (fish innards) is washed and mashed using a blender
2. Waste weighed 500 grams put in glass jar
3. Added formic acid 85% as much as 3% of the total weight of raw materials
4. The waste mixture is stirred until flat then fermented for 14 days
5. The silage of fish waste is measured pH, then neutralized with soda ash as much as 3% of the raw material weight.
6. Silage of fish waste that has been neutralized, mixed with hyacinth flour 20% of the weight of raw materials
7. The mixing results are dried by oven for 50ºC for 50 hours then finely ground until it becomes silage flour.
8. Fish waste silage flour in physical and chemical analysis

QUALITY OF FISH OFFAL SILAGE

To get a good quality fish silage product must be added a mixture of formiat acid and propionic acid as much as 3%. Formy acid or metanoic acid also known as ant acid is an organic compound that contains carboxyl groups (-CO_2H) and is part of carboxylic acid compounds. The purpose of using this formous acid mixture is to accelerate fermentation, while propionic acid serves to prevent the growth of fungi. The use of this organic acid has been widely researched in the manufacture of fish silage. One of them is Saleh and Rahayu (1981), that the mixture of formiat acid and propionate produces the best fish silage. A mixture of formal acid and propionic acid can stop the spoiling bacteria that damage the nutritional content of the fish. The ratio of formy acid with propionate is 1: 1 with 3% use. The use of acid is less than 3%, the resulting silage will be susceptible to mold and the pH decrease is relatively slow (Company and Ilyas, 1993). Yeoh (1999), reported that the addition of 85% formiat acid in the manufacture of temyata fish silage was able to lower the pH from 6.5 to 3.8 and was relatively stable at a pH of 4.4. While Mairizal (2005), malaporkan that the manufacture of fish innard silage using 3% formiat acid 85% is able to reduce pH from 6.4 to 3.6 and stable at pH 4. The manufacture of silage by adding acids can increase the protein content inhibits the activity of the crushing organism and helps the breakdown of proteins into short peptides or amino acids that are easily digested by fish. Silage methods are also more practical to overcome decay early.

Silage research with various types of acids has been done a lot and get pretty good results. According to the results of the Akhirany study (2011), that fish silage made chemically using organic acids produce silage with a protein content of 76.5% with a fat content of 9.2%. The main problem of silage products is too high in water content, making it difficult to dry and not durable. Direct drying of a protein source feed material will produce flour that is still hygroscopic, which ultimately causes the material to be not durable and cause clumping (Kompiang, 1981).

According to Purba (2001) the silage of tilapia fish innards contains a further 51.67% protein Setiawati et al., (2002) the silage of tilapia fish innards can replace 50% of the protein derived from fish meal in tilapia gift fish feed, because at that rate the growth of fish is still high and the efficiency value is still high and silage offal tilapia fish can be used as a mixed ingredient in fish feed formulations.

According to Yanto (2010), In general, the higher the silage level the higher the protein retention to some extent, and then decrease again with the higher the silage levels in the

feed. Gallagher (1993) in Ali et al., (2002), The increase in protein and fat content is thought to be due to the presence of a number of free amino acids and the high activity of hydrolysis enzymes in experimental feed containing silage.

Protein content in Hossain and Alam research silage flour (2015) added rice bran by 20.84% and Supriyanto research (2015) silage flour with the addition of fermented kiambang by 32.71%. The quality standard of 3 fish meal proteins according to SNI (1996) is at least 45%, the protein content in silage flour has met the standard to replace fish flour.

The fat content of fish silage flour by using freshwater fish waste raw materials is greater than sea water fish waste. It is suspected that the high fat depends on the type of waste raw material used. Fat content of patin fish innards 26.51% (Hastarini et al., 2012), tilapia fish 2.57% (Haris, 2008), cork fish innards 2.26% (Oktavia, 2011), cob 0.87% (Suhandana 2010), bloated fish innards 0.44-3.01% (Salamah et al., 2004). The fat content of silage flour with higher freshwater fish waste raw materials is due to the high fat content in freshwater fish waste.

According to Utomo et al. (2013), mineral content is not only obtained from bones but from raw materials and other parts of the fish body (Utomo et al., 2013). Calcium in silage flour is obtained from the waste of fish used, namely gills.

The results of the proximal silage test of patin fish in the study Debby Alvionita Hutagaol (2019) are protein 54.1%, fat 21.79% and ash 4.29 % (Probosasongko, 2003). Furthermore, in the Jayanti et al. study, 2018 obtained the results of proxy tests of fish innards silage flour protein levels with differences in raw materials and additives of hyacinth flour ranged from 40.92% to 47.43%, fat levels ranged from 14.27% to 24.17%, coarse fiber levels ranged from 2.34% to 4.57% and calcium levels ranged from 2.51% to 5.51%.

FISH INNARDS SILAGE FLOUR MARKET IN INDONESIA

The market in Indonesia regarding the silage of fish innards as an alternative to fish feed raw materials is still lacking even not even sold in the market. This is because there is still a lack of public understanding of the benefits of fish innards that can be processed into silage flour. But that way this provides great opportunities and opportunities for students or the fishing industry that has been running to take advantage of fish innards processed into fish meal silage so that it can be marketed in Indonesia and can replace fish meal. In addition to providing personal benefits, it can also support the fisheries sector in Indonesia by providing fish silage flour ingredients at affordable prices compared to fish flour.

CONCLUSION

Based on the literature study obtained information that the characteristics of silage flour from fish innards are as follows: protein content ranges from 40.92% to 54.17%, fat content ranges from 14.27% to 24.17%, mineral content ranges from 2.51% to 5.51% and coarse fiber content ranges from 2.34% to 4.57%.

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