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ANALYSIS OF THE TYPES OF BACTERIA CONTAINED IN THE PROCESS OF FERMENTATION OF BEKASAM

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Abstract

Bekasam is a traditional food product fermented from freshwater fish with the addition of rice and salt. This review article aims to get information aboutthe bacteria involved in the fermentation process of processed used fish, peranan bakteri to processed used fish and the impact of direct addition of bacterial stater lactic acid in the process of making processed used fish. Based on the results of the review study obtained information that the types of bacteria that play a role or are involved in the fermentation process processed fish bekasam is from the group of lactic acid bacteria. Lactobacillus *plantarum* and *Lactobacillus acidophilus.* The role of lactic acid bacteria is to produce enzymes that are able to convert carbohydrates (glucose) into lactic acid so that it can inhibit the growth of other bacteria including rotting bacteria. The impact of the direct addition of lactic acid bacterial stater to the process of making processed used fish is to improve the functional properties of used fish as a functional food product.

Keywords : Bekasam, BAL, Bacteria, Fermentation

INTRODUCTION

Waste fermentation is fermentation that occurs spontaneously, relying only on salt as a selector of microorganisms (Rahayu, 2000). Microorganisms that grow with the presence of salts on the scars are lactic acid bacteria that belong to the group of amymoilotic microorganisms. According to Pambayun and Kurnia, amylase which is the main carbohydrate will be the initial

substrate for lactic acid bacteria, then hydrolyzed into simple carbohydrates. According to Hidayati (2012), lactic acid bacteria are able to hydrolyze various monosaccharides and disaccharides. Therefore, carbohydrate sources are used in the form of glutinous flour, meizena flour, wheat flour, tapioca flour and rice flour. (Ayu Kalista *et al* 2012).

According to Taufik (2007), the waste is made with several stages, namely weeding, washing fish, mixing rice and salt into the fish's abdominal cavity, entering into a closed container and fermented for 7 (seven) days. During the fermentation process, conditions must remain controlled and there is no air (Lestari et al 2018). Bekasam has a fairly good nutritional composition and is consumed as a complement to side dishes. Bekasam is not yet commercial enough in the market as a fermentation product, compared to other fermented products, such as fish sauce and peda.

Bekasam was made as one of the efforts of the previous community to preserve fish during the harvest season. The large number of fish and the unavailability of facilities to preserve food at low temperatures, makes people try various ways of processing fish so that fish are not threatened with rot. Fermentation in the former is done traditionally by utilizing natural / spontaneous fermentation. The fermentation process is not only done by adding salt to the ingredients, but also the addition of rice as a source of carbohydrates for the growth of microorganisms. Carbohydrates will be decomposed into simple sugars by microorganisms, then they will be converted into lactic acid, ethanol, acetic acid, formic acid, and CO2. The result of fermentation is what will give the taste and aroma typical of the former. Before consumption, the waste is cooked first and then eaten as a side dish to eat rice. In this waste fermentation, there are several bacteria needed for maximum waste fermentation results (Lestari et al 2018). Every bacterium in the fermentation process of the former has a role and influence on the processed waste. This review article aims to get information aboutthe bacteria involved in the fermentation process of processed used fish, peranan bakteri to processed used fish and the impact of direct addition of bacterial stater lactic acid in the process of making processed used fish.

Types of bacteria in processed used fish

Microorganisms that play a role in the waste process are a type of lactic acid bacteria. Lactic acid bacteria are classified as *lactobacillae faimili*. Bacteria in this group include gram positive non-spore, long rod-shaped, facultative anaerobic and negative catalases. The most

important property of lactic acid bacteria is their ability to ferment sugar into lactic acid. This property is important in the manufacture of fermented products such as fermented vegetables, milk, and fish. Because acid production by lactic acid bacteria is rapid, the growth of other unwanted microbes can be inhibited.

There are basically two small groups of microorganisms from the lactic acid bacterial group, namely organisms that are homofermentative and heterofermentative. Lactic acid bacteria in the body is a type of homofermentative lactic acid bacteria that produce only lactic acid from the sugar metabolism it does (Buckle, 1987).

Proteases are enzymes capable of hydrolyzing proteins into simpler compounds such as small peptides and amino acids. The world's enzyme industry is almost 60% protease enzyme derived from microbes. Protease user industries include detergents, food, pharmaceuticals, chemicals, skins, and paper industries. Microorganisms as a source of enzymes are more profitable because of the low production costs, using environmentally friendly sources, easier to increase productivity and thermostabil. One of the potential microorganisms producing protease enzymes is lactic acid bacteria (BAL) that are isolated from the former. *Lactobacillus plantarum* SK (5) is a type of lactic acid bacteria isolated from fermented fish products (bekasam).

The role of bacteria on processed used fish

Bekasam is a processed fish product by fermentation using high salt levels and lactic acid bacteria. Lactic acid bacteria in these scars are *Lactobacillus plantarum bacteria.* Lactic acid bacteria are a group of bacteria capable of converting carbohydrates (glucose) into lactic acid. The bactericidal effect of lactic acid is related to a decrease in the pH of the environment to 3 to 4.5 so that the growth of other bacteria including rotting bacteria will be inhibited (Oktaviani, 2004).

The growth of *Lactobacillus plantarum* can inhibit contamination from pathogen and toxin-producing microoganism due to its ability to produce lactic acid and lower the pH of the substrate, in addition to lactic acid bacteria can produce hydrogen peroxide which can serve as an antibacterial (Suriawiria, 1983). *Lactobacillus plantarum* also has the ability to produce bacteriocins that function as antibiotic substances (Jenie and Rini, 1995).

The effect of bacteria on the quality of processed fish used

Lactic acid bacteria from the former are used as a starter for fermented products (Hidayati 2012), as a bacteria producing antibacterial / bacteriocin substances, and as probiotic bacteria

(Taufiq 2007). Lactic acid bacteria in these scars are *Lactobacillus plantarum* bacteria. Lactic acid (BAL) bacteria have been widely used as a starter culture for fermenting meat, milk, and vegetables. The role of BAL is to improve the taste of fermented products, provide preserving properties of a product and can increase the digestibility value of nutrients. This is due to the hydrolysis of proteins into free amino acids during fermentation. Lactic acid bacteria during the fermentation process also produce bioactive components that function for health, including antihypertensive, antibacterial, and anticolestrol *Lactobacillus acidophilus*, one of the BAL isolated from fish as wide as possible fish is known to produce lovastatin as an inhibitor of cholesterol synthesis. Lovastatin belongs to a statin compound also known as monaco K or mevinolin. Desniar (2011) mentioned that the compound lovastatin acts as a competitive inhibitor for the enzyme HMG-KoA (3-hydroxy-3 methylglutayl Coenzyme A) reductase, which is an enzyme that determines cholesterol biosynthesis so that it can help lower cholesterol levels in the blood. Kasim et al. (2005), stated that lovastatin can lower blood cholesterol levels by 11%-32% and triglyceride levels by 12%-19%. The addition of lactic acid bacteria as a starter in the manufacture of scars can not only be done to improve the nutritional quality (digestibility) of the former but is expected to also increase the functional value of the former, therefore in this study the addition of L. acidophilus as a starter in the manufacture of scars which is expected to have a positive effect on the characteristics of the former and the functional properties of the former in producing lovastatin known as anticolestrol.

The fermentation process is strongly influenced by the presence of lactic acid bacteria.

The average total value of used BAL after fermentation for 7 days tends to increase along with the increased concentration of starter L. acidophilus used. Lactic acid bacterial cells can grow to the maximum amount in a medium that is affected by the availability of nutrients in that medium. This is in accordance with the opinion of Hidayat et al. (2013), which states that the increase in the concentration of starters is followed by an increase in the number of bacteria in the media and ideal conditions, which will be followed by increased activity and breeding of bacteria.

The results of the fingerprint analysis of the average variety of total BAL values in the former produce different values are not real at the level of 5%. This is because BAL that grows and develops in the fermentation of waste is not only a type of L. acidophilus bacteria but all types

of BAL that generally play a role in the fermentation process. Candra et al. (2007) successfully isolated lactic acid bacteria from *the Streptococcus* and *Lactobacillus* groups and *Staphylococcus* from the traces. *L. plantarum* used as a starter is BAL derived from traces that are isolated based on its ability to form lovastatin (Rinto et al. 2015b). The antagonist's ability *of L. plantarum* against lactic acid bacteria and other bacteria is not yet known. Therefore, it is still possible for the presence of other BAL that also grows during the fermentation process so that it does not have a significant effect on the total bal of the former.

According to Ayu Kalista's research (2012), the total log number of lactic acid bacteria increased from 8.01 (day 2) to 8.95 (day 6) and then decreased until the 10th day with a value of 8.27. The total log count of bacteria (TPC) decreased until the fermentation of the 4th day from 7.46 to 7.1. However, on the 6th day of fermentation there was an increase with a value of 8.16 and then decreased again until the fermentation of the 10th day with the value of the results of the study showing that the total lactic acid bacteria produced during fermentation was higher than the total bacteria. The longer the fermentation time, the number of lactic acid bacteria increases.

How bacteria multiply in waste fermentation

In the logarithmic phase, lactic acid bacterial cells grow and divide to the maximum amount, resulting in high lactic acid. The increase in total BAL that occurs in fermented products is caused by the addition of salts that can stimulate the growth of lactic acid bacteria (Anwar et al., 2014). In addition, the addition of carbohydrates also makes a good environment for the growth of lactic acid bacteria and can be a source of energy for these bacteria. Conversely, the total value of bacteria (TPC) obtained during the fermentation process tends to decrease. This is due to increasingly acidic conditions, so only bacteria that can withstand acidic conditions can live. According to klinic et al. (2006), the total decrease in bacteria in the waste fermentation process is caused by lactic acid bacteria converting carbohydrates into lactic acid, causing an acidic atmosphere resulting in a decrease in pH. So that bacteria that are not resistant to acidic conditions can be inhibited in their growth.

Total Titrated Acid During the fermentation of the traces the total value of the titrated acid increased from day 2 to day 7, with a value of 0.36% to 1.17%. While on the 8th day it decreased by a value of 0.63% and then increased again on the 10th day to 0.99% can be seen in Figure 5.

The increase and decrease in the total value of acid is related to the number of lactic acid bacteria found in the former. The higher the total lactic acid bacteria, the higher the total lactic acid produced (Kusmarwati et al., 2011).

Conclusion

Based on the results of the review study obtained information that the types of bacteria that play a role or are involved in the fermentation process processed fish bekasam is from the group of lactic acid bacteria, especially *Lactobacillus. plantarum* and *Lactobacillus acidophilus.* The role of lactic acid bacteria is to produce enzymes that are able to convert carbohydrates (glucose) into lactic acid so that it can inhibit the growth of other bacteria including rotting bacteria. The impact of the direct addition of lactic acid bacterial stater to the process of making processed used fish is to improve the functional properties of used fish as a functional food product.

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