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Microbial analysis on freshwater shell (*Corbicula sumatrana*) in singkarak lake solok district west sumatera Indonesia

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Abstract

Corbicula sumatrana is typical of freshwater mussels or brackish water economically valuable. *Corbicula sumatrana* is a shellfish which known by people with the name Lokan. Lokan consumed by people as a source of animal protein and animal feed ingredients. Singkarak Lake is used by people in daily life from the source of drinking water, toilets, fisheries, irrigation, Hydroelectric Power Plant and Tourism. Many activities of the community could be expected to cause pollution and affect the *C. sumatrana* become vectors of biotoxin because his diet is filter-feeder. Lokan meat is an excellent medium for bacterial growth. This study aims to determine the presence of *Escherichia coli* and *Salmonella* sp. on fresh meat shellfishes (*C. sumatrana*) originating from Singkarak Lake. The research was conducted in April–August 2015 and January –April 2016. This research is a descriptive method, by looking at and analyzing the presence of microorganisms are bacteria *E. coli* and *Salmonella* sp. The method used to determine the bacteriological quality of the meat is Lokan by MPN method and examination of *Salmonella*. Data were analyzed by calculating the number of bacteria *E. coli* by observing the number of positive results of the estimation of presumptive test, confirmative test and completed test. The next number of bacteria from each positive results are matched with MPN table. *Salmonella* sp. Test was done by looking at the colony grows. The results of bacteriological tests on meat samples were examined in BAPELKES Padang showed that of the four samples tested, three of which were negative for the bacteria *E. coli* samples take in Nagari Singkarak and samples contained negative for *Salmonella* sp. Of this study is suggested to consumers that cooking shellfishes perfectly, to avoid diseases that may occur because it is caused by bacteria.

Keywords: Bacterium, Meat, *Corbicula sumatrana*

1. Introduction

Pelecypoda is the second largest class of the Mollusca Phylum which is widely used by the community as a source of animal protein or as raw material for industry^[5,7]. The waters of Indonesia live a variety of Pelecypoda species. some live in fresh water (rivers and lakes). Pelecypoda that live in fresh water are usually called pensi or lokan and which live in the sea in the sea called shells. Utilization of animal protein source began to demand by some people of Indonesia, especially Pelecypoda types that have economic meaning. One of the animals that inhabit the bottom waters is *Corbicula sumatrana*. *C. sumatrana* is one of the benthic animals that inhabit the bottom waters which are muddy and sandy^[5]. These types of shellfish harvested by people in large numbers. Because it is one of the types of foods that taste good. Residents around Singkarak Lake familiar with the term as “pensi” shells. Besides sold as shellfishes that are still intact, is also sold in the form without a shell. The shellfish is a source of practical and tasty food as a substitute for other animal protein. Shellfish become vectors of biotoxin because the diet that are filter-feeders that by filtering food washed ashore or the flow of water through the gills and pass the necessary ingredients. This process causes the accumulation of plankton, chemical compounds and other small particles in the digestive tract shellfish^[3]. Shellfish *C. sumatrana* is strongly influenced by environmental factors. The most influential environmental factor is the substrate organic content^[12]. Generally in Indonesia *C. sumatrana* is a typical freshwater mussels. *C. sumatrana* were also reported in Diatas Lake, Dibawah Lake and rivers which is located around the lake. Singkarak Lake is one of the largest lake which is located in West Sumatera. In Singkarak Lake is widely available *C. sumatrana* which is used by the public, beside the habitat of this biota, the lake is also used in everyday life, ranging from drinking water sources, sanitation,

fisheries, irrigation, Hydroelectric Power Plant (HEPP) and tourism, The number of community activities at Singkarak Lake, it can contaminate the water. According to Alcamo [8] waters are a wide range of microorganisms and macroorganisms life. Between microorganisms and macroorganism will occur the interaction of them, such as the bacteria are symbiotically with organisms that live in the waters such as plankton, zooplankton, fish, shrimp and scallops.

Most mussels are marketed in the fresh state (do not get treatment) without packing, thus enhancing the development of aerobic bacteria due to contact with air. Aerobic bacteria which can grow is *Salmonella* and others. *Salmonella* is one of the causes of infectious diseases. The affecting factor among other things is poor sanitation hygiene plays an important role in the spread of the disease. *Salmonella* can grow on milk and processed products, shellfish, frozen eggs, meat and meat products. It needs to be examined for bacteriological testing fresh meat of *C. sumatrana* shellfish that comes from Singkarak Lake.

2. Materials and Methods

The sampling of *C. sumatrana* in Singkarak Lake was held in January-May 2016. Bacteriological test is carried out in the Laboratory of Microbiology, BAPELKES Padang. The using tools were autoclaves, incubators, scales, erlenmeyer flask, test tubes, Durham tube, spiritus light, a petri dish, a sterile pipette 5 ml and 10 ml, ose needle, measuring cup, stir bar, test tube rack, alcohol spray, scissors, cookers, filters, buckets, tweezers, mortil, refrigerator, digital cameras and stationery. The using materials are Lokan's meat, selenith broth, LB medium, BGLB, EMB, SSA, plastic bags, distilled water, paper labels, lighters, sticky tape and tissue.

This research was conducted through a descriptive approach. Shellfish samples was taken at Singkarak Lake with 2 times of the decision. Data analysis was done by counting the number of *E. coli* bacteria by examining the number of positive results from the test results estimation, confirmation and the finisher. Furthermore, the number of bacteria of each positive result which was matched the MPN table. *Salmonella* sp. Testing was done by looking at the growing colony. Then, the results of this analysis are compared with the Decree of the Minister of Marine and Fisheries Number: KEP.17/MEN/2004 [8].

3. Results and Discussion

The result of bacteriological test of *C. sumatrana* shellfish's fresh meat that comes from Singkarak Lake in the Laboratory of Microbiology, BAPELKES Padang. The results of the bacteria *Escherichia coli* in shellfish flesh can be seen in Table 1 below. In Table 1 it can be seen that the shellfish taken at Tikalak and Sumani areas found the accumulation of *E. coli* bacteria

Table 1: Presence of *Escherichia coli* in the test table improvers with MPN / 100 ml with Variety: 5 x 10 ml, 1 x 1 ml and 1 x 0.1 ml.

| Sample Code | T1 | T2 | T3 |
|-------------|----|----|----|
| A1 | - | + | - |
| A2 | - | - | + |
| A3 | - | - | + |
| A4 | - | - | - |
| B1 | + | - | + |
| B2 | + | + | - |
| B3 | - | - | + |
| B4 | - | - | - |

Description: T1 = 10 ml of the gas bubble tube, T2 = 1 ml of the gas bubble tube, T3 = 0.1 ml of the gas bubble tube, A = Tikalak District, B = Sumani District

Based on the results showed that the samples of freshwater mussel meat has been contaminated with *E. coli*. *E. coli* is a bacteria of family Enterobacteriaceae which is a normal inhabitant of the gastrointestinal tract warm-blooded animals such as humans and livestock that are in the feces. If it is found that bacteria can be used as an indicator that the freshwater mussel meat contaminated by feces both humans and animals. The bacteria sanitation indicators generally are bacteria prevalent and live in the human gut, so the presence of the bacteria in water or food indicates that the sample had contact with feces from the human intestine and therefore it may contain other pathogens which are harmful. According to Entjang [2], *E. coli* bacteria grows at temperatures of 10 °C to 40 °C and can die on heating above 40 °C for 60 minutes.

In Table 2 below it can be seen that the bacteria *Salmonella* sp. not found in *C. sumatrana* meat.

Table 2: Results of examination of bacteria *Salmonella* sp. reviewed Fresh Meat of shells that comes from Singkarak Lake.

| Sample | <i>Salmonella</i> sp. |
|--------|-----------------------|
| A | Negatif |
| B | Negatif |

Description: A = Location I (Tikalak district), B = Sumani District

Salmonella bacteria thrives in the intestinal tract of humans and animals and can cause food poisoning. Any raw food of animal origin, such as meat, eggs, milk and seafood may carry *Salmonella* bacteria [1]. Most of contamination of *Salmonella* sp. derived from feces. One of the diseases caused by *Salmonella* sp is enteric fever. This syndrome is caused by only a few *Salmonella*, the most important is *S. typhi* (fever typhoidal). *Salmonella* is ingested reach the small intestine into the lymphatic flow and then enter the bloodstream. The organism is carried by the blood to various organs, including the intestines. *Salmonella* multiply in limfoidusus tissue and excreted in the feces [4]. Based on the test results of *Salmonella* sp. means that the freshwater mussel meat is healthy for consumption by the consumer. As there was no bacterium *Salmonella* sp on freshwater mussel meat.

The mussels are filterfeeder which can accumulate bacteria contained in the habitat. Because it is a filter feeder and live as benthic animals, these shells are able to accumulate bacteria on meat [10]. *C. sumatrana* can affect the abundance and spread of bacteria in nature especially in waters because of its nature as filter feeder [6]. Shellfish is one of fishery products which have important economic value. Generally shellfish, after capture of waters is not handled properly. The product quality of shellfish are highly influenced by the waters where shellfish are caught [9]. Some evidence suggests that outbreaks of disease occur in humans due to eating contaminated shellfish. The types of diseases that comes from contaminated shellfish include; Salmonellosis, Tiphoid, Gastro-enteritis, *Vibrio* and biological toxins. *C. sumatrana* is a filter feeder and lives on the bottom of the waters. This way of life makes these shellfish, especially the meat and gill many of the accumulated materials derived from the waters. In the meat and gill of shellfish are found compounds of pesticides [11].

4. Conclusion

Based on the results and discussion which are described above, it can be concluded that the mussel meat of *C.*

sumatrana been contaminated with *E. coli* bacteria, but the *Salmonella* sp. bacteria was not found on this clam meat. Based on the results of bacteriological test can be recommended that the freshwater mussel meat is healthy for consumption by the consumer.

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