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Identification of Bacteria as Health Indicators of Mangrove Crab (Scylla Serrata) at Farm Suppliers in South Kalimantan

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Abstract— *This study aims to identify the types of pathogenic bacteria in mangrove crabs (Scylla serrata) and determine the health condition of mud crabs (Scylla serrata) at farm supply in South Kalimantan Province. The research method used is a case study, with sampling of mangrove crabs by purposive sampling at the farm supplier by considering the form supplier is already a legal entity, is still active in shipping and the frequency of shipments is quite a lot as well as continuous delivery to domestic and export destinations. For locations, sampling of mangrove crabs (Scylla serrata) was carried out at 3 (three) farm suppliers, namely CV. ACS in Banjarbaru City, CV. Three A's in Banjar Regency and UD. SLM in Banjarbaru City. For bacterial examination, it was repeated three times with the number of crab samples adjusted to the delivery population at the time of the study. The results showed that 15 mud crabs were infected with the pathogenic bacteria Plesiomonas sp (42%) followed by Actinobacillus sp. (39%), Vibrio sp. (16%) and Moraxella sp. (3%). The most common type of pathogenic bacteria infecting the farm supplier CV. ACS is a type of Actinobacillus sp. as many as 5 tails, while on the farm supplier CV. Three A are Plesiomonas sp. and Actinobacillus sp each as many as 5 tails and on farm supplier UD. SLM is a type of Plesiomonas sp as many as 6 tails. The condition of the mud crab (Scylla serrata) is declared physically healthy with the characteristics when the swimming legs are pulled away from the carapace and then released, the legs move quickly to their original position, the eye stalks are very responsive, that is, they enter the orbital area when touched, the mouth does not release foam, color The carapace is bright and does not have a bad smell and there are no pathogenic bacteria found in mud crabs that are harmful to the human body or safe for consumption.*

Keywords— ***Mangrove Crab (Scylla serrata). Mangrove Crab Health Indicator***

I. INTRODUCTION

One of the important fishery commodities in Indonesia is the Mangrove Crab (Scylla serrata). According to (Unthari et al, 2018). Mangrove crab (Scylla serrata) is one of the fauna that live in mangrove habitats. Mangrove crab (Scylla serrata) is one of the high economic commodities that is very suitable for breeding. Most of the production of mangrove crabs still comes from the fishing sector in nature.

According to (Risamasu at al, 2014), there are four types of crabs that are generally consumed, namely Scylla serrata, Scylla tranquebarica, Scylla paramamosain, Scylla olilvacea. Scylla serrata is the most popular type of crab as a food ingredient and has a fairly expensive price.

The high traffic of fishery commodities from South Kalimantan Province at this time, especially the Mangrove Crab (Scylla serrata) commodity both for domestic and for export, thus certainly increases the possibility of the entry

and spread of fish diseases from one country to another and from one area to another within the country. territory of the Republic of Indonesia.

Bacterial disease that attacks crabs is one type of infectious disease. This disease occurs from incompatible interactions between three main components, namely the environment, biota, and disease-causing organisms. The cause of this bacterial disease is not always an attack of organisms, but can also be triggered by the environment, such as poor water quality and unqualified food factors.

(Susanti, Prayitno et al, 2016) Bacterial diseases attack all crab stages, both juvenile to adult crabs. This bacterial disease can cause high mortality, so it can cause economic losses. Various studies have been conducted to identify the causes of bacterial disease in mud crabs, including:: *Pseudomonas sp., Aeromonas sp., Vibrio sp.,* dan *Mycobacterium sp.* (Feriandika et al, 2014).

Diseases caused by bacteria can be identified by the symptoms they cause, but laboratory tests can determine the species of bacteria that causes the disease. So that the cause of the disease can only be known if a necropsy is carried out which further examines the cause of the disease. This encourages the identification of bacteria that cause bacterial disease in mud crabs so that appropriate prevention and treatment can be carried out on aquaculture..

Changes in global trade trends and issues are followed by increasingly stringent requirements that must be met, from disease-free, environmental, traceability, biosecurity and certain technical requirements before fishery commodities are trafficked. This shows that the fishery commodities to be traded are not enough to be disease-free when they are exported, but are in good health from the start of production to the time they are shipped.

The market demands for quality products, of good quality, not contaminated with contamination, especially pathogenic bacteria that can disrupt trade both domestically and abroad are very large. Research on the identification and inventory of pathogenic bacteria in mud crab (Scylla serrata) as a health indicator in Indonesia has not been widely carried out, especially the identification and inventory of pathogenic bacteria in mud crab (Scylla serrata) as a health indicator in South Kalimantan Province. Therefore, the authors are interested in conducting research on "Identification and Inventory of Pathogenic Bacteria in Mangrove Crab (Scylla serrata) as Health Indicators in Farm Suppliers in South Kalimantan". Information related to the types of pathogenic bacteria found in mangrove crab commodities that will be sent out of South Kalimantan Province is expected to be used as a reference in efforts to prevent and treat infection with these diseases so that the resulting commodities are of good quality and healthy

II. RESEARCH METHODS

Place and time of research

This research has been carried out at the mangrove crab (Scylla serrata) farm supplier in South Kalimantan Province for three weeks from 6 to 24 June 2022.

Research procedure

The method used in the observation is the case study method. The case study research method is a research that includes an assessment aimed at providing a detailed description of the background, nature and character of a case, in other words that a case study focuses on a case intensively and in detail. A case study is a research strategy to carefully investigate a matter by collecting complete information using various data collection procedures. In addition, case studies are also conducted to gain in-depth understanding and analyze more intensively about an individual, group, or situation (5).

Researchers determine the location of research sampling with purposive sampling technique. According to (Rina et al, 2017) purposive sampling is a data sampling technique based on certain considerations. The purposive sampling method is taken in determining the sampling location at the farm supplier with the consideration that it is already a legal entity, is still active in shipping, has a fairly large and continuous delivery frequency for both domestic and export shipments..

For locations, sampling of mangrove crabs (Scylla serrata) was carried out at 3 (three) farm suppliers, including:

- CV. ACS in Banjarbaru City
- CV. Three A's in Banjar Regency
- UD. SLM in Banjarbaru City.

This study was carried out with three treatments at the farm supplier and three replications for bacterial examination with the number of crab samples adjusted to the delivery population at the time of the study. The minimum number of samples taken according to the Decree of the Head of BKIPM Number 117 of 2017 can be seen in Table 2.1.

Table 2.1 Number of Samples

Farm Name	Mean Delivery Population During Research (Crabs)	Number of Samples (Crabs)	Number of Samples / Replications (Crabs)			Total Sampel (Ekor)
			1	2	3	
CV. ACS	**700 – 1.000**	**4**	**4**	**4**	**4**	**12**
CV. Tiga A	**800 – 1.000**	**4**	**4**	**4**	**4**	**12**
UD. SLM	**500 – 1.000**	**4**	**4**	**4**	**4**	**12**

Source : (7)

Research Tools and Materials

1. Research Tools
   - Stationery
   - Disecting set
   - Microtube
   - Dropper Dropper
   - Laminary flow
   - Ose Needle
   - Bunsen
   - Spray Bottle
   - Autoclave
   - Plastic
   - Digital scales
   - Tray
   - Petri dish
   - Incubator
   - Surgical table
   - Measuring cup
   - Hot plate stirer
   - Refrigerator
   - Magnetic stirrer
   - Cool box
2. Research Materials
   - 70% alcohol.
   - TSA
   - 3% KOH solution
   - TSIA
   - 40% KOH solution
   - Crystal violet solution
   - Urea agar
   - Safranin solution
   - Gelatin hydroxide
   - Paraffin
   - iodine-lugol
   - Naphthol
   - Aquades
   - Aluminum Foil
   - OF
   - MIO
   - Citrate Agar
   - LIA
   - Kovacks reagansia
   - Catalase solution H2O3 3%
   - Potassium
   - Solution
   - Sample Tes

Bacteria Test Flow

he flow of bacterial examination can be seen in Figure 2.1.

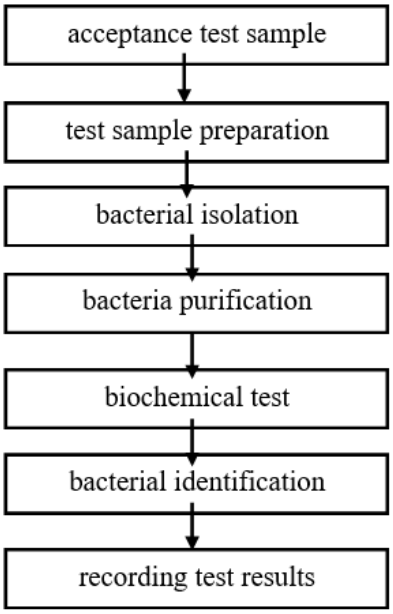

Fig.2.1. Bacteria Test Flow

Preparation of Tools and Materials

Preparation of tools and materials carried out included preparing surgical instruments, trays, scales and other equipment, then preparing test materials, namely materials for bacterial isolation media and biochemical tests used to observe bacteria in mud crabs. Next, prepare samples of mangrove crabs to be observed.

Sampling Method

In accordance with the Decree of the Head of BKIPM Number 117 of 2017 the method of sampling test samples is carried out by random sampling and lethal sampling. Random sampling is a sampling technique in which all individuals in the population are given the same opportunity to be selected as sample members. Lethal sampling is a test sampling technique by turning off the sample fish. The large number of samples taken for research can be seen in Table 2.2.

Table 2.2. Number of samples taken

Total Population (Crabs)	Number of Test Samples (Crabs)
50-100	**2**
101 – 250	**3**
251 – 999	**4**
> 1000	**8**

Source : (7)

The mechanism for taking samples using the random sampling method is a lottery or lottery system where in this method the researcher assigns a number to each basket or container and then the number is chosen randomly. This random selection uses methods such as lottery or social gathering with eyes closed when taking numbers. The randomly selected number represents the selected population member. Farm supplier data that will be used as a sampling location can be seen in Table 2.3.

Table 2.3 Mangrove Crab Sampling Site.

Name	Delivery Destination	Origin of Raw Materials
CV. ACS	**Jakarta and Cina**	**Kotabaru Regency, Tanah Bumbu Regency, Banjar Regency, Barito Kuala Regency**
CV. Tiga A	**Jakarta and Cina**	**Kotabaru Regency, Tanah Bumbu Regency, Banjar Regency, Barito Kuala Regency and Tanah Laut Regency**
UD. SLM	**Jakarta and Batam**	**Kotabaru Regency, Tanah Bumbu Regency, Banjar Regency**

Data analysis

Data from the identification and inventory of bacteria that infect mangrove crabs (Scylla serrata) were analyzed descriptively and presented in the form of figures and tables. Descriptive analysis is an analytical technique that provides information only about the observed data, draws conclusions that are generalized to the population and does not aim to test hypotheses. The purpose of descriptive analysis is only to present and analyze data to be meaningful and communicative (Purwanto et al, 2017)

Analysis of research data is a measuring tool used to measure the parameters that have been observed, namely by examining all types of bacteria that have been found to then carry out an inventory of the types of bacteria that have been found based on literature references which are then compiled in tabulations.

The data analysis technique in this study used descriptive data analysis techniques with percentages. Furthermore, to calculate the percentage in each type of sample population infected with bacteria, the formula from (9) is:

$$P = \frac{f}{n} \times 100\%$$

Information :

P : Percentage Number

f : Number of frequencies found

n :Number of frequency/number of population

III. RESULTS AND DISCUSSION

3.1. Bacteria Identification

The condition of the mud crab (Scylla serrata) samples at each farm supplier at each farm supplier can be seen in table 1

Table 3.1. Condition of mud crab (Scylla serrata) samples

Nama Farm	Gender		Average Crab Weight (grams)	Average Crab Length (cm)
	Male (Crabs)	Female (Crabs)		
CV. ACS	**8**	**4**	**281,2**	**11,3**
CV. Tiga A	**9**	**3**	**318,7**	**11,4**
UD. SLM	**9**	**3**	**258,7**	**10,9**

Based on the results of the examination issued by the Laboratory of KIPM Banjarmasin on bacterial testing on samples of mangrove crabs (Scylla serrata) with a total sample of 36, it was found that 15 were infected with Plesiomonas sp. pathogenic bacteria, 14 were infected with Actinobacillus sp. pathogenic bacteria, 6 tails infected with pathogenic bacteria Vibrio sp. and 1 tail was infected with the pathogenic bacteria Moraxella sp. The results of the identification of pathogenic bacteria in mud crab (Scylla serrata) stated that the type of bacteria Plesiomonas sp. more dominant in infecting mangrove crabs (Scylla serrata) which are trafficked out of South Kalimantan Province compared to other types of bacteria. This is due

to high rainfall conditions when crabs are caught in the coastal waters of South Kalimantan Province which causes the water conditions to become cloudy and mixed with mud and can resulting in contamination that can contaminate the crab. Plesiomonas sp. will grow in muddy water media and tolerant to high pH.

The descriptive percentage of pathogenic bacteria found in the mud crab (Scylla serrata) samples can be seen in Table 3.2.

Table 3.2. Descriptive Data Percentage of Pathogenic Bacteria Found in Mangrove Crab (Scylla serrata) Samples

Types of Pathogenic Bacteria	Number of Crab Test Samples (crabs)	Number of Bacteria Infecting Mangrove Crab (crabs)	Percentage (%)
Plesiomonas sp.	36	15	42
Actinobacillus sp.	36	14	39
Vibrio sp.	36	6	16
Moraxella sp		1	3

It can be seen that the most common type of pathogenic bacteria infecting mud crabs (Scylla serrata) is Plesiomonas sp. (42%), followed by the type of bacteria Actinobacillus sp. (39%), Vibrio sp. (16%) and the bacteria Moraxella sp. (3%).

The number of pathogenic bacteria that infect mud crab (Scylla serrata) in each farm supplier can be seen in Table 3.3.

Table 3.3. Number of Pathogenic Bacteria Infecting Mangrove Crabs (Scylla serrata) in Each Farm Supplier.

Farm Name	Type of Bacteria				Number of Samples
	Plesiomonas sp.	*Actinobacillus sp.*	*Vibrio sp.*	*Moraxella sp.*	
CV. ACS	**4**	**5**	**2**	**1**	**12**
CV. Tiga A	**5**	**5**	**2**	**0**	**12**
UD. SLM	**6**	**4**	**2**	**0**	**12**
Total	**15**	**14**	**6**	**1**	**36**

It is known that the most pathogenic bacteria infecting mud crab samples at farm supplier CV. ACS is a type of Actinobacillus sp. as many as 5 tails, while on the farm supplier CV. Three A are Plesiomonas sp. and Actinobacillus sp each as many as 5 tails and on farm supplier UD. SLM is a type of Plesiomonas sp. as many as 6 tails.

Of the three farm suppliers, UD. SLM is the most infected with the pathogenic bacteria Plesiomonas sp. because the farm supplier does not yet have a CKIB certificate (Good Fish Quarantine Method) issued by the competent authority so that periodic monitoring is not carried out both from the aspect of the feasibility of facilities and infrastructure, product health, handling during distribution as well as sanitation and hygiene.

Mangrove crab (Scylla serrata) shipments that are trafficked out of South Kalimantan Province for both domestic and export shipments through farm suppliers can be stated that the condition of mangrove crabs (Scylla serrata) is healthy and safe from fish diseases even though the results of the examination of test samples indicate infection from pathogenic bacteria . This is because the spread of these pathogenic bacteria can still be controlled both in aquaculture waters and for human consumption as also regulated in the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 17 of 2021 concerning the category of types of bacterial diseases in fish that may be trafficked.

However, the pathogenic bacteria Plesiomonas sp., Actinobacillus sp., Vibrio sp. and Moraxella sp are types of bacteria that can cause disease either through direct invasion or contamination, especially Vibrio sp. is the most dominant type of bacteria causing White spot syndrome virus (WSSV) disease, especially in tiger prawns. Transmission of WSSV disease can be caused by the presence of a carrier organism, which is a disease-carrying organism that can transmit disease to other organisms, but the carrier organism does not show clinical symptoms of the disease. Horizontal disease transmission through carrier organisms, such as crabs (Pranawaty, R.N. et.al, 2012). This is of course a warning to farm suppliers against Vibrio sp bacterial infections so that more careful, faster and hygienic handling is needed in the packing or distribution process at farm suppliers so that bacterial growth can be prevented and the mortality rate can be reduced to a minimum.

3.2 Mangrove Crab Health

Mangrove crab (Scylla serrata) trafficked through farm suppliers in South Kalimantan is declared healthy because it is seen from several aspects, namely:

1. Physical Aspect

Healthy crabs have physical characteristics, namely when the swimming legs are pulled away from the carapace and

then released, the legs move quickly to their original position (close to the carapace), the eye stalks are very responsive, which goes straight into the orbit area when touched, the mouth does not release foam, the color of the carapace bright and does not smell bad (BKIPM, 2016).

2. Aspects of Bacterial Infection

Healthy crabs certainly do not contain any type of pathogenic bacteria that can harm the human body or are safe for consumption, including not containing Edwardsiella ictaluri, Aeromonas salmonicida, Streptococcus iniae, Streptococcus agalactiae, Yersinia ruckeri and Renibacterium salmoninarum bacteria which are required for live food commodities.

The results of the examination did not find pathogenic bacteria so that the mangrove crabs could be declared healthy.

IV. CONCLUSION

1. A total of 15 mud crabs were infected with Plesiomonas sp. pathogenic bacteria, 14 were infected with Actinobacillus sp., 6 were infected with Vibrio sp. and 1 tail was infected with the bacteria Moraxella sp.
2. The most common type of pathogenic bacteria found was Plesiomonas sp (42%) followed by Actinobacillus sp. (39%), Vibrio sp. (16%) and Moraxella sp. (3%).
3. The most common type of pathogenic bacteria infecting the farm supplier CV. ACS is a type of Actinobacillus sp. as many as 5 tails, while on the farm supplier CV. Three A are Plesiomonas sp. and Actinobacillus sp each as many as 5 tails and on farm supplier UD. SLM is a type of Plesiomonas sp as many as 6 tails.
4. The condition of the mud crab (Scylla serrata) is healthy by meeting the criteria for the physical aspect with the characteristics when the swimming legs are pulled away from the carapace and then released, the legs move quickly to their original position, the eye stalks are very responsive, that is, they enter the orbital area when touched, the mouth no foam, bright carapace color and no bad smell. In addition, mangrove crabs did not find pathogenic bacteria that could be harmful to the human body or safe for consumption, namely they did not contain the bacteria Edwardsiella ictaluri, Aeromonas salmonicida, Streptococcus iniae, Streptococcus agalactiae, Yersinia ruckeri and Renibacterium salmoninarum

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