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Relationship of water quality with bacterial disease in Dumbo catfish (*Clarias gariepinus* L.) in culture ponds in Palembang city

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ABSTRACT

This study aims to determine water quality related to the occurrence of bacterial diseases of "Dumbo" catfish (*Clarias gariepinus*) reared in the pond. Field study was conducted at Bukit Lama and Bukit Baru Ilir Barat I Bukit Besar Palembang and laboratory studies was conducted at the Laboratory of Fish Quarantine Center of SMB II Palembang. The study was carried out at 3 representative locations. The parameters measured were: physical (temperature), chemical (dissolved oxygen, pH, ammonia, nitrate, and nitrite). The results of physical and chemical parameters indicated that the average value of all study sites was temperature of 30.30 to 30.73 º C, pH 6.5 - 7.0, ammonia of 0.01 to 1.6 ppm, dissolved oxygen of 0.87 to 3.4 ppm, nitrate of 1.4 to 3.2 ppm, nitrite of 0.01 ppm. The results of the identification of bacteria found 4 species, namely: *Aeromonas hydrophila*, *Yersinia enterocolitica*, *Vibrio anguillarum*, *Pseudomonas aeruginosa* which are pathogenic bacteria on fish. The dominant bacteria found during the study was *Aeromonas hydrophila*. The results of the study showed that the water quality of "Dumbo" catfish ponds (*C. gariepinus*) in Bukit Lama and Bukit Baru Ilir Barat 1 Palembang is not recommended for aquaculture.

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1. Introduction

South Sumatra Province has a large potential for fisheries resources with an area of approximately 2.5 million ha of public waters, consisting of 11% lake waters (275,000 ha), river waters, and swamp fisheries (Anonymous, 2007). Fish production in the period 2000-2004 tends to increase by an average of 1.06%. However, this condition needs to be watched out for because in 2006 there was overfishing (Dinas Kelautan dan Perikanan, SUMSEL, 2006). Therefore, the management and utilization of fishery resources must be carried out wisely and as well as possible by taking into accountenvironmental sustainability. Excessive management and utilization of fishery resources without paying attention to environmental factors will result in environmental degradation which in turn causes fish pests and diseases. The fish disease can reduce the yield (quality) of production and the quality of the product so that it can threaten the sustainability of fishery biological resources of important economic value.

Farmers in South Sumatra have long been cultivating fish in ponds, especially in Palembang City, and this activity continues to grow from year to year. From the data from the Fisheries Service of Palembang City in 2008-2009, aquaculture production, especially catfish in the city of Palembang, experienced considerable losses, wherein that year there were mass deaths caused by disease, he losses sufferedby fish farmers were more than 50%, 2009).

One of the fish that is quite popular among the people of Palembang City and also has the potential to be cultivated is "Dumbo" catfish (*Clarias gariepinus*). Catfish has advantages including fast growth, delicious taste, and high nutritional content. "Dumbo" catfish (*C. gariepinus*) is the freshwater fish that has important economic value for the people of South Sumatra Province. This can be seen from the development of "Dumbo" catfish (C. *gariepinus*) cultivation with pond culture system in freshwater fish farming centers in Palembang City, namely in Bukit Baru, Bukit Lama, and other sub-districts.

In catfish farming activities, some obstacles are often faced by fish farmers, namely the presence of pests and diseases in the aquatic environment. The disease is one of the causes of crop failure, due to an imbalance between the environment, fishand pathogenic organisms in the water.

According to Robert et al, in Maisyaroh (2009), bacterial disease in fish is caused by bacteria that can thrive on the host supported by a decrease in water quality, such as the occurrence of spoilage of fish feedwhich will become a growing medium for *Pseudomonas anguilliseptica* bacteria so that the bacteria penetrate fish organs, namely heart and eyes. After this bacteria grow, it will then spread to other organs in the fish's body through blood circulation and cause lesions and ulcers to appear on the fish's body. Under certain conditions, the fish will weaken and eventually die. Bacteria attack on fish is very quickly, so it requires serious handling, namely intensive treatment (continuous) and water quality control.

Based on the description above, it is necessary to conduct a study on the effect of water quality on the occurrence of bacterial diseases in the rearing pond of "Dumbo" catfish (*C. gariepinus*) in Palembang city.

This study aims to determine the relationship between water quality and the incidenceof bacterial disease in the "Dumbo" catfish (*C. gariepinus*) rearing pond in Palembang, identify the type of bacteria, and determine the dominant type of bacteria that infects "Dumbo" catfish (*C. gariepinus*) in the rearing pond in the city of Palembang.

2. Material and methods

The study was carried out in the "Dumbo" catfish (*C. gariepinus*) culture pond in the Bukit Besar District, Palembang city and in the Class I Fish Quarantine Test Laboratory of SMB II Palembang.

The equipment used in the field in this study consisted of boxes to carry equipment/materials, surgical equipment, inoculation, testing and identification of bacteria and water quality checkers, petri dishes, gloves, scope net, and masks. Meanwhile, the tools used in the laboratory consist of a microscope, glassware, laminary airflow, incubator, autoclave, inoculation device, surgical equipment, chemical, and chemical materials cabinets, and other materials for bacterial examination in the laboratory.

Fish samples were "Dumbo" catfish (*C.gariepinus*) originating from farmers' ponds in Bukit Besar Palembang, size 100-150 grams, a total of 27 fish at each point.

This study was conducted using a survey, while the study method used was the method of causality using descriptive analysis.

The parameters observed were water quality, namely the degree of acidity (pH), dissolved oxygen (DO), temperature (temperature), ammonia (NH3), Nitrate (NO3), Nitrite (NO2), bacteria that infect catfish and the dominant bacteria infecting.

The data were analyzed according to the variance analysis procedure, then the average between treatments was tested by the Duncan's Test and Descriptive Analysis of the data from the examination of the carrier media (fish) sample during the study. Secondary data were analyzed as supporting data and compared with the existing literature.

3.1. *General Conditions of Study Location*

The study was conducted at three different locations.From the results of a study in the field, the location of each cultivation pond and the environmental conditions of the cultivation area can be seen in Table 1

Table 1. General Condition of study Location

General Condition	Location 1	Location 2	Location 3
City	Palembang	Palembang	Palembang
Sub-district	Ilir Barat 1	Ilir Barat 1	Ilir Barat 1
Kelurahan	Bukit Lama	Bukit Lama	Bukit Baru
Large Area	1800 m^2	700 m^2	600 m^2
Around the Area	Residential areas, Swamp,	residential areas, Swamp,	Residentsareas, Swamp
	Tofu Factory	Tofu Factory	Roads
Water sources	Swamp	Swamp/Infiltration	Swamp
Origin of Seeds	Local	Local	Local
Pond	Drained	Not drained	Not drained

3.2. Measurement of Water Quality Parameters in the Field

Water quality measurements were carried out during the day from 10.00 WIB to 15.00 WIB. The results of the measurement of physico-chemical factors in each pond culture in the Bukit Lama and Bukit Baru Villages obtained the water quality values as shown in Table 2.

Table 2. Results of Water Quality Measurements at each Study Location

No	Parameter	Study Locations		
		L1	L2	L3
1	Temperature (°C)	30,6±0,2	30,9±0,2	30,5±0,3
2	DO (ppm)	3,5±1,3	0,88±1,2	2,5±1,3
3	pH	6,5±0,3	7,0±0,3	7,1±0,2
4	Ammonia (ppm)	0,02±0,9	1,3±0,8	1,7±0,9
5	Nitrate (ppm)	3,3±1,1	1,7±1,0	1,3±0,9
6	Nitrite (ppm)	0,01±0	0,02±0	0,03±0

3.3. *Physical and Chemical Parameters*

3.3.1 *Physical Parameters*

a. Temperature

The water temperature of the catfish culture pond during the study ranged from 30.1 °C - 30.9 °C. The highest average temperature was found at the catfish farming location in location 1 of Bukit Lama Village because it is close to residential areas and tofu factories. This is because the organic matter content is also high in brackish water so that the sunlight is absorbed more quickly by the waters and in the end the temperature at this location is higher than in other locations.The results of direct temperature measurements in three aquaculture ponds for "Dumbo" catfish (*Clarias gariepinus*) in the villages of Bukit Lama and Bukit Baru can be seen in Table 3

Table 3. Temperature (°C) during the Study

Ponds	Locations			
	L1	L2	L3	Average
1	30,60	30,90	30,50	30,66
2	30,40	30,70	30,30	30,46
3	30,10	30,60	30,10	30,26
Average	30,36	30,73	30,30	30,46

This temperature range is still within the optimal temperature range. In addition, Ghufran (2007) stated that the optimal temperature range for fish life in tropical waters is between 28°C-32 °C. At a temperature 18 °C-25 °C, the fish still survive, but their appetite begins to decline. The water temperature of 12°C-18°C starts to be dangerous for fish, while at temperatures below 12°C the tropical fish freeze to death.

3.3.2. *Chemical Parameters*

a. pH

The results of pH measurements during the study in the catfish (*Clarias gariepinus*) culture ponds of the Bukit Lama and Bukit Baru villages ranged from 6.5 to 7.1. This condition indicates that the pH range is still in the optimal range. According to (Ghufran, 2007) water pH affects the level of water fertility because it affects the life of microorganisms. Acidic waters will be less productive, and can even kill farmed animals. At low pH (high acidity) dissolved oxygen content will decrease, as a result, oxygen consumption decreases, respiratory activity increases, and appetite decreases. Aquaculture business will run well in water with a pH of 6.5-9.0, and the optimal range is pH 7.5 - 8.7. The pH content is still in the normal range for cultivation, which is between 7 to 8.5 (Murjani, 2011).The results of pH measurements during the study are shown in Table 4.

Table 4. pH during the study

Ponds	Locations			
	L1	L2	L3	Average
1	6,5	7,0	7,1	6,8
2	6,6	6,9	7,0	6,8
3	6,5	6,8	7,1	6,8
Average	6,5	6,9	7,06	6,8

b. *Dissolved Oxygen*

The results of the measurement of dissolved oxygen in each catfish (*C. gariepinus*) culture ponds in the Bukit Lama and Bukit Baru villages during the study can be seen in Table 5, where the average value of dissolved oxygen during the study at each study location varied. The average value of dissolved oxygen at each location in the catfish pond is: location 1 Bukit Lama Village (3.5 ppm), location 2 Bukit Lama Village is (0.88 ppm) and location 3 Bukit Baru Village is (2.5 ppm). This value is still relatively low, but can still be tolerated by organisms that usually live in minimal conditions.

Table 5. Dissolved Oxygen (ppm) during the Study

Ponds	Study Locations			
	L1	L2	L3	Average
1	3,50	0,88	2,50	2,29
2	3,30	0,85	2,40	2,18
3	3,40	0,89	2,30	2,19
Average	3,40	0,87	2,40	2,22

Based on the data of dissolved oxygen content at each location of the catfish farming ponds in Bukit Lama and Bukit Baru subdistricts, not all culture ponds meet water quality standards. This can be seen in Table 5 on the catfish (*Clarias gariepinus*) culture pond at location 2 in Bukit Lama Village. The low dissolved oxygen content near residential areas and tofu factories is due to the large amount of organic waste thrown awayby residents. The decomposition these wastes requires oxygen. In addition, organisms (Zooplankton) also need oxygen for respiration.

The need for oxygen in fish has animportance in two aspects, namely the environmental needs of certain species and consumptive needs that depend on fish metabolism (Zonneveld et al., 1991 in Irianto, 2005). Although some types of fish can survive in waters with an oxygen concentration of 3 ppm, the minimum concentration that is still acceptable for most aquaculture biota to live properly is 5 ppm. In waters with oxygen concentrations below 4 ppm, some types of fish are still able to survive but their appetite decreases. For this reason, a good concentration of dissolved oxygen in aquaculture is 5-7 ppm (Ghufran, 2007).

Although catfish (*Clarias gariepinus*) is a fish that can withstand low oxygen content, according to Ghufran (2007) the O_2 content can affect the biological function and slow growth, and can even cause death. According to Dini (2010), factors that cause infection can be caused by contamination from equipment, changes in temperature and an inadequate environment. Based on observations in the villages of Bukit Lama and Bukit Baru, Ilir Barat I District, Palembang, it shows that the environmental conditions are quite goodc. *Nitrate (NO3)*

Biologically, ammonia is converted to nitrate, a harmless compound, in the nitrification process with nitrifying bacteria. In this nitrification process, sufficient carbon and oxygen sources are needed as energy source (Poernomo, 1989). Nitrate content during the study can be seen in Table 6. Nitrate values in catfish (*C. gariepinus*) culture ponds at three locations during the study had varied differences, namely: Location 1 Bukit Lama Village (3.3 ppm), while location 2 Bukit Lama Village (1.7 ppm) and location 3 Bukit Baru Village (1.3 ppm).

Table 6. Nitrate (ppm) during the study

Ponds	Study Locations			
	1	2	3	Average
1	3,30	1,70	1,30	2,10
2	3,20	1,60	1,40	2,06
3	3,10	1,60	1,50	2,06
Average	3,20	1,63	1,40	2,07

d. *Ammonia (NH3)*

The results of the field study on the range of ammonia levels are as follows: at location 3 catfish cultivation ponds (*Clarias gariepinus*) in Bukit Lama village (1.7 ppm), location 2 in Bukit Lama village (1.3 ppm l), and location 3 in Bukit Lama village New (0.02 ppm), complete data on ammonia during the study are in Table 7. According to Ghufran (2007), the direct effect of high ammonia levels that has not yet killed death is the destruction of the gill tissue, where the gill plate swell so that their function as a breathing apparatus will be disrupted.. As a result, in chronic conditions, fish can no longer live a normal life. The highest ammonia content was found in location 2 villages in Bukit Baru and in locations 3 in the villages of Bukit Lama. This location is close to residential areas, tofu factories, and roads, which are thought to originate from domestic waste, especially waste from residents, and also the feed is given in the form of pellets, resulting in spoilage of the remaining feed. At this location, the water is never drained or cleaned. This can increase the ammonia content in the water. The decomposition of organic matter requires oxygen. Due to the low amount of oxygen, the atmosphere becomes anaerobic, so the decomposition of organic matter produces ammonia which is toxic to aquatic organisms. This is following Boyd's (1979) statement in Zuryani (2010) that the main source of ammonia is organic materials, metabolic activities, and the decomposition of organic materials, especially those that contain lots of protein. At Location 2 the ammonia value is low because at this location the pond is often drained and cleaned so that food residue does not accumulate at the bottom of the pond.

Table 7. Ammonia (ppm) during the study

Ponds	Study Locations			
	L1	L2	L3	Average
1	0,02	1,30	1,70	1,00
2	0,01	1,20	1,60	0,93
3	0,02	1,30	1,70	1,00
Average	0,01	1,26	1,66	0,97

Based on the results obtained in the study for 4 weeks with 3 repetitions, the concentration of ammonia (NH3-N) at a concentration of (0.1 mg/L) for 4 weeks with 3 repetitions ranged from 0.242 to 3.150 mg/L, at a concentration of (0 0,5 mg/L) ranged from 0.170 to 3.135 mg/L, the concentration (1 mg/L) ranged from 0.169 to 3.123 mg/L, and the value of ammonia concentration in the control ranged from 0.016 to 3.132 mg/L. According to Hermawan et al., (2012), stated that catfish can still live in the ammonia range of 0.5 – 3.8 mg/L. This is reinforced by Hastuti and Subandiyono (2015) that the ammonia concentration which is still safe for catfish is 5.70 mg/L. So the results of ammonia during the research still meet the feasibility and good for catfish growth.

e. Nitrite (NO2)

The nitrite value in all locations of catfish (*Clarias gariepinus*) cultivation ponds in Bukit Lama and Bukit Baru villages is still below the threshold. At location 1 Bukit Lama Village (0.01 ppm), Location 2 Bukit Lama Village (0.02 ppm), and Location 3 Bukit Baru Village (0.03 ppm). The value of Nitrite (NO2) during the study is shown in Table 8

Table 8. Nitrite (mg/l) during the study

Ponds	Study Locations			
	L1	L2	L3	Average
1	0,01	0,02	0,03	0,02
2	0,01	0,02	0,01	0,01
3	0,02	0,01	0,01	0,01
Average	0,01	0,01	0,01	0,01

According to Ghufran (2007), Nitrite (NO2) is also toxic to fish because it oxidizes Fe^{2+} in hemoglobin. In this form, the blood's abilityto bind oxygen is greatly reduced. In shrimp whose blood contains CU (hemocyanin), nitrite oxidation of CU can occur and give the same effect as in fish. The toxicity mechanism of nitrite is its effect on oxygen transport in the blood and gill damage. Levels of 6.4 mg/l NO2-N inhibited the growth of 50% of *Penaeus indicus* shrimp, while levels of 1.8 mg/l of NO2-N had inhibited the growth of 35% in *Macrobrachium rosenbergii* shrimp. The accumulation of nitrite in the pond is thought to occur due to the imbalance between the rate of change of nitrite to nitrate from ammonia to nitrite.

3.3.4 ***Infected fish populations***

In Table 9, the infected fish population at each cultivation pond location shows that Location 3 is infected 9 individuals, Location 1 is infected 15 individuals and Location 2 is infected 17 fish. From the analysis of variance in, the population of infected fish at pond 3 was different from pond 1 and pond 2

Table 9. Result of calculation of infected fish population

Location	N (head)	Population (head) infected	Infected%
L3	27	9	33.3
L1	27	15	55.6
L2	27	17	63

From the observations made on the infectedpopulation of "Dumbo" catfish (*Clarias gariepinus*) at the location of each pond, it was found that the number of infected fish in location 22 was the highest, this was thought to be caused by poor water quality. This can be seen from the low content of dissolved oxygen (DO) in the culture pond, high content of ammonia (NH3) and nitrate (NO3) content The low quality of water in these 2 locations is because they are close to residential areas and tofu factories, the ponds have never been cleaned or drained, causing the oxygen content to be below the threshold. The low oxygen content is also caused by a large amount of organic waste or household waste thrown away by residents. And also the feed given is chicken offal (chicken intestines) and also pellets so that spoilage occurs in the rest of the feed. This possibility also causes the ammonia and nitrate content to be high. In addition, the decomposition of organic matter requires oxygen which causes low dissolved oxygen. According to Ghufran (1997), "Dumbo" catfish (*C.gariepinus*is) a fish that can survive a low oxygen content, can affect the biological function and slow growth, and can even cause death.

The results of calculation inTable 9are from observations made on the number of infected "Dumbo" catfish (*C. gariepinus*) at least at location 3. This is suspected by several factors, including at that location even though it is close to people's homes and tofu factories. At this location, the ponds are often drained and cleaned so that there is no possibility of accumulation ofdirt at the bottom of the pond. This can be seen from the oxygen content, even though it is still below the threshold for fish farming, but the remaining feedand manure do not accumulate at the bottom of the pond which causes the dissolved oxygen to be rather high, compared to the location 1 pond that has never been drained or cleaned.

3.3.5 *Identified types of bacteria*

Bacterial infection of "Dumbo" catfish kept in the aquaculture ponds of each location may be caused by several factors. Water as a medium for the cultivation of biota must meet the requirements for quantity and quality. A sufficient water supply does not guarantee a successful harvest if water quality managementmeets the requirements for the life and growth of fish farming during the maintenance period. Pond water quality is strongly influenced by water quality, source, pond conditions, feed management, stocking density, water circulation, and weather. Therefore, the decline in water quality is also closely related to the above factors.The results of field observations and the results of bacterial identification in the laboratory during the study on catfish (*Clarias gariepinus*) reared from each of the several sample ponds can be seen in Table 10.

Table 10. Types of Bacteria in "Dumbo" Catfish Identified during the Study

Location (L)	Clinical symptoms	Clinical Symptoms from Target organs	Type of Bacteria Identified
1	• Yellow body • Body lesions	• Swollen kidneys • Yellow body fluid • Muscle • Swollen liver	• *Yersinia enterocolitica* • *Pseudomonas aeruginosa* • *Aeromonas hydrophila* • *Pseudomonas aeruginosa*
2	• Body lesions • Yellow body • Dropsy • Ascites • Dark body	• Body lesions • Kidneys • Yellow liver • Muscle	• *Vibrio anguillarum* • *Aeromonas hydrophila* • *Aeromonas hydrophila* • *Aeromonas hydrophila*
3	• Body lesions • Yellow liver • Dropsy	• Abdomen lesions • Lesions and ulcer • Red Anus • Swollen liver • Swollen kidneys	• *Aeromonas hydrophila* • *Aeromonas hydrophila* • *Aeromonas hydrophila* • *Yersinia enterocolitica* • *Yersinia enetrocolitica*

Table 10 shows that the catfish reared in the pond at location 1 of the Bukit Lama Village out of 27 (twenty-seven) samples identified 1 (one) type of *Vibrio anguillarum* bacteria in body lesions, 1 (one) type of *Aeromonas hydrophila* in kidneys, liver and muscle tissue. At the location of 2 ponds for "Dumbo" catfish (*Clarias gariepinus*) in Bukit Lama Village, from 27 (twenty-seven) samples identified 1 (one) type of *Aeromonas hydrophila* bacteria in abdominal lesions, body ulcers, and red anus, 1 (one) *Yersinia enterocolitica* type of swollen liver and swollen kidneys. While at location of 3 catfish farming ponds in Bukit Baru Village, from 27 (twentyseven) samples identified 1 (one) type of *Yersinia enterocolitica*, 1 (one) type of *Pseudomonas aeruginosa* in swollen body fluids and liver, 1 (One) *Aeromonas hydrophila* (one) type in muscle tissue.

a. *Aeromonas hydrophila* bacteria

Aeromonas hydrophila was found in locations 1,2 and 3 in the pond culture of "Dumbo" catfish (*Clarias gariepinus*) with clinical symptoms of red lesions and anus. Dana and Angka (1990) stated that the clinical symptoms in fish infected with *Aeromonas hydrophila* include bleeding in the body (hemorrhage), ulcers (ulcer) necrosis, anus, swollen stomach (dropsy), and fish often limp on the surface or bottom of the pond.

The dominant type of bacteria is *Aeromonas hydrophila*, the feed given is chicken gut taken from chicken breeders and rain-fed ponds that do not have outlets. This can be seen from the measurement of water quality in the field during the studywith low dissolved oxygen (DO) content where the oxygen value is below 1 ppm and the high ammonia content above the threshold. These bacteria are facultative aerobic (can live with or without oxygen). Observing the condition of the pond, bacterial infection can occur due to decrease in water quality due to ponds without water circulation and residual feed can be seen by the high value of ammonia due to spoilage of feed residues. Coupled with the pool is never drained or cleaned, so bacteria can thrive.

The decomposition process of organic matter that takes place in a pond will require large amounts of oxygen so that the oxygen content in the pond is low or in anaerobic conditions which result in ammonia which is toxic to aquatic organisms. Reid (1961) in Dwiharniati (2004) states that ammonia is very toxic to freshwater organisms, especially when its concentration is more than 2.5 ppm. According to Ghufran (2007), this oxygen demand is getting bigger with the increase in the waste material content. If the oxygen supply is insufficient, anaerobic conditions in the pond are unavoidable. *Aeromonas hydrophila* is easily found in the dry and rainy seasons, especially in ponds contaminated with organic matter (Bullock et al., 1989).

According to white (1991), *Aeromonas hydrophila* causes disease in fish known as "Hemmorhagic Septicemia", "Motile Aeromonas Septicemia", "Ulcer Disease", or "Red-Sore Disease". Synonyms for this disease are associated with lesions caused by bacteria which include the lesions of septicemia when bacteria or bacterial toxins are present in various organs in fish and from ulcers. *Aeromonas hydrophila* is a gram-negative, motile, rod-shaped bacteria that can usually be isolated from freshwater ponds and is also a normal inhabitant of the digestive tract of fish. This disease mainly attacks freshwater fish such as catfish and bass, and various types of tropical or ornamental fish. Fish infected with *Aeromonas hydrophila* may have many different clinical signs. Starting from sudden death in healthy fish, swimming disorders, pale gills, skin ulcerations. Skin ulcers can occur in fish and are often surrounded by a bright red border of tissue. This disease can harm the high economic value in fish farming. *A. Hydrophila* bacteria in seeds experienced clinical symptoms such as reddish skin, irregular swimming, and damage to the fins. However, not all seeds experience disease and clinical symptoms when pathogen attacks occur. Various factors influence each individual's response to a pathogen. Pathogens must be able to penetrate the seed's immune system to cause disease. Natural endurance seeds allow each individual to be free from pathogen attack. Each individual has a different resistance, this is determined by age, gender, nutritional status, and stress (Rey et al., 2009). *A. hydrophila* when bacteria in the host's body get an environment with sufficient temperature, pH, and nutrients, these bacteria will live and multiply. Triyaningsih et al. (2014) reported that fish infected with *A. hydrophila* had clinical symptoms in the form of decreased response to feed, swimming with abnormal movements and injuries to body parts

b. *Yersini enterocolitica* bacteria

Yersinia enteocolitica was found in cultivation ponds at locations 2 and 3 of Bukit Lama and Bukit Baru sub-districts. Robert et al, in Maisyaroh (2009) stated that clinical symptoms in fish infected with *Y.enterocolitica* include bleeding in the body and reddish wounds. The dominant bacteria identified during the study in each location of the “Dumbo” catfish (*Clarias gariepinus*) cultivation pond was *Yersinia enterocolitica*, *Y. enterocolitica* was a small, rod-shaped, Gram-negative bacteria. These bacteria are often isolated from clinical samples such as wounds, feces, phlegm, and lymph nodes in the stomach (mesenteric lymph nodes) *Y. enterocolitica* or the digestive tract. *Y. enterocolitica* belongs to the Enterobacteriaceae family. Pathogenic species to humans and animals are *Y. pestis*; *Y. pseudotuberculosis*; *Y. enterocolitica*. Bacteria are Gram-negative, facultatively anaerobic, m form) in young culture (25 ° C) stems (1 - 3.5 x 0.5 - 1.3 oval or cocoid produce cells (coccoid). The optimum temperature for bacterial growth is 32° - 34°C. Growth is better when added with sulfuric amino acids (methionine or cysteine), and added thiamin Bacteria tolerant to high pH, bile salts, and surfactants.

At the catfish culture location, the average temperature during the study ranged from 30.5 ºC-30.9 ºC. From the isolation of bacteria in the necropsy fish laboratory, it was seen that there was an infection in the digestive tract, especially the liver. Liver with abnormalities can be seen in the color change of the liver to yellowish. Liver function abnormalities can damage the digestive system and metabolism of the fish body. According to Ghufran (2007), the effect of temperature is generally fast because it directly affects the metabolism in the body of cultivated biota. The higher the water temperature, the higher the metabolic rate of water biota, which means the greater the oxygen consumption, even though the temperature increase even reduces the solubility of oxygen in the water.

The temperature that is not suitable for fish life can cause stress and even death because the physiological adjustment of the fish body takes a long time. The body temperature of the fish is 0.5°C higher than the temperature of the environment, therefore the temperature is an important role in fish activity (Brown, 1979 in Dwiharniati, 2004).

The feed given is submerged pellets and chicken gut (intestines) so that the possibility of remaining feed mixed with fish excrement and other sediment accelerates this spoilage process seen with high levels of ammonia and nitrate. Feed management is very important in aquaculture because it greatly affects water quality and the surrounding environment. According to Poernomo (1992) that cultivating tiger prawns with a density of 16 heads/m² and feeding 2.5-5% of the weight of the biomass/day can increase the ammonia content from 0.7 mg/l to 4.5 mg/l after 14 weeks of maintenance. . The quality of water quickly decreases when the remaining feed is very large. If the hoarding of feed at the bottom of the pond is not immediately anticipated, some organic matter will decompose, which results in toxic substances such as ammonia, nitrite, and H danS (Ghufran, 2007). Darmayati et al (2009) reported that Yersinia sp. including water pollution indicator bacteria whose density increases with proximity to land containing domestic waste pollution. According to Hatmanti (2003), Yersinia spp. is one of the bacteria that was originally not a pathogen, but at a time when environmental conditions allow it can also cause disease (opportunistic).

The opportunistic nature of A. hydrophila bacteria makes farmers must always be aware of environmental changes that can cause this disease. A. hydrophila bacteria has a tendency to increase its pathogenicity when there is a decrease in water quality and a decrease in fish health conditions caused by stress. At 30°C, the mortality rate of catfish (C. batrachus), carp (Labeorohita), and Betok (Anabas testudineus) reached 60-100% for 2-11 days of rearing (Sarkar and Rashid 2012).

c. *Vibrio anguillarum* bacteria

Vibrio anguillarum was found in aquaculture ponds in the village of Bukit Lama with clinical symptoms of lesions on catfish bodies. The clinical symptoms of fish infected by *V. anguillarum* include darkening of the skin, decreased appetite, and fish experiencing bruising (Ghufran and Kordi, 2004). According to Robert, et al in Maysaroh (2009), clinical symptoms of fish infected by *V.anguillarum* are mouth lesions, skin surface lesions, and muscle tissue lesions.

Furthermore, the dominant bacteria identified during the study from the graph above is *Vibrio anguillarum*. The presence of vibrio pathogenic bacteria in coastal waters indicates contact with industrial and household waste such as human feces or other food waste, these bacteria will directly grow and develop if the water conditions allow. This bacterial attack occurs after the fish is bruised/injured. Furthermore, this situation will then affect the aquatic biota (Feliatra, 1999). This can be seen in the location of each cultivation pond adjacent to residential areas and tofu factories, especially waste originating from residents which causes low levels of ammonia, nitrate, and nitrite high in oxygen. According to Ghufran (2007), in chronic conditions, sublethal levels of ammonia in pond water significantly suppress shrimp growth. Levels of 0.45 mg / l NH2-N inhibited the growth rate by 50%, whereas levels of 1.29 mg / l had killed some Penaeus shrimp. Nitrite is also toxic to aquaculture biota because it oxidizes Fe2- N. The mechanism of poisoning nitrite is its effect on oxygen transport in blood and tissue damage.

d. *Pseudomonas aeruginosa* bacteria

Pseudomonas aeruginosa was found in catfish cultivation ponds at location 3 of Bukit Lama Village with clinical symptoms of lesions on the body. *P. aeruginosa* is an obligate aerobic gram-negative bacterium, encapsulated, which has a polar flagellum so that it is motile, measuring about 0.5-1.0 µm. According to Austin (2007), these bacteria are zoonotic and in fish can cause infection in wounds.

The dominant bacteria identified during the last study was that *Pseudomonas aeruginosa* is an opportunistic bacterium that lives in soil, water, and even in environments such as hot tubs. This bacteria is a type of putrefactive bacteria that is usually found in fish meat. In addition, these bacteria are found in nature, soil and water. When these bacteria enter the body's tissues, it will cause infection of the urinary tract, lung tissue, cornea. From clinical symptoms in the field, it shows the presence of lesions or wounds on the fish's body. One of the pathogenic bacteria is *P.aeruginosa* which is a Gram-negative bacteria, rod-shaped, non-fermentative, aerobic, and several species become pathogens in plants and animals (fish). *P. aeruginosa* can be isolated from the environment such as soil, animals/animals, and humid environments, water, and waste *P. aeruginosa* can also infect almost all tissues in the organism's body (host) by spreading from the local lesions through the bloodstream causing septicemia or can result in lesions in other tissues and cause bacteremia (Botzenhart and Ruden, 1987).

4. Conclusion and Suggetions

4.1. *Conclusion*

The water quality in the "Dumbo" catfish (*Clarias gariepinus*) ponds, Bukit Lama, and Bukit Baru Villages is not suitable for "Dumbo" catfish cultivation where dissolved oxygen values range: 0.88 ppm - 3.5 ppm, ammonia value; 0.02 ppm - 1.7 ppm, and nitrate values range from 1.3 ppm - 1.7 ppm.

Four types of bacteria were found, namely, *Aeromonas hydrophila*. *Yersinia enterocolica*, *Vibrio anguillarum,* and *Pseudomonas aeruginosa* are all pathogenic bacteria in aquaculture.

Poor water quality (dissolved oxygen, ammonia, pH, and nitrate) affects the predominance of bacterial disease in "Dumbo" catfish (*C.gariepinus*). The dominant bacteria causingdisease in "Dumbo" catfish (*C.gariepinus*) is A. hydrophila.

4.2. *Suggestion*

It is recommended that bacterial disease control be carried out with good water quality management (dissolved oxygen, temperature, pH, ammonia, nitrates, and nitrites).

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References

Anonim. (2007). Hama dan penyakit ikan karantina. Departemen Kelautan dan Perikanan. Jakarta

Austin, B. dan Austin, D. A. (2007). *Aeromonadaceae* representatives (*Aeromonas salmonicida*). In: *Bacterial Fish Pathogens*: *Diseases in Farmed and Wild Fish*, 4th Edition. Praxis Publishing, Chichester, UK : 24-314.

Bullock, G. L., Pascho, R. J., & Elliot, D.G. (1989). Development in the control of bacterial kidney disease of salmonid fishes. *Dis. Aquat*. *Org*. 6(2): 55-64.

Dana, D., & Angka, S. L. (1990). Masalah penyakit parasit dan bakteri pada ikan air tawar serta penanggulangannya. Hal: 10-23. Prosiding Seminar Nasional II Penyakit Ikan dan Udang. Balai Penelitian Perikanan Air Tawar. Bogor

Darmayati, Y., Kunarso, D. H., Ruyitno. (2009). Dinamika bakteri indikator pencemaran di perairan estuari Cisadane. Oseanologi dan Limnologi di Indonesia 35(2): 273-290.

Dinas Kelautan dan Perikanan SUMSEL (2006). Sumatera Selatan Dalam Angka 2006/2007. Palembang

Dini, S. M. (2010). Isolation, characterization, and Identification of bacterium *Aeromonas sp*. causative agents of Motile Aeromonas Septicemia (MAS) in gouramy. Sains Akuatik, 13 (2), 9–16.

Dwiharniati, K. (2004). Kualitas perairan situ babakan dan pengaruhnya terhadap beberapa jenis biota, Institut Pertanian Bogor, Program Pascasarjana

Feliatra. (1999). Identifikasi bakteri patogen (*Vibrio sp*) di Perairan Nongsa Batam. Riau. *Jurnal Natur Indonesia*. Vol.II

Ghufran, M. & Kordi, K. (2007). Pengelolaan kualitas air dalam budidaya perairan. Rineka Cipta

Hastuti, S., & Subandiyono. (2015). Kondisi kesehatan ikan Lele Dumbo (*Clarias gariepinus*) yang dipelihara dengan teknologi biofloc. *Jurnal Saintek Perikanan*. 10(2): 74-79.

Hatmanti A. 2003. Penyakit bakterial pada budidaya krustasea serta cara penanganannya. J*. Oseana* XXVIII(3): 1-10.

Hermawan, A. T, Iskandar, & Ujung. S. (2012). Pengaruh padat tebar terhadap kelangsungan hidup pertumbuhan Lele Dumbo (*Clarias gariepinus* Burch) di kolam Kali Menir Indramayu. *Jurnal perikanan dan kelautan*. 3(3): 85-93.

Maisyaroh, (2009). Inventarisasi jenis bakteri yang menginfeksi ikan Lele Dumbo (*Clarias gariepenus)* pada beberapa kolam di daerah Bukit Besar Palembang. Universitas Muhammadiyah

Murjani, A. (2011). Budidaya beberapa varietas ikan sepat rawa Trichogaster trichopterus (Pall) dengan pemberian pakan komersial. Fish Scientiae, Jurnal Ilmu-Ilmu Perikanan dan Kelautan 1: 214–232.

Rey, A., Verjan, N., Ferguson, H. W., & Iregul, C. (2009). Pathogenesis of *Aeromonas hydrophila* strain KJ99 infection and its extracellular products in two species of fish. *Veterinary Record*, 164:493–499.

Sarkar, M., & Rashid M. (2012). Pathogenicity of Isolate the Bacterial *Aeromonas hydrophila* to Catfishes, Carps and Perch. *Journal Bangladesh AgricultureUniversity* 1(10): 157-161.

Triyaningsih, Sarjito, & Prayitno S. B. (2014). Patogenisitas *Aeromonas hydrophila* yang diisolasi dari Lele Dumbo (*Clarias gariepinus*) yang Berasal dari Boyolali. *Journal of Aquaculture Management and Technology*, 3(2): 11-17.

White, R. (1991). Diagnosis of *Aeromonas hydrophila* infection in fish University West Lafayette, IN 47907 West Lafayette

Zuryani, H. (2010). Studi kualitas air pada kanal di Kota Terpadu Mandiri (KTM) Rambutan-Parit Kabupaten Ogan Ilir untuk mendukung pengembangan budidaya ikan dalam karamba. Universitas Sriwijaya Program Pasca Sarjana