



## INFLUENCE METHOD OF DEATH ON FISH FILLET QUALITY

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### KeyWords

Fillet, Fish, Freshness, mortality, quality, method, Cutting.

### ABSTRACT

Indonesia has a variety of abundant natural resources, one of which is marine resources, namely fish. Based on statistical data obtained by the Ministry of Fisheries and Marine Affairs (KKP) in 2014, fisheries have contributed as much as 13% of the total natural resource wealth found in the marine and fisheries sector. With abundant natural resources, Indonesia needs to pay attention to the quality of fish that will be traded. Good quality and fresh fish has a high selling value in the market, but in reality, the handling of fresh fish has not yet reached certain standards such as careless handling, unhygienic handling and inappropriate temperature handling. Fish fillets are semi-finished products that can increase sales value, this is because fish fillets can facilitate consumers and benefit producers.

However, fish fillets are prone to bacterial contamination so that in the process of making fish fillets, it is necessary to pay attention to the factors that can reduce the quality value of fish fillets. This article will explain the effect of fish mortality methods and other factors on the quality of fish fillets. In making fish fillets, it is necessary to pay attention to the quality of the fish to be filled, the method of fish death, fish cutting time, and the process of filleting. Fish fillets need to pay attention to many factors because fish fillets are semi-finished products that are prone to bacterial contamination, which can reduce the quality of the fish. When the fillet process is recommended to use the death method with a hit or the use of carbon dioxide, provided that when using the hit method, it is necessary to pay attention to the accuracy of the user's power and expertise. It is recommended that the time for cutting the fish be done as soon as possible after the fish has died, to get good results and it should be noted when using the manual fillet method because it can reduce the bonding to the fish meat.

## A. INTRODUCTION

The handling of fishery products plays an important role in the utilization and production of fisheries. Treatment in fisheries processing starts from the fish caught on board, when landed, in markets, to retailers (Reo.A.R, 2010). Fish fillet is one of the products from fishery processing with fresh fish raw materials that have undergone cutting treatment with or without skin, washing, then stored in frozen storage so that freshness is maintained (Sedana.I.G.W, Widia.I.W, 2015) . The advantage of fish fillet products is that it makes it easier for consumers when cooking because there is no need for cleaning, from the point of view of fish fillet producers it will add economic value to the product. To get fresh fish, the fish must be turned off immediately because of how it kills or kills the fish.

To get fish with good freshness, the fish lethal stage needs to be done after the fish is caught. The fish lethal stage needs to be done quickly because the freshness of the fish is greatly influenced by the method of killing and the time of death of the fish (Sedana.I.G.W, Widia.I.W, 2015). After the fish die, blood or technique removal will be carried out *bleeding*, Blood excretion in fish can maintain its freshness because blood is a good medium for the growth and spread of rotting microbes from the gills to the flesh through blood vessels. The most common handling of fish after the death of the fish is the use of low temperatures, this is done to maintain the freshness of the fish. When at low temperatures, the growth of putrefactive bacteria and biochemical processes that take place in the body will slow down so that the deterioration of the quality of the fish will slow down (Sedana.I.G.W, Widia.I.W, 2015). The durability of fish can decrease if the fish die with the great struggle at each fishing process and the fish are injured due to rough handling (Reo.A.R, 2010) . In Indonesia, ° C and 70 - 90% so that within 10 - 12 hours the fish will rot (Irianto.H.E, Giyatmi.S 2016).

Enzymes in the fish body can be a factor in reducing freshness, this process is called the autolysis reaction. The autolysis reaction is caused by an enzyme in the fish's body tissues that can break down protein, fat and carbohydrates. The decrease in freshness by enzymes takes place when the fish have entered the pre-rigor and rigor mortis stages. After the fish die, blood circulation will stop so that oxygen supply is reduced and metabolic activities stop. This causes the fish to experience quality degradation in anaerobic conditions. In anaerobic conditions, the fish are in the pre-rigor stage, which coincides with the loss of the control system (Irianto.H.E, Giyatmi.S 2016). As a result of the loss of the control system, there are unusual biochemical changes. One of the signs is that fish produce liquid and clear mucus that covers the entire body. This process is called *hyperemia* which takes 2 - 4 hours, if more and more mucus is produced then the mucus will be the most ideal medium for the growth of putrefactive bacteria. After that the fish will experience the rigor mortis stage or the fish's body has become stiff, this is due to various biochemical reactions. This process lasts for 5 hours, at the rigor mortis stage the fish is still in a fresh state. When the pH drops, the enzymes in muscle tissue whose activity is at low pH become active. Likewise enzymes - enzymes in other organs such as the stomach. This makes the fish meat slightly soft (Irianto.H.E, Giyatmi.S 2016). Chemical reactions that occur in fish can cause a rancid smell, change the colour of the fish meat to pale, and change the taste.

It can be concluded that the quality of fishery products is influenced by the handling of two important factors, namely: the bleeding technique factor and the cooling media used. The cooling medium is needed to extend the mortality stage of fish, especially in the pre-rigor and rigor mortis stages, because the fish at this stage can be eaten raw and can be a good raw material for processing fishery products.

## B. FISH FRESH ASSESSMENT

Assessment of fish freshness can be seen based on chemical, microbiological, physical, and organoleptic conditions (Irianto.H.E, Giyatmi.S 2016).

### 1. Chemical assessment

This assessment can be done by determining trimethylamine (TMA), total volatile base (TVB), xanthine oxidase test, and K-value. Trimethylamine has an ammonia-like odour which is the result of the decomposition of trimethylamine oxide from the activity of microorganisms. In freshwater fish, almost all of the TVB values obtained were ammonia. In spiny marine fish, the amount of ammonia is comparable to or slightly higher than trimethylamine, whereas, in fish that have cartilage, the ammonia content is much more than trimethylamine.

Xanthine oxidase test is used to measure the hypoxanthine formed in the process of degrading fish quality from the gradual degradation of ATP. Hypoxanthine measurement provides a good indicator of changes in the early post mortem stages in fish meat.

### 2. Microbiological Assessment

The rate of spoilage of fish can be determined by the total number of bacteria present in the fish. Generally, the determination of the number of bacteria using the total plate count method, namely by growing *nutrient agar* which takes a minimum of 2 - 3 days. This method of assessment is carried out at a temperature of 35 - 37 ° C, the incubation is carried out at a temperature of 0 - 4 ° C and 20-25 ° C.

3. Physical Assessment

This method uses a Torry Fish Freshness Meter (or Torry Meter) tool. This tool is suitable for use in the field. The indicator for the freshness level of this tool is 1 - 19 with a higher value indicating better fish quality. However, this tool has a weakness because fish that have been physically damaged can affect the results of the measurement.

4. Organoleptic Assessment

This assessment method is a subjective assessment that is carried out individually. However, if the person using the appraisal is experienced then this method is sufficient and quite reliable. The advantage of this method is that it is easy to perform, does not require sophisticated, and results are obtained quickly.

Signs of high-quality fresh fish  
(Irianto.H.E, Giyatmi.S 2016)

No.	Parameter	Signs
1	Appearance	Shiny brilliant fish according to type, a body of the fish is intact, not broken, not physically damaged, the stomach is intact and tough, and the anal canal is closed
2	Eye	Bright (bright) eyes, clear eye membranes, black and protruding pupils
3	Gill	Gills are bright red or slightly brownish, and no mucus
4	Smell	Has a fresh odour with a specific slightly fishy smell which is soft. The
5	Mucus	the mucous membrane is thin, watery, clear, shiny, not sticky, smells slightly fishy, and does not smell bad.
6	Texture and flesh	Stiff fish with solid flesh when pressed with large fingers, quickly recovered, the scales did not come off easily, the tissue between the flesh was still strong and compact, and the incisions had the colour of real fish flesh.

**C. Death method**

The choice of the fish mortality method can affect the quality of the fish because if the fish experience prolonged stress during the death process of the fish, a lot of energy will be drained which results in decreased fish quality. Following are the methods of fish mortality (Poli.BM & Parisi.G, 2005).

1. Death in the air (affixing)

Affixing is a method of dying fish due to fish dying in the water. This method can cause detrimental changes to the shelf life and quality of the fish, this is because it creates a prolonged period of suffering before death. At higher temperatures, the fish will die faster.

2. Death to powder ice

This method is to transfer the fish after harvest and transfer them directly to powder ice. This method is suitable for small fish. Fish oxygen demand has also decreased dramatically so that the fish mortality process can be prolonged. The use of this method does not cause stress levels compared to the affixing method.

3. Electric shock

This method uses an electric shock in freshwater because freshwater is a good conductor of electricity, so the fish pass out quickly. This is very efficient because it only takes 1 second depending on the size of the fish. However, this method can cause a fracture of the spine, mouth and opercula wide open. Also, this method does not guarantee that the fish is unconscious. If implemented properly by selecting the appropriate current strength for fish species, this method is very practical.

4. Carbon dioxide

This method places the fish in saturated water that has been filled by dissolved. In this process, the fish will experience a decrease in blood and pH. However, this method torments the fish because they are view of the fish's rapid and violent reaction, attempting to escape, and abnormal activity before stunning.

5. Hit

This method is used to kill the fish one by one. The fish is held manually and beaten one or two times on the brain using a wooden or plastic stick. This method relies heavily on skill and hard or weak strokes. With a hard hit, the fish will immediately lose consciousness and the quality of the fish meat will be maintained. This method is one of the methods that are fast and not stressful, but it takes a long time.

## 6. Spiking

This method is the destruction of the brain using sharp nails that are inserted through the brain. This method is fast and efficient and does not cause stress. This method is suitable for catching fish of a large size

The results obtained were based on the comparison of fish mortality methods, on the first day, the comparison between treatments was not very visible. However on the fifteenth day, they found that the method of death by bumping and carbon dioxide maintained the glycogen levels, the lowest pH compared to the other methods and the longest duration of maintaining the rigor mortis stage. The method of using an electric shock produces a biochemical parameter that is comparable or better than the method although the quality in fish muscles is lower. The asphyxia method produces the lowest quality compared to other methods (Poli.BM & Parisi.G, 2005).

## D. FISH FILLET QUALITY

The quality of fish fillets is influenced by freshness, mortality and time of slaughter. The best time to slaughter fish is when the fish have died at the same time. Fish that were cut immediately after the death of the fish had high muscle pH, hardest texture, best muscle bond, and low drip loss (Roth.B & Birkeland 2009)  
Lower quality was obtained when using the electric shock and cooling methods because it directly decreased the quality of the fish along with the length of treatment. However, the process during filleting can reduce the quality of the meat bonding in fish, especially using the manual method (Roth.B & Birkeland. S 2009)

## E. CONCLUSION

In making fish fillets, it is necessary to pay attention to the quality of the fish to be filled, the method of fish death, fish cutting time, and the process of filleting. Fish fillets need to pay attention to many factors because fish fillets are semi-finished products that are prone to bacterial contamination, which can reduce the quality of the fish. When the fillet process is recommended to use the death method with a hit or the use of carbon dioxide, provided that when using the hit method, it is necessary to pay attention to the accuracy of the user's power and expertise. It is recommended that the time for cutting the fish be done as soon as possible after the fish has died, to get good results and it should be noted when using the manual fillet method because it can reduce the bonding to the fish meat.

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