

## QUALITY ASSURANCE OF TILAPIA FISH (*Oreochromis niloticus*) FRESHNESS WITH TREATMENT OF WEEDING

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### ABSTRACT

Fresh fish is a fish that has the same properties as live fish, both in appearance, smell, taste and texture. This research aimed to determine the quality of a fishery product. This research aimed to determine the freshness test of tilapia in a sensory way and see the different characteristics of different fish conditions. Method research measured yield, morphometric, and organoleptic. The treatment used was low temperature. Low temperature storage (0-5 °C) in tilapia (*Oreochromis niloticus*) by treatment without weeding can reduce the rate of deterioration in post-death tilapia quality even though the results are not significant with the average organoleptic value of tilapia freshness which is 7-9 in the range of days 0-2.

**Keywords:** *Fish Freshness, morphometric, organoleptic, yield*

### INTRODUCTION

Fresh fish is a fish that has the same properties as live fish, both in appearance, smell, taste and texture. Fresh fish according to SNI 01-2729, 1-2006 are fishery products with fish raw materials which are treated as follows: reception, washing, weeding or without weeding, weighing, cooling and packing (BSN, 2006). Freshness of fish can be classified into 4 categories according to Hadiwiyoto (1993), namely fish that still have excellent freshness (observation score 9), Fish with good freshness (observation score 7-8), Fish with moderate freshness (observation score 5-6) and fish that are no longer fresh (observation score 1-4).

Tilapia (*Oreochromis niloticus*) is a fish that is beneficial because it has advantages such as being resistant to environmental conditions, omnivorous, able to digest food efficiently, has a rapid growth rate compared to other species and has a high nutrient content (Suyanto, 2002). The species

*O. niloticus* is an euryhaline species characterized by rapid growth and resistance to pathogens also resistant to low temperatures (Welcomme, 1988; Trewavas, 1983). This research aime to determine the freshness test of tilapia in a sensory way and see the different characteristics of different fish conditions.

### MATERIALS AND METHODS

#### Tools and Materials

The material used was tilapia (*O. niloticus*). The tool used was an organoleptic scoresheet based on SNI 01-2729,1-2006, a container for fish, a scalpel, tissue, cloth, stationery and refrigerator.

#### Method

Each sample of fish to be tested was coded to distinguish one fish sample from another. Then organoleptic testing was done

by using scoresheet for assessment standards. The research process can be seen in Figure 1.

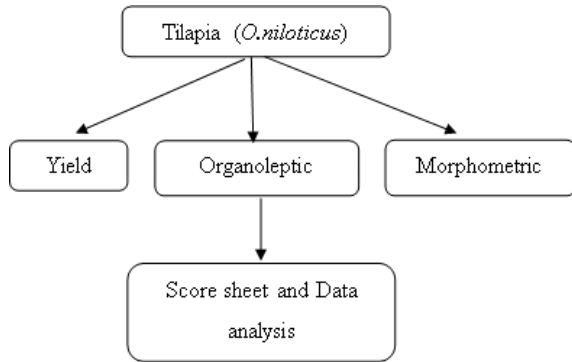


Figure 1. Research procedure

**Yield**

Before preparing the fish the full weight was weighed first, then the boundary between the head and the stomach was cut until it reaches the abdominal limit, then separate the skin, meat, and innards. The weight of each meat and offal is weighed first. Then calculate the yield with the following formula:

$$\text{Yield (\%)} = \frac{\text{meat weight} \times 100\%}{\text{Fish Weight}}$$

**RESULTS AND DISCUSSION**

**Morphometric**

Morphometrics is one characteristic that is related to the size and length of parts of an organism. The morphometrics measured are the weight and length of tilapia. The total weight of tilapia is 203 grams, total length is 22.6 cm, and the raw length is 18 cm. This morphometric measurement shows the condition of fresh tilapia in terms of size and weight. This is very necessary for the purposes of sorting fresh tilapia based on size and weight.

Tilapia has a flat body shape in a vertical direction (compress) and the position of the mouth is located at the tip of the nose (terminal). Characteristics of tilapia are dark

vertical lines on the tail fin of six. This line is also found in the dorsal and anal fins. Generally, tilapia consumption size ranges from 200-500 grams and total length is around 30 cm. Tilapia has dorsal fins with 16-17 sharp spines and 11-15 soft fingers, and anal fins with 3 thorns and 8-11 fingers. The tail has a vertical stripe of 7-12 pieces (Suyanto, 1999).

**Yield**

The recovery is the percentage comparison between the weight of the part of the material that can be utilized with the total weight of the material. Yield value is an important parameter for knowing the economic value and effectiveness of a product. The tilapia yield calculated in this lab includes parts of bone, meat, skin, and innards. The yield of tilapia can be seen in Figure 2.

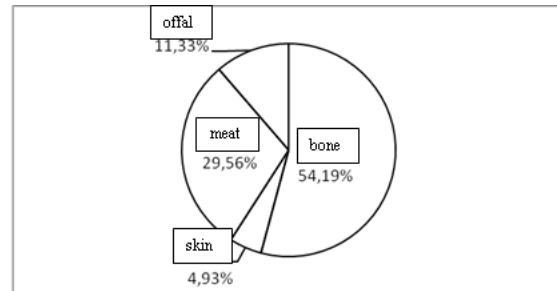


Figure 2. The yield of tilapia (*O. niloticus*)

The highest yield value was found in bone (including head parts), which was 54.19%, followed by parts of meat, innards, and skin respectively at 29.56%, 11.33% and 4.93%. Calculation of yield on fresh fish is very important. this is because it is related to the aspects of the parts that can be used. The separation of the parts of tilapia, both bones, offal and skin, shows that the part of the meat used is very small, below 30 percent. Almost all of the tilapia fish proportion is dominated by bones Bone which is the largest part of

tilapia can be used as an ingredient in making fish bone flour. Tilapia meat has also been used in the form of fillets to become an export commodity (Gustiano and Arifin, 2010).

### Freshness Observation

#### Eye

The eye is one part of the body of the fish which is used as a parameter for the level of fish's fitness. Based on the results of organoleptic assessment on the eyes of tilapia (*O. niloticus*) can be presented in Figure 3.

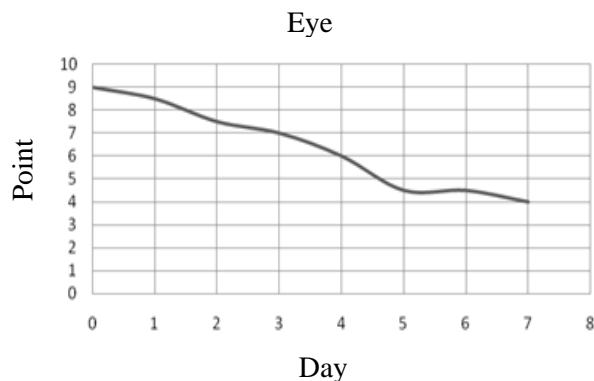


Figure 3. Organoleptic results of tilapia eye (*O. niloticus*)

Based on these data, it can be seen that the average organoleptic value at 0 days is 9, day 1 is 8.5, day 2 is 7.5 and day 3 is 7 at chilling (-1 to 5°C). This shows that the length of storage for 0 days to 3 days of fish is still in the fresh category, because based on the organoleptic assessment of the eyeball which still stands bright, pupil is somewhat grayish and the cornea looks clear indicating that the freshness of the fish is still quite high. Whereas for 4 - 7 days of storage from existing data that the fish has undergone a process of decay, organoleptic results show a rather concave eye, pupil color becomes cloudy, and the cornea becomes cloudy. This shows that the storage time has undergone a process of quality deterioration.

Irawan (1995) explained that freshness would be achieved if the handling of fish went well. Fresh fish means that it has

not experienced biochemical, microbiological, or physical changes that can cause severe damage to fish meat (Hidayat 2016). To maintain the quality of fresh fish, raw materials must be processed as soon as possible. If forced to wait for further processing, the fish must be stored with ice or cold water (0°C to 5°C), sanitary and hygienic (SNI 01-2729.1-2006).

#### Gill

Gills are one of the places where bacteria live which can cause damage to fish meat (Munandar *et al*, 2009). Gills can be used as a parameter to determine the freshness of the fish. Fresh fish have brilliant red gills without mucus while rotten fish have brown gills with thick mucus (Irawan 1995). Changes in the organoleptic mean value of tilapia gills during storage of chilling temperatures can be seen in Figure 4.

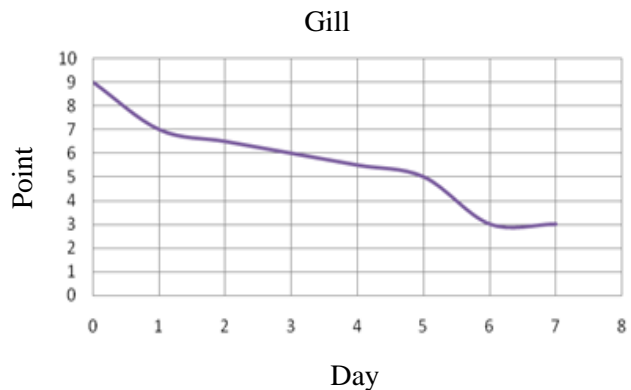


Figure 4. Organoleptic results on tilapia gill (*O. niloticus*)

Based on the picture above, the deterioration of the quality of fish when viewed from the gills shows that there is a significant change in the observation of the second day with a value of 6.5 and observation of the 6th day with a value of 3. This occurs because the fish orlep test is not directly inserted into the cooler after being turned off so that there is an increase in microbial activity and if it lasts long the quality deterioration will occur quickly.

**Body Surface Mucus**

Mucus has a protective ability for animals, among others, coating the surface of the body so as to facilitate movement when swimming, forming a protective layer of infection with pathogenic agents, containing antimicrobial compounds and playing a role in the osmoregulation process (Irianto, 2005). The organoleptic value of the body mucus surface of tilapia (*O. niloticus*) decreases along with the length of storage time. At the 0th to 2nd day storage the average organoleptic value of body mucus surface ranged from 7-9. At storage of the 3rd to 7th day the average organoleptic value ranges from 5-6. Based on SNI 01-2346-2006, fresh fish has an organoleptic value of 7-9. Fresh fish has clear, transparent and shiny bright mucus, while rotten fish have thick mucus that clumps and has a yellow-brownish color (BSN, 2006). The organoleptic value of the mucous surface of tilapia (*Oreochromis niloticus*) on the storage of chilling temperature is presented in Figure 5.

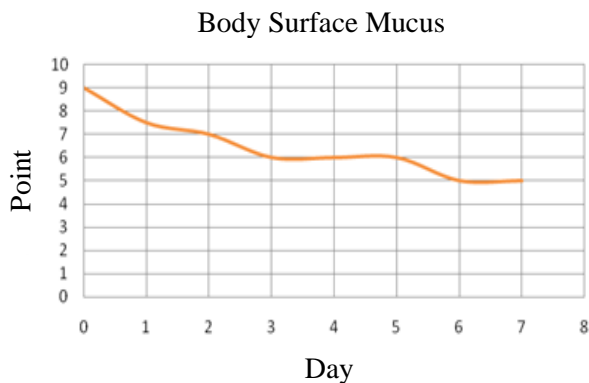


Figure 4. Organoleptic results on body surface mucus of tilapia

**Odor**

Organoleptic testing is a subjective test with the help of the five human senses as a benchmark for the acceptance of a material. The organoleptic testing of tilapia includes appearance (eyes, gills, body mucus, flesh, odor, and texture with organoleptic observational limits of 1-9. Observations were made based on the quality deterioration

phase namely phase rigormortis, initial post rigor and final post rigor. Odor is an easy-to-use parameter determining fish freshness. Fresh fish has a fresh, specific type of smell. Rotten fish smells of ammonia, acid and rotten (BSN, 2006). The results of the organoleptic test for the smell of tilapia can be seen in Figure 6. The organoleptic odor of tilapia ranged from 1 to 9, the value of 9 showed that the odor parameters were very fresh, the specific odor of fish and the value of 1 showed clear foul odor parameters according to SNI 01-2729-1-2006. The results of observations of the organoleptic average value of the smell of tilapia can be seen in Table 1.

Table.1 The average organoleptic value of the smell of tilapia

Days	Odor
0	8,5
1	7,5
2	5
3	5
4	5
5	4
6	3
7	3

From the table above it can be seen the highest value of the organoleptic odor of tilapia on day 0 is 8.5 and the lowest value on the organoleptic odor of tilapia on the 7th day is 3. Based on the results of the organoleptic test of the smell of tilapia with treatment without weeding on day 0 to day 7 has an organoleptic mean value ranging from 8.5 - 3. On day 0 the organoleptic value of smelly tilapia is 8.5 (very fresh, specific smell) type), day 1 the organoleptic value of odor of tilapia is 7.5 (fresh, specific type), day 2 to day 4 the average organoleptic value of tilapia is 5 (the smell of ammonia starts to smell, a little sour smell), the fifth day the organoleptic value of the smell of tilapia was

4, the 6th to 7th day the organoleptic value of the smell of tilapia was 3 (strong ammonia odor, H<sub>2</sub>S smell, clear smell and rotten acid).

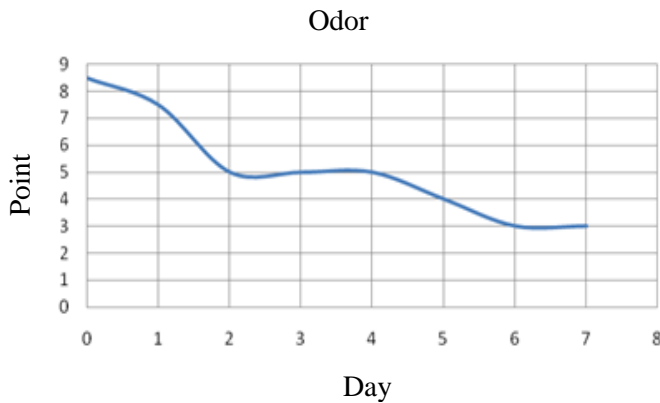


Figure 6. Organoleptic results on odor of tilapia fish (*O. niloticus*)

The difference in the average value of the organoleptic results of the odor of tilapia by treatment without weeding was seen on day 0 to day 1, the smell of fish with treatment without weeding had an organoleptic average value ranging from 8.5 to 7.5, according SNI 01-2729-1-2006 the condition of the fish is still in a fresh state while the average value of the odor of organoleptic test for tilapia by treatment without weeding on days 2 to 7, the smell of fish with no weed treatment has an average value Organoleptic average ranges from 3-5, according to SNI 01-2729-1-2006 the condition of fish not classified as fresh anymore is characterized by the smell of ammonia, sour smell, H<sub>2</sub>S odor, foul odor. The average organoleptic value of the smell of tilapia (*Oreochromis niloticus*) can be seen in Figure 6.

### Texture

Another important parameter in determining the level of freshness of fish is the texture of fish because the change in texture is very clearly seen when there are changes in the stages of decline in the quality of fish. Fresh fish has a dense and elastic meat texture. Very soft texture of fish meat will be

found in rotten fish (BSN 2006). The organoleptic test results for the texture of tilapia can be seen in Figure 7.

Through the organoleptic texture test we did, it can be concluded that at the beginning of storage the fish texture is worth 9 meaning the texture of the fish is still dense, elastic when pressed with a finger, and difficult to tear the meat from the spine, while on the first to the third day of meat the fish has begun to deteriorate, which is a rather dense texture, still elastic when pressed with a finger and still difficult to tear the meat from the spine and on the 4th and 5th day the flesh starts to soften, less elastic when pressed with a finger and easy to tear meat from the backbone.

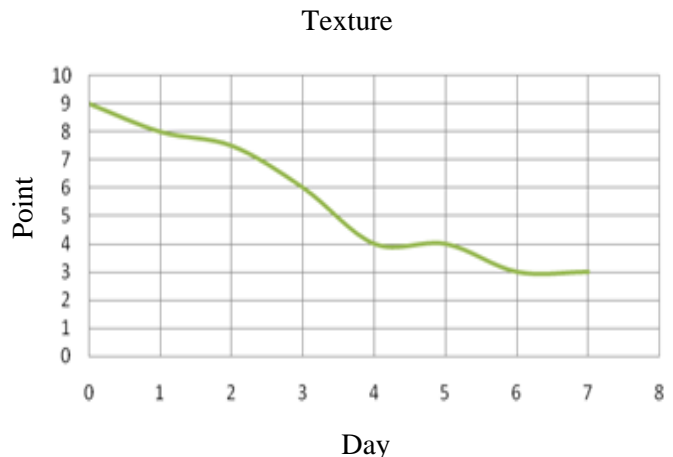


Figure 7. Organoleptic results on texture of tilapia fish (*O. niloticus*)

On the 6th and 7th day which is the last day of observation of the organoleptic test of tilapia, the results show that the texture of the meat is soft, the finger marks are seen when pressed, and it is easy to tear the meat from the spine so that it can be assumed that to the organoleptic value of fish texture.

### Meat

The main parameter to determine the freshness of the fish is meat and contents stomach. Fresh fish meat, the incision is still brilliant, while the rotten fish is dull.

Enzymatic reactions such as kaptasin in meat play a role in the acceleration of the decay process (Bramstedt and Aurbach, 1961). Besides being caused by enzymatic reactions, microbial activity in the digestive tract is also able to decompose proteins that play an important role in the process of decreasing the quality of tilapia (Moeljanto, 1992). Figure 8 showed the average organoleptic value of tilapia meat.

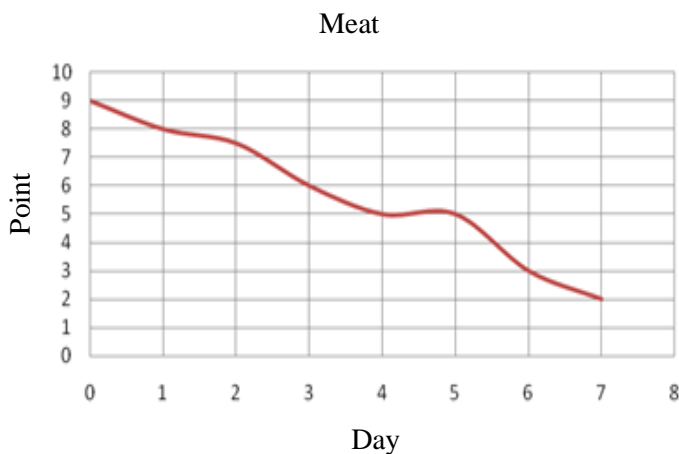


Figure 8. Organoleptic results of tilapia (*O. niloticus*) meat

From the picture above it can be seen that on day 0-2 the meat is still said to be fresh because it has an organoleptic value above 7. On day 3-5, tilapia has begun to experience a phase of deterioration in quality with a range of organoleptic values characterized by changes in the meat incision. begin to soften, milking along the spine and soft abdominal wall. On the 5-7th day the fish is said to be no longer fresh with organoleptic values below 4. This result is also in accordance with the study of Munandar *et al.* (2009) indicating that tilapia without weeding begins to enter a period of not fresh after day 4. Change phase Tilapia meat occurs immediately after the fish die with different levels of change in various phases from pre rigor mortis - post rigor (Junianto, 2003).

## CONCLUSION

The process of quality deterioration of tilapia at the storage of chilling temperature (0-5°C) with treatment without weeding gives the results of the phase of deterioration of quality which lasts more quickly. This phase of quality deterioration is faster due to the process of microbial and enzymatic activity which increases with increasing days which causes a process of quality deterioration which increases with the characteristics of physical, chemical and organoleptic changes of tilapia.

## REFERENCES

- Badan Standardisasi Nasional [BSN]. 2006. Petunjuk Organoleptik Ikan Segar. Jakarta: Standar Nasional Indonesia 01-2346-2006.
- Bramstedt, F., Auerbach, M. 1961. Fish as Food II : The Spoilage of Fresh-Water Fish. Borgstrom G. (ed). New York : Academic Press
- Gustiano, R. Arifin O.Z. 2010. Menjaring Laba dari Budidaya Nila Best. Bogor: IPB Press.
- Hadiwiyoto, S. 1993. Teknologi Pengolahan Hasil Perikanan Jilid I : Teknik Pendinginan Ikan. Jakarta : CV Paripurna.
- Hidayat T. 2016. Quality deteoration gourami fish (*osphronemus gouramy*) during storage. International Journal of Materials Chemistry and Physics. 2(1):40-44
- Irawan HSR. 1995. Pengawetan Ikan dan Hasil Perikanan. Solo : CV Aneka
- Irianto A. 2005. Patologi Ikan Teleostei. Yogyakarta : Gajah mada University Press.
- Junianto. 2003. Teknik Penanganan Ikan. Jakarta : Penebar Swadaya
- Moeljanto. 1992. Pengawetan dan Pengolahan Hasil Perikanan. Jakarta : Penebar Swadaya

- Munandar A., Nurjanah, Nurimala M. 2009. Kemunduran Mutu Ikan Nila (*Oreochromis Niloticus*) Pada Penyimpanan Suhu Rendah dengan Perlakuan Cara Kematian dan Penyiangan. *Jurnal Teknologi Pengolahan Hasil Perikanan Indonesia*. 7 (2) : 88-101
- Suyanto, S.R. 1999. *Nila*. Jakarta: Penebar Swadaya.
- Trewavas, E. 1983. *Tilapiine Fishes Of The Genera Sarotherodon, Oreochromis and Danakilia*. London: British Museum of Natural History
- Welcomme, R.L. 1988. *International Introductions Of Inland Aquatic Species*. F.A.O. Fisheries Technical Paper, 294, pp. 318.