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IMPLEMENTATION OF COLD CHAIN ON THE QUALITY OF KURISI FISH AT BELAWAN SAMUDERA FISHING PORT

Penerapan Rantai Dingin terhadap Kualitas Hasil Tangkapan Ikan Kurisi di Pelabuhan Perikanan Samudera Belawan

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ABSTRACT

The implementation of a cold chain is one way to maintain the quality of the catch. Good handling practices affect the freshness of the fish, both in terms of temperature and organoleptic, so that the quality of the kurisi fish is maintained until it reaches the consumer. The purpose of this study was to determine how the cold chain is implemented for kurisi fish caught landed at the Belawan Ocean Fishing Port (PPS). This study was conducted qualitatively, namely by conducting direct observations in the field and measuring the temperature and organoleptic of the kurisi fish catch. The results showed that the handling of kurisi fish at the Belawan PPS has implemented the ABCD principle (Careful, Clean, Quick, Cold). The stages start from unloading the fish from the hold, washing with seawater, transporting them to the sorting area, sorting by size and type, and the weighing process. All series of activities are carried out quickly and carefully to prevent physical damage and maintain the quality of the fish. The results of fish temperature measurements showed an average initial temperature of 2.47°C upon arrival, this value is in accordance with SNI 2729:2021, which is ≤ 5°C, indicating that the fish is still very fresh, then increased to 6.6°C after sorting, which from the unloading stage to the completion of the sorting process takes ±3 hours. The average organoleptic value is 8.24 with parameters of eyes (8.2), gills (8.2), mucus (8.1), meat (8.3), odor (8.3), and texture (8.3). These results are in accordance with the SNI 2729:202, which is a minimum of 7 for the fresh fish category.

Keywords: Kurisi Fish, Handling, Fish Quality, Belawan Ocean Fishing Port

ABSTRAK

Penerapan rantai dingin merupakan salah satu cara yang dilakukan untuk mempertahankan kualitas hasil tangkapan. Implementasi penanganan yang baik berpengaruh terhadap kesegaran ikan, baik dari aspek suhu maupun organoleptik, sehingga kualitas ikan kurisi tetap terjaga hingga sampai ke tangan konsumen. Tujuan dari penelitian ini untuk mengetahui bagaimana penerapan rantai dingin hasil tangkapan ikan kurisi yang didaratkan di Pelabuhan Perikanan Samudera (PPS) Belawan. Penelitian ini dilaksanakan secara kualitatif yaitu dengan

melakukan observasi langsung ke lapangan serta mengukur suhu dan organoleptik hasil tangkapan ikan kurisi. Hasil penelitian menunjukkan bahwa penanganan ikan kurisi di PPS Belawan telah menerapkan prinsip ABCD (Hati-Hati, Bersih, Cepat, Dingin). Tahapan dimulai dari pembongkaran ikan dari palka, pencucian menggunakan air laut, pengangkutan ke area sortir, penyortiran berdasarkan ukuran dan jenis, hingga proses penimbangan. Seluruh rangkaian kegiatan dilakukan dengan cepat dan hati-hati untuk mencegah kerusakan fisik serta menjaga kualitas ikan. Hasil Pengukuran suhu ikan menunjukkan rata-rata suhu awal kedatangan 2,47°C, nilai tersebut sudah sesuai dengan SNI 2729:2021 yaitu ≤ 5°C yang menandakan bahwa ikan masih sangat segar, kemudian meningkat menjadi 6,6 °C setelah selesai disortir yang mana dari tahap bongkar sampai selesai proses sortir memakan waktu ±3 jam. Rata-rata nilai organoleptik sebesar 8,23 dengan parameter mata (8,2), insang (8,2), lendir (8,1), daging (8,3), bau (8,3), dan tekstur (8,3). Hasil ini sudah sesuai dengan standar SNI 2729:2021 yaitu minimal 7 untuk kategori ikan segar.

Kata Kunci: Ikan Kurisi, Penanganan, Kualitas Ikan, PPS Belawan

INTRODUCTION

The Ocean Fisheries Port (PPS) Belawan is a center for landing marine catches that plays an important role in supporting fisheries activities in North Sumatra. The Belawan Ocean Fisheries Port is located in a fairly strategic position, namely between the waters of the east coast of Sumatra (the Malacca Strait), the waters of the Indonesian Exclusive Economic Zone (IEEZ), and the South China Sea (Siahaan *et al*., 2016). PPS Belawan acts as an economic center in North Sumatra that is able to increase fishermen's income through the provision of fisheries port facilities and infrastructure, while simultaneously encouraging the growth of the fisheries industry. The available facilities, such as landing sites, make PPS Belawan have excellent prospects for both local and export markets (Yuliani *et al*., 2018).

One of the main commodities is kurisi fish (*Nemipterus japonicus*). Kurisi fish has a flat and elongated body with a pinkish-silver color, and is characterized by a golden-yellow line extending from the back of the head to the tail fin. Kurisi fish is one of the fish species with considerable economic value for the general public in Indonesia (Oktaviyani *et al*., 2016). Kurisi fish has thick white flesh that is highly favored by both local and international consumers at a relatively affordable price. The nutritional content of kurisi fish consists of protein 16.47%, fat 1.5%, and ash 2.53% (Wati & Hafiludin, 2023). The physical characteristics of this fish include an elongated body shape with a pink color and a yellow line along the body starting from the back of the head to the base of the tail fin (Elhaweet, 2014).

The application of a cold chain system to landed catches is one of the aspects that influences the freshness and quality of the fish caught. Proper fish handling aims to maintain fish quality according to expected standards (Ismanto *et al*., 2013). Success in fish processing can be influenced by various elements, such as the equipment used, as well as the correct handling methods or techniques, including the skills of the workers (Tani *et al*., 2020). Post-harvest fish handling also plays an important role in obtaining maximum value. This handling stage determines the selling value and subsequent utilization processes as well as product quality. The fish handling process begins when the fish are lifted onto the vessel until they reach consumers or processing industries. Handling quality plays a vital role because it directly affects fish quality; poor handling and long handling durations can accelerate spoilage (Metusalach *et al*., 2014). Proper handling of landed catches is extremely important because it directly affects fish quality while maintaining freshness (Asni *et al*., 2022).

Each stage requires careful attention to prevent quality deterioration, considering that fish are highly susceptible to temperature changes and microbiological contamination (Waluyo & Kusuma, 2017). Fresh fish handling is very important not only to prevent spoilage but also

to keep fish fresh for a longer period. Proper handling of landed catches is essential to maintain fish freshness, as preserved quality directly influences their economic value (Sobariah & Syafei, 2021). Proper handling helps slow down the spoilage process so that fish quality can be preserved until it reaches consumers (Mailoa *et al*., 2020).

The principles of proper fish handling include the application of cold, fast, careful, and clean conditions. The earlier and more consistently these principles are applied, the better the fish quality can be preserved. Fish quality degradation begins at the time of capture and lifting onto the vessel, and continues throughout handling on board, storage in the hold, unloading, and distribution to processing units or consumers (Alimina *et al*., 2022). Proper fish handling is conducted by applying the principles of fast, precise, clean handling while maintaining cold temperatures. The implementation of these principles aims to maintain fish freshness, prevent quality deterioration, and extend shelf life so that product quality remains preserved until it reaches consumers. Organoleptic testing is one of the food product evaluation methods carried out by observing human sensory responses as the primary tool, based on subjective assessments by panelists (Puni *et al*., 2020). This method is also known as testing using human senses to evaluate products (Nurmianto *et al*., 2018). In fish quality assessment, organoleptic testing is conducted by observing several parameters such as appearance (eyes, gills, slime on the body surface), flesh, aroma, and texture (Vatria, 2020).

METHODS

Time and Place

This research was carried out at the Ocean Fisheries Port Belawan (PPS) located in the city of Medan, North Sumatra Province. The research was conducted for 2 months, starting from June 30, 2025 until August 30, 2025.

Tools and Materials

The tools used in this research were; writing tools such as books, pens, mobile phones, and thermometers. Meanwhile, the materials used were *kurisi* fish landed at PPS Belawan and the Scoresheet Form SNI 2729:2021 Fresh Fish.

Research Method

The method used was a qualitative method by conducting direct observation at PPS Belawan related to the handling of *kurisi* fish catches at PPS Belawan starting from *kurisi* fish unloaded from the hold until the sorting was completed. At the unloading activity from the hold, sampling was conducted 30 times of observation to assess the organoleptic quality of *kurisi* fish landed. Organoleptic testing used SNI 2129:2001 Fresh Fish, and temperature measurement was also carried out for 23 observations at the unloading stage and the stage when the fish were fully unloaded. Measurement of the duration required starting from *kurisi* fish unloaded from the hold until sorting was completed was also conducted. These measurements were conducted 3 times during the research.

Data Analysis

The data from organoleptic tests and fish temperature as well as the weight of *kurisi* fish catches were processed using MS. Excel to determine the freshness level of *kurisi* fish landed at PPS Belawan as well as the total *kurisi* fish catch for 2 months.

RESULTS

Handling of Fish Catches

The handling process began with unloading the fish from the hold, washing with seawater, transporting to the sorting warehouse, sorting based on size and type, weighing, and

distribution to traders. These stages, for the most part at PPS Belawan, have followed the principles of ABCD so that the freshness of the fish remains maintained.
The following is the handling process:
1. The process of unloading fish from the hold

Figure 1. Withdrawal From the Hatch

Pulling fish from the hold is the process of removing the catch from the ship's storage area after fishing is completed and the vessel reaches port. The hold is usually equipped with ice or a cooling system to maintain the freshness of the fish during the journey at sea. After the kurisi fish are landed, handling begins by carefully removing the fish from the hold using a pulling method to avoid injury or physical damage to the fish. This is done quickly, with clean equipment, and with the fish's temperature remaining within the standard range of 1°C.

2. Fish washing process

Figure 2. Fish Washing

Washing or sprinkling fish is an action that not only helps maintain the temperature of the fish to remain low so that its freshness is maintained longer, but also cleans the fish's body from mucus, blood, and dirt that sticks to it. At this stage, the principles of handling fresh fish at PPS Belawan have implemented the principles, namely fast in handling from the ship, the tools used are clean, careful in lifting or pulling fish from the hold onto the ship, and

maintaining the temperature of the fish to remain cool (ABCD handling).

3. The process of transporting to the sorting table

Figure 3. Withdrawal to Sorting

The fish are pulled from the ship to the sorting warehouse, where they are sorted, weighed, and transported by the traders who have purchased them. At this stage, the crew at the Belawan PPS have implemented good handling principles by carefully transporting the fish to prevent physical damage, while working quickly to ensure the fish arrive promptly at the warehouse for sorting. This proper and efficient handling not only helps maintain the quality and freshness of the fish but also minimizes the risk of contamination and supports the smooth flow of the subsequent distribution process.

4. Sorting process

Figure 4. Sorting

Sorting is generally done based on the type and quality of fish, because the size of each type of catch is generally relatively uniform. At this stage, the sorters at PPS Belawan have begun to apply good principles, namely being careful when sorting, using clean tools, such as the baskets used, and using gloves to maintain cleanliness and hygiene, and also the sorting table is clean, and fast in sorting.

5. Weighing process

Figure 5. Weighing

Weighing is done to determine the exact weight, then recording the type, quantity, and weight of each fish as part of the production data. The weighing used at the Belawan Ocean Fishing Port uses digital scales provided by the warehouse owner. This process is not only useful for trade purposes, but also as an important source of information for fisheries management and sustainable fish stock monitoring. At this stage, the crew have implemented the principles of clean, fast and careful where they have cleaned the baskets that will be used, and done quickly after sorting, and pulling or pushing the baskets to the weighing place is done carefully so that the fish are well maintained. After weighing is complete, the fish will be directly taken by the traders to their place.

Demolition Process Time Until Completion

The process of unloading the kurisi fish at the Belawan PPS takes approximately 2 hours.

Table 1. Unloading time

Date	Dock	Warehouse	Sorting	Consumers/Collectors	Duration
19-Aug	10:06	10:38	12:00	12:20	2 Hours 14 Minutes
24-Aug	10:00	10:30	11:30	11:47	1 Hour 47 Minutes
25-Aug	10:09	10:15	11:15	11:20	1 Hour 11 Minutes

In Table 1 above, we can see that the process from unloading to sorting takes approximately 2 hours and 14 minutes. This difference indicates variations in efficiency or working conditions in the field, such as catch volume, workforce readiness, and the smoothness of the sorting process.

Temperature of the caught kurisi fish

The following is the temperature of the kurisi fish when it was in the hold and the temperature after being sorted at the Belawan PPS, which can be seen in Table 2.

Table 2. Kurisi fish temperature

No	Vessel Name	Date	Arrival Temperature	Temperature After Sorting
1	Berombang bersama	16.07	1°C	6°C
2	Famili 100	17.07	2°C	3°C
3	Usaha baru sukses	18.07	2°C	5°C
4	New usaha	21.07	1°C	15°C
5	Samudera V	24.07	2°C	4°C
6	Super II	25.07	1°C	10°C
7	Famili 100	28.07	2°C	8°C
8	Nusantara prawn	28.07	3°C	9°C
9	Elang laut	29.07	2°C	5°C
10	Sinar baru 18	31.07	2°C	9°C
11	Berombang bersama	01.08	2°C	9°C
12	Citra 4	01.08	9°C	6°C
13	Serba maju 1	04.08	2°C	5°C
14	Sumber samudera	05.08	2°C	9°C
15	Hai ex	07.08	3°C	8°C
16	Berkat bintang II	08.08	2°C	8°C
17	Wijaya baru	11.08	2°C	6°C
18	Nusantara bersatu 08	13.08	2°C	5°C
19	Makmur jaya	14.08	2°C	8°C
20	yakin	15.08	7°C	6°C
21	sinar sukses	19.08	2°C	5°C
22	Aries indo 2	24.08	2°C	2°C
23	Sinar bahari	25.08	2°C	1°C
	Average		**2,47**	**6,6**

In table.2 above shows that the temperature of the kurisi fish upon arrival is in the range of 1-3°C with an average of 2.47°C which indicates that the fish is still fresh, while the temperature of the fish after sorting ranges from 3-15°C with an average of 6.6°C this value indicates that the fish has experienced a decrease in quality. Where in the table we can see this difference shows an increase in the arrival temperature with the temperature after sorting in the kurisi fish, this has the potential to affect the quality and freshness of the kurisi fish. The temperature of the kurisi fish when stored in the hold is an important factor in maintaining its freshness and quality, where the newly caught fish will be put into the hold at the time of fishing, by adding ice blocks, to maintain a good temperature that is close to 0°C to 4°C in accordance with good handling standards.

Organoleptic quality of kurisi fish

Organoleptic testing is a scientific discipline focused on the measurement, analysis, and interpretation of food characteristics based on human sensory perceptions: sight, smell, taste, and touch. Organoleptic properties in fish refer to sensory attributes such as taste, aroma, texture, and appearance, which determine consumer perceptions of freshness. For the kurisi fish (Nemipterus japonicus), organoleptic assessments generally focus on several key aspects, such as the condition of the eyes, gills, surface mucus, flesh, odor, and texture. The organoleptic quality of kurisi fish at the Belawan Fish Farming Center (PPS) can be seen in Table 3.

Table 3. Organoleptic Quality of Kurisi Fish from July to August 2025

No	Vessel Name	Organoleptic Value	SNI standards
1	Nusantara bersatu 8	8,3	9
2	Widuri 68	8,2	9
3	Sinar baru 17	8,3	9
4	Chamar 32	8,1	9
5	Yakin 88	7,7	9
6	Rezeki bersama	8,1	9
7	Berombang bersama	8,1	9
8	Famili 100	8,4	9
9	Usaha baru sukses	8,0	9
10	New usaha	8,4	9
11	Samudera V	8,3	9
12	Super II	8,3	9
13	Famili 100	8,4	9
14	Nusantara prawn	8,3	9
15	Elang laut	8,2	9
16	Sinar baru 18	8,2	9
17	Berombang bersama	8,3	9
18	Citra 4	8,2	9
19	Serba maju 1	8,4	9
20	Sumber samudera	8,2	9
21	Hai ex	8,4	9
22	Berkat bintang II	8,7	9
23	Wijaya baru	8,7	9
24	Nusantara bersatu 08	8,4	9
25	Makmur jaya	8,3	9
26	yakin	8,3	9
27	sinar sukses	7,8	9
28	Aries indo 2	8,1	9
29	Sinar bahari	8,3	9
	Average	**8,23**	**9**

From table 3 above, we can see that based on the assessment results, the organoleptic value of each vessel ranged from 7.7 to 8.7 with an average of 8.23, which indicates that the quality of the fish caught is classified as good and still meets the quality standards for fresh fish according to the provisions of SNI 2729:2021.

1. Eye

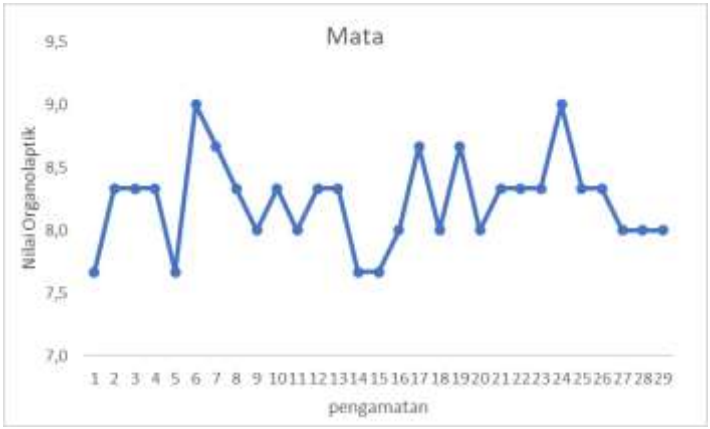

Figure 1. Graph of the eye of the kurisi fish

Figure 1 shows that the highest organoleptic value for the eye parameter is 8.2, indicating that the kurisi fish is still very fresh. According to SNI 2729:2021, the fish is still fresh and safe for consumption.

Figure 2. Eyes of the kurisi fish

Figure 2 shows that the eye parameters of the kurisi fish are in the very good category, with an average organoleptic value of 8.2. This value indicates that the fish is still relatively fresh, characterized by clear, bright, and prominent eyes, thus classifying it as a high-quality product. Based on SNI 2729:2021, the fish is still fresh.

2. Gill

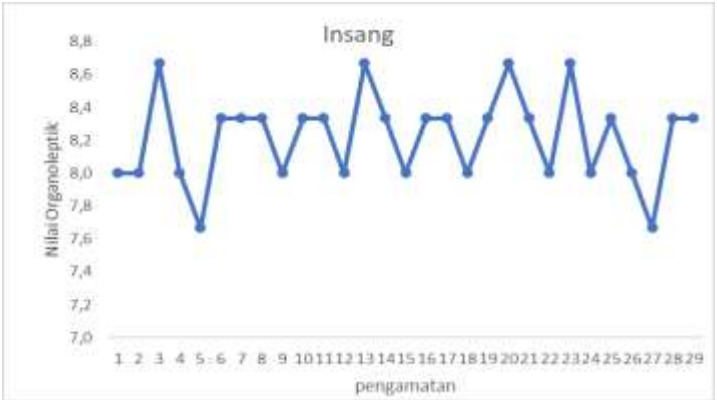

Figure 3. Graphic of the gills of the kurisi fish

In Figure 3 above, we can see that the organoleptic value of the kurisi fish in the gill parameter has the highest value of 8.7, which indicates that the kurisi fish is still very fresh and the lowest organoleptic value is 7.7, which indicates that the kurisi fish is still at the fresh stage.

Figure 4. Gills on the kuisi fish

In Figure 4, we can see that the fish is still fresh with an average of 8.2. This indicates that the gills of the Kurisi fish still meet the SNI 2729:2021 standard. This value shows that the quality is still in the fresh category and is suitable for consumption.

3. Mucus

Figure 6. Graph of mucus on the kurisi fish

Figure 6 shows that the mucus parameter of the kurisi fish has the highest organoleptic value, at 8.7, indicating that the kurisi fish is still fresh. The average organoleptic value for the kurisi fish is 8.1, indicating that the fish is still fresh. This is in accordance with SNI 2729:2021, which indicates that the kurisi fish is still in the fresh and edible category.

4. Meat

Figure 7. Meat graph of the kurisi fish

In Figure 7 above, we can see that the organoleptic value for the meat parameter has the highest value of 9, indicating that the fish is still very fresh, and the lowest value is 7.7, and the average organoleptic value is 8.3, indicating that the fish is still fresh. The texture of the meat still shows characteristics of freshness, namely dense, elastic, and springy to the touch, and is able to return to its original shape after being pressed. This is in accordance with the SNI 2729:2021 standard, because it is within the minimum score limit of 7, making it still suitable for consumption.

5. Smell

Figure 9. Odor graph of the kurisi fish

Figure 9 shows a graph of the parameters of kurisi fish meat which has a high organoleptic value of 9, which indicates that the fish is still very fresh, and the lowest organoleptic value is 7.7, which still indicates that the fish is fresh. Kurisi fish has obtained an average organoleptic value for the odor parameter of 8.3, which has met the SNI 2729:2021 standard, because it exceeds the minimum score of 7, so we can see that the kurisi fish is included in the fresh category and is safe and suitable for consumption.

6. Texture

Figure 10. Texture graph of the kurisi fish

From Figure 10, we can see that the organoleptic value for the texture parameter has the highest value of 9, indicating that the fish is still very fresh, and the lowest value is at 7.7, which still indicates that the fish is still fresh. The average organoleptic value obtained from the texture parameter is 8.3, this is in accordance with the SNI 2729:2021 standard, because it exceeds the minimum score of 7, so we can see that the kurisi fish is still classified as fresh and suitable for consumption.

Kurisi fish production

Fish production is the activity of producing fish, either through catching them in natural waters or through a managed cultivation process. In fish production, fish are obtained directly from the sea, rivers, or lakes using various types of fishing gear. Fish production activities aim to improve the welfare of fishermen by increasing their income. The following data shows the production of kurisi fish from July to August 2025.

Table 3. Kurisi Fish Production

No	Vessel Name	GT	Kurisi Fish Catch	Catch Percentage (%)	Total Catch
1	Nusantara bersatu 8	28	1.272	0,251	5.076
2	Widuri 68	29	321	0,080	4.013
3	Sinar baru 17	27	575	0,109	5.281
4	Chamar 32	50	580	0,105	5.538
5	Yakin 88	30	431	0,097	4.442
6	Rezeki bersama	30	504	0,092	5.507
7	Berombang bersama	30	277	0,093	2.979
8	Famili 100	17	273	0,065	4.220
9	Usaha baru sukses	60	866	0,169	5.132
10	New usaha	28	505	0,151	3.334
11	Samudera V	29	864	0,157	5.505
12	Super II	47	633	0,098	6.448
13	Famili 100	17	396	0,223	1.774
14	Nusantara prawn	30	776	0,100	7.756
15	Elang laut	23	1.254	0,154	8.138
16	Sinar baru 18	29	807	0,143	5.638
17	Berombang bersama	30	728	0,145	5.017
18	Citra 4	25	473	0,044	10.658
19	Serba maju 1	28	979	0,162	6.046
20	Sumber samudera	29	607	0,121	5.016
21	Hai ex	75	591	0,098	6.003
22	Berkat bintang II	21	890	0,125	7.139
23	Wijaya baru	29	587	0,153	3.834
24	Nusantara bersatu 08	28	775	0,137	5.670
25	Makmur jaya	30	415	0,090	4.595
26	yakin	28	300	0,126	2.378
27	sinar sukses	30	475	0,139	3.429
28	Aries indo 2	30	658	0,118	5.586
29	Sinar bahari	30	459	0,130	3.521
	Total		**18.271**	**3,675**	**149.673**
	Average		**630**	**0,127**	**5.161**

Table 3 shows that the Nusantara Bersatu 8 vessel caught 1,272 kg of fish, while the vessel with the lowest yield, Berombang Bersama, only caught 277 kg. The total catch of each vessel showed considerable variation, ranging from approximately 1,774 kg to 10,658 kg. The average total catch was approximately 5,161 kg, with an average production of kurisi fish of 630 kg. This indicates that the contribution of kurisi fish to the total catch varies greatly, influenced by vessel capacity, length of time at sea, and water conditions.

DISCUSSION

According to Wijaya *et al.* (2024) handling of fish that is good is carried out through the application of appropriate techniques starting from the vessel to the hands of consumers, handling of fish must be carried out immediately because after the fish dies, physical, chemical, and organoleptic changes occur very rapidly (Mahdaniar, 2017). Where According to (Lubis *et al.*, 2019) the unloading process in Indonesia generally lasts between 1 and 3 hours on small-sized vessels, whereas on larger vessels, the time required tends to be longer. This process includes accurate recording, cooling of fish with ice blocks while maintaining the quality of the catch. This process is important to maintain the physical quality and freshness of fish before the next stage. Good handling of fishery products affects the quality of the final product produced, and this will also have an impact on export potential and high selling value (Roiska *et al.*, 2025).

Temperature in the storage hold must remain low, ideally close to 0 °C (Metusalach *et al.*, 2014). Before the sorting process is carried out, fish first undergo an initial washing stage using seawater (Sartika *et al.*, 2017). This washing stage is very important to prepare the fish before entering the next processing or storage process (Ghaly *et al.*, 2021). Next, sorting functions to facilitate the distribution process, maintain consistency of quality, and provide a clearer picture of daily production results, thus supporting efficiency in the fisheries supply chain (Tani *et al.*, 2020). The quality of skipjack tuna stored at cold temperatures for 12 hours remains safe for consumption based on organoleptic and sensory parameters (Roiska *et al.*, 2025).

Handling of fresh fish should be carried out by keeping its temperature low, close to 0 °C, and avoiding temperature increases that may occur due to exposure to sunlight or limited availability of ice, because such conditions may disrupt temperature stability in the hold (Metusalach *et al.*, 2014). According to Sangsari (2013) storage temperature significantly affects fish freshness. Fish stored under ice (0 °C) or in refrigeration (4 °C) exhibit varying quality, with lower temperatures maintaining freshness better, as shown by physical, chemical, and sensory analyses.

The decline in organoleptic freshness of fish is generally characterized by decreased quality of taste, aroma, and texture. This process occurs quite rapidly after capture, particularly due to temperature factors and handling methods (Franceschelli *et al.*, 2021). After fish are caught, these quality parameters decline rapidly, which may affect product quality and reduce consumers' willingness to pay optimal prices (García *et al.*, 2022).

In addition, according to Pariansyah *et al.* (2018), the condition of fish eyes is an important parameter in determining freshness level. Changes in the eyes usually occur more rapidly than in other body parts, making them an initial indicator to distinguish fresh fish from fish that have begun to decline in quality. Gills are also organs that potentially become a place for bacterial growth due to their high blood content, according to Pariansyah *et al.* (2018).
Changes in aroma in fish are caused by microbial activity producing ammonia (NH_3) from protein degradation and hydrogen sulfide gas (H_2S) from the decomposition of sulfur compounds by H_2S-producing bacteria (Dotulong & Montalalu, 2018). Fish landed at ports are generally still considered fresh, with organoleptic values between 7 and 8, thus categorized as still fresh (Gunawan *et al.*, 2018; Metusalach *et al.*, 2014; Herawanty *et al.*, 2021; Asni *et al.*, 2022).

Based on observations, fresh kurisi fish have firm flesh texture with compact, strong muscle fibers that adhere well. When touched or pressed, the surface of the flesh feels elastic and springy, and immediately returns to its original shape without leaving an imprint. These characteristics indicate that the fish is in fresh and good-quality condition (Andayani *et al.*, 2014). Freshness of fish can be assessed through the condition of the mucus on its body surface. The presence of this mucus layer becomes an indicator that the quality of the fish has begun to

decline and marks the onset of the pre-rigor phase, according to Mailoa *et al.* (2020).

CONCLUSION

The handling of kurisi fish at PPS Belawan has basically been carried out well through the implementation of appropriate procedures to maintain its quality and freshness. The handling stages begin with the process of unloading from the ship's hold which is carried out carefully when transporting fish, by paying attention to the tools used such as baskets and sorting tables which have been cleaned before use, carrying out transportation from the hold into the warehouse for quick sorting and weighing so that the condition of the fish is maintained, and keeping the conditions cool so that the fish do not experience physical damage. and the organoleptic quality of kurisi fish at the Belawan Ocean Fishing Port still shows freshness according to SNI 2729: 2021 standards, namely with an average organoleptic quality of 8.2 which indicates that the kurisi fish is still fresh and safe and suitable for consumption.

RECOMMENDATION

Further research is needed on the chemical and microbiological quality of the kurisi fish catch to determine the complete quality of the catch.

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