Original research article

Handling and Composition of Purse Seine Catches at Fishing Port, Batam City

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ABSTRACT

Handling fish on board must be carried out properly to maintain the quality of the fish obtained. This study analyzed the handling process and composition of catches on purse seine vessels unloaded at the Fishing Port, Batam City. Handling of catches on purse seine vessels is carried out in the following stages, namely loading fish onto the ship, washing fish, sorting fish, washing fish before entering the Air Blasting Freezer (ABF) room, freezing using Air Blasting Freezer (ABF), packaging, and storage in cold storage rooms. The catch on trip 1st, with fishing operations from March 21st to April 15th 2022, resulted in a catch of 36,308 kg, with the following percentage of dominant catch composition, namely Indian scad of 78.61%, Bigeye scad of 7.52%, Shrimp scad of 3.41%, Yellowtail scad of 3.05%, and Indian mackerel of 2.63%. The catch on trip 2nd, during the fishing operation period, from April 21st to May 13th, 2022, is presented in Table 2. The catch consisted of target and non-target species, with a total weight of 21,386 kg. The catch was dominated by Indian scad of 80.47%, Bigeye scad of 5.81%, Goldstripe sardinella of 5.29%, Bullet tuna of 2.63%, and Squid of 2.14%. Indian scad is the dominant species caught in the purse seine operation.

Introduction

Batam is a strategic coastal city located in the Riau Archipelago Province and directly borders other countries, so the capture fisheries business's economic potential is highly attractive. This coastal city has quite high fish landing activity and is also equipped with fishing port facilities. The capture fisheries sector is one of the leading sectors to increase regional income. Some activities facilitated at fishing ports include mooring boats, landing catches, marketing catches, filling marine supplies, maintaining fishing gear, and repairing ships (Alfin et al., 2014).

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Fishery products are perishable, so the ability to catch standardized fish is an important factor in maintaining good fish quality. However, some problems fishermen and ship owners face today are the decreasing quality of fish caught due to the long fishing time at sea. For this reason, a preservation technology is needed, such as an air blast freezer (ABF), which can maintain the quality of fish longer from the time it is caught until it is landed at the fishing port (Hastrini et al., 2013).

Handling fish on board must be carried out properly to maintain the quality of the fish obtained. The stages of handling fish on board start from removing fish from the nets, washing fish on board, sorting fish, washing fish before entering the hold, cooling, packaging and storing in the hold. This study analyzed the handling process and composition of catches on purse seine vessels based at the Fishing Port, Batam City.

Apart from maintaining good handling, the sustainability of capture fisheries (Perangin-angin, 2020) can be achieved using selective fishing gear. The catch's composition can be used to measure the selectivity and effectiveness of operating fishing gear in certain waters (Taiwo & Alopade, 2017). For this reason, this study aims to evaluate the handling and composition of the catch in purse seine operations.

Material and Method

The research was conducted on March 2022 on six small islands in Central Bangka Regency waters, consisting of Panjang Island, Semujur Island, Ketawai island, Ketugar Island, Gusung Asam Island, and Bebuar Island. The station locations were decided using a purposive sampling method considering the coverage and the representative of the areas in small islands waters in Central Bangka Regency. Data collection was conducted in 8 stations. Research location maps are shown in Figure 1. This study was conducted from March 21st to May 13th 2022, following fishing operations to landing catches on purse seine vessels based at the Fishing Port, Batam City, Riau Archipelago Province.

Descriptive analysis is used to analyze the handling of catches on purse seine vessels. Roy (1997) states that descriptive research seeks to interpret something, for example, existing conditions or relationships, processes that take place, or effects that occur. The composition of the catch is calculated using the unit weight or kilogram (kg) of each type of fish caught at the time of catching each trip, according to Equation 1 (Azizah et al., 2015).

$$Kj = \frac{ni}{N} \times 100 \quad \dots\dots\dots\dots\dots (1)$$

Notes:

Kj   : Composition of fish species (%)

n_i : The weight of the catch of each type - i (kg)

N   : Total weight of the catch

Result and Discussion

Catch Handling

Handling of caught fish on purse seine vessels based at the Fishing Port, Batam City, consists of several stages: washing, sorting, washing before entering Air Blast Freezer (ABF), freezing, packaging, and storage in a cold storage room.

Fish washing

The initial stage in handling fish on board is washing the fish. Fish washing is carried out when the caught fish collected on the dredge/drill ring is lowered onto the ship's deck, then watering the fish with seawater flowing through a water hose. This washing activity is carried out to clean the fish from scales and dirt attached to the fish's body (Figure 1). Vebronius et al. (2020) state that the stages of washing fish on board are carried out to clean the fish from blood and dirt that sticks to the fish's body. The purpose of this stage is to reduce the number of bacteria present in the fish's body so that the quality of the fish can be maintained.

Fish Sorting

The sorting stage of fish is carried out when the fish washing stage is finished. This stage is carried out by sorting the fish according to type, size and quality by placing them in each prepared tin pans (Figure 2). Rahayu et al. (2017) state that the sorting process is done by selecting fish because many other types of fish are caught.

Washing Fish Before Entering the Freezer

After the fish has been sorted according to type, size, and quality, the fish placed into the cans is washed again. Washing is done by pouring the fish contained in the can into the prepared basket, and then the fish is soaked while shaking in a water bath filled with cold water (Figure 3). Washing fish before entering the freezer aims to clean fish with scales or blood attached to the body. Rahayu et al. (2017) stated that washing or rinsing fish using cold water aims to remove seawater or salt content in fish.

Figure 1. Fish Washing

Figure 2. Fish Sorting

Figure 3. Washing Fish Before Entering the Freezer

Fish freezing

At this stage, the fish that has been washed is then placed in a container made of cans, after that the fish in the canned containers are put into the ABF room using rail aids. Fish freezing is carried out using ABF, which aims to freeze and preserve fish so that the quality of the fish can be maintained until it arrives at the port. The process of freezing fish in the ABF room takes around 8 – 12 hours, depending on how many fish are loaded into the ABF room (Figure 4). The temperature in ABF before the fish is loaded is around -10ºC, and when the fish has been frozen in ABF, the temperature will be lowered to around -24ºC to -25ºC.

Vebronius et al. (2020) state that the stages of freezing fish aim to preserve fish for some time before the fish are unloaded at the port. Fish frozen in the ABF room at temperatures ranging from -25 ºC to -26 ºC can proceed to the packaging stage.

Fish packaging

Fish that has been frozen in the ABF room is then unloaded to proceed to the packaging stage. At the packaging stage, the fish still in the can is dipped in water, making it easier for the fish to be removed from the can. Releasing fish from can packaging is done by placing the fish packaging on a mat so the fish is not damaged and making packaging easier. Packaging is done by placing frozen fish into the plastic packaging that has been prepared, with a size of 35x50 cm, then tied using plastic rope (Figure 5).

The stages of fish packaging aim to facilitate fish loading when compiling it into the hold (freezer) and help preserve fish before the fish are unloaded at the port. Vebronius et al. (2020) stated that

packaging was carried out using low-density polyethylene (LDPE) plastic measuring 80x50 cm. This type of plastic is used because it is elastic and good for food packaging.

Figure 4. The process of putting fish into the Air Blast Freezer (ABF) room

Figure 5. Fish packaging in plastic packaging

Fish Storage

Fish that have been packed are immediately put into the hold and arranged neatly so that the fish loaded into the hold can be filled as a whole. Fish are arranged in stacks starting from the bottom of the hold until it is full (Figure 6). When fish is stored, the temperature in the hold/freezer ranges from -23ºC to -26ºC. Vebronius et al. (2020) stated that fish in the holds was arranged in stacks, and the storage temperature in the holds/freezers was maintained up to 4ºC.

Catch Composition

Catches on purse seine vessels landed at the Fishery Port, Batam City, can be classified into two categories, namely target fish species and non-target fish species. The types of fish caught in the purse seine operation in the waters of the South China Sea consisted of 23 fish species. The target and non-target fish species obtained in this study can be seen in Table 1 and Table 2.

Figure 6. Arrangement and storage of fish in the cold storage room

Table 1. Target fish species

No.	Common Name	Scientific Name
1.	Indian scad	*Decapterus russelli*
2.	Bigeye scad	*Selar crumenophthalmus*
3.	Indian mackerel	*Rastreliger sp.*
4.	Yellowtail scad	*Atule mate*
5.	Shrimp scad	*Alepes djedaba*

Table 2. Non-target fish species

No.	Common Name	Scientific Name
1.	Indian anchovy	*Stolephorus indicus*
2.	Milkfish	*Chanos chanos*
3.	Yellowstripe goatfish	*Mulloidichthys sp.*
4.	Giant trevally	*Caranx ignobilis*
5.	Spotted catfish	*Arius maculatus*
6.	Barracuda	*Sphyraena obtusata*
7.	Kawakawa	*Euthynnus affinis*
8.	Goldstripe sardinella	*Sardinella gibbosa*
9.	Narrow-barred Spanish mackerel	*Scomberomorus commerson*
10.	Albacore	*Thunnus alalunga*
11.	Bullet tuna	*Auxis rochei*
12.	Bottlenose wedgefish	*Rhyncobathus Australia*
13.	Harlequin sweetlips	*Plectorhinchus chaetodonoides*
14.	Moonfish	*Mene maculata*
15.	Daggertooth pike conger	*Muraenesox cinereus*
16.	Silver-stripe round herring	*Spratelloides gracilis*
17.	Squid	*Loligo spp.*

Based on weight, the composition of the catch in the purse seine operation showed that the total catches in trip 1st and trip 2nd were 36,308 kg and 21,386 kg, respectively. The catch on trip 1st, with fishing operations from March 21st to

April 15th 2022, resulted in a catch of 36,308 kg, with the following percentage of dominant catch composition, namely Indian scad of 78.61%, Bigeye scad of 7.52%, Shrimp scad of 3.41%, Yellowtail scad of 3.05%, and Indian mackerel of 2.63% (Table 3). The catches on this trip were dominated by Indian scad, which showed a very good level of selectivity for purse seine fishing gear.

Table 3. The composition of the catch on trip 1st, for the period of fishing operations from March 21st to April 15th 2022.

No.	Common Name	Scientific Name	Weight (Kg)	Percentage (%)
1	Indian scad	*Decapterus russelli*	28.542	78,611%
2	Bigeye scad	*Selar crumenophthalmus*	2.731	7,522%
3	Shrimp scad	*Alepes djedaba*	1.239	3,412%
4	Yellowtail scad	*Atule mate*	1.106	3,046%
5	Indian mackerel	*Rastreliger sp.*	955	2,630%
6	Squid	*Loligo spp.*	583	1,606%
7	Barracuda	*Sphyraena obtusata*	427	1,176%
8	Bullet tuna	*Auxis rochei*	368	1,014%
9	Albacore	*Thunnus alalunga*	71	0,196%
10	Kawakawa	*Euthynnus affinis*	65	0,179%
11	Goldstripe sardinella	*Sardinella gibbosa*	63	0,174%
12	Yellowstripe goatfish	*Mulloidichthys sp.*	58	0,160%
13	Indian anchovy	*Stolephorus indicus*	49	0,135%
14	Milkfish	*Chanos chanos*	22	0,061%
15	Spotted catfish	*Arius maculatus*	22	0,061%
16	Giant trevally	*Caranx ignobilis*	6	0,017%
17	Narrow-barred Spanish mackerel	*Scomberomorus commerson*	1	0,003%
Total			36.308	100%

The catch on trip 2nd, during the fishing operation period, from April 21st to May 13th, 2022, is presented in Table 2. The catch consisted of target and non-target species, with a total weight of 21,386 kg. The catch was dominated by Indian scad of 80.47%, Bigeye scad of 5.81%, Goldstripe sardinella of 5.29%, Bullet tuna of 2.63%, and Squid of 2.14%. Indian scad is the dominant species caught on trip 2 of the purse seine operation (Table 4). A study on the operation of the Stationary Lift Nett in Tengkolak, Sukakerta Village, Karawang Regency, showed a dominance level of the target species of 34% (Sutono, 2021).

Table 4. The composition of the catch on trip 2nd, for the period of fishing operations from April 21st to May 13th 2022.

No.	Common Name	Scientific Name	Weight (Kg)	Percentage (%)
1	Indian scad	Decapterus russelli	17.209	80,47%
2	Bigeye scad	Selar crumenophthalmus	1.243	5,81%
3	Goldstripe sardinella	Sardinella gibbosa	1.132	5,29%
4	Bullet tuna	Auxis rochei	562	2,63%
5	Squid	Loligo spp.	458	2,14%
6	Barracuda	Sphyraena obtusata	323	1,51%
7	Yellowtail scad	Atule mate	220	1,03%
8	Indian mackerel	Rastreliger sp.	180	0,84%
9	Milkfish	Chanos chanos	29	0,14%
10	Harlequin sweetlips	Plectorhinchus chaetodonoides	14	0,07%
11	Bottlenose wedgefish	Rhyncobathus Australia	7	0,03%
12	Moonfish	Mene maculata	5	0,02%
13	Daggertooth pike conger	Muraenesox cinereus	4	0,02%
	Total		21.386	100%

Conclusion

The method of handling catches on purse seine vessels based at the Fisheries Port, Batam City, with the stages of the catch handling process include boarding the fish, washing the fish, sorting the fish, washing the fish before entering the Air Blasting Freezer (ABF), freezing, packaging, and storage in the hold/freezer, have been carried out according to handling standards.

The fish catches on trip 1st and trip 2nd were 36,308 kg and 21,386 kg, respectively, dominated by Indian scad, with a percentage of each trip of 78.61% and 80.46%.

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