ISSN.0216-8316

JURNAL PENELITIAN PASCA PANEN PERIKANAN
(Journal of Post-Harvest Fisheries Research)

No. 57
Tahun 1987

BALAI PENELITIAN PERIKANAN LAUT
Badan Penelitian dan Pengembangan Pertanian
Departemen Pertanian
JAKARTA

JURNAL PENELITIAN PASCA PANEN PERIKANAN

(Journal of Post-Harvest Fisheries Research)

Diterbitkan oleh : BALAI PENELITIAN PERIKANAN LAUT
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(Journal of Post-Harvest Fisheries Research)

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Jurnal Pen. Pasca Panen Perikanan No. 57 Th. 1987 Hal. 31 - 37

ACIAR PROJECT 8313 : FISH DRYING IN EAST JAWA AREA I : ON–BOARD HANDLING EVALUATION OF FISH CAUGHT BY TRADITIONAL AND C S W BOATS IN MUNCAR, EAST JAWA

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ABSTRACT : Studies of the effects of on board handling on fish were carried out. In this study the fish caught by CSW boats and the fish caught by traditional boats were compared. The results showed that the fish caught by traditional boats had higher internal temperature than the fish caught by CSW boats.

Concerning the quality and price of fish, the CSW system revealed better than traditional handling. Most of the fish caught by traditional boats was converted into fish meal and dried salted fish, while that caught by CSW system boats was canned.

INTRODUCTION

Unavailability of good quality raw material for fish processing industries and fresh fish consumption is a big problem in fishery sector until now, especially fish from tradisional fishherman. Poor handling has been incriminated for low quality raw material production.

The quality of raw material used affects the quality of end products. A good quality raw material produces better quality products. To insure the quality of the products, fish processors usually have a definite condition of the fish quality as raw material.

About ninety percent of landed fish in Muncar (East Jawa) was "lemuru" *(Sardinella longiceps*/Oil Sardine) and it was caught by purse seine boats. Lemuru has an adverse characteristic, ie. high content of fat (in the range of 2 –22% depending on the season). This characteristic creates a problem for fisherman, because the fish has low price. Fish processing industries need high quality raw material, and high content of fat in lemuru makes a problem for them, especially for the dried salted fish processors.

The quality grades of lemuru in Muncar are usually as follows: (1) bagus (good quality), (2) setengah tuwo (medium quality), and (3) tuwo (poor quality). These quality grades will affect the price and their final use in processing lines. Generally, the relationship between the quality grades of lemuru and final use is as shown in table 1.

Table 1. Quality Grades of Lemuru and Their Final Use

Quality Grade	Final Use
Bagus (good quality)	Canned fish
Setengah Tuwo (moderate quality)	Boiled salted fish ("pindang") and dried salted fish
Tuwo (poor quality)	Fish meal and "gaplekan" (dried fish).

In this experiment, catches of 2 types of purse seine boats were compared, i.e. CSW (Chilled Sea Water) and traditional type, especially to evaluate the effects of on board handling on the quality of the raw materials upon landing.

METHODS

The experiments were carried out on board and after arriving at the auction place and the laboratory. Questionnaires were used particularly to evaluate quality, total weight, price, and end use.

RESULTS AND DISCUSSION

A. Internal Temperature of Fish

Results of fish temperature measurements on board of the fishing vessels are presented in table 2 and table 3.

Table 2. Internal Temperature of Fish From Traditional Boats

Species	Average of Initial Temperature (^{O}C)	Average of final Temperature (^{O}C)
"Lemuru" *(Sardinella longiceps)*	27.6	25.4
"Layang"/scads *(Decapterus sp)*	27.4	23.4

The internal temperature of lemuru and layang were 27.6^{O}C and 27.4 ^{O}C respectively, and those fish had relatively high final temperature, i.e. 25.4 ^{O}C and 23.9^{O}C respectively. High final temperature is potential to induce the deterioration of fish quality, because this temperature is suitable for the growth of undesirable organisms, and usually the fish is processed into fish meal and gaplekan.

Table 3. Internal Temperature of Fish of CSW Boats.

No. of ship	Species	Initial Temperature (^{O}C)	Final Temperature of fish (^{O}C)				Temp. of chilled sea water (^{O}C)			
			H1	H2	H3	H4	H1	H2	H3	H4
1.	Lemuru	28.7	17.6	15.4	15.4		18.9	17.0	16.9	
2.	Lemuru	27.2		16.5				15.8		
3.	Lemuru	27.7	8.8	7.3	9.1	8.1	5.8	5.4	6.4	5.3
4.	Lemuru	29.7		13.8	11.1			7.6	5.8	
5.	Layang	28.3				13.8				16.0

Note : Hx = number of hold

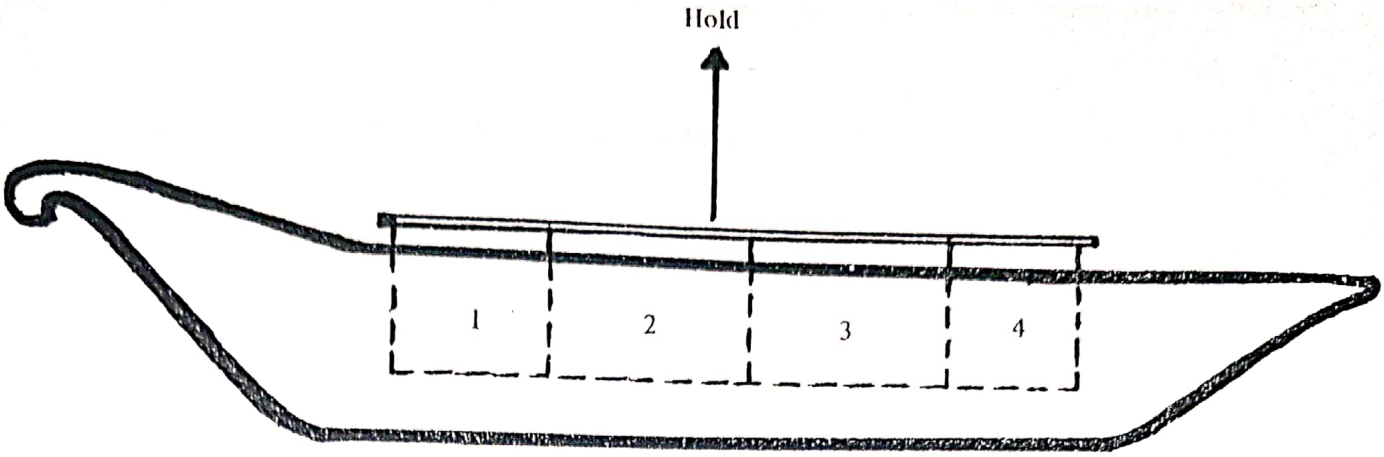

Figure 1. Posisiton of Fish Hold on CSW boats

Compared to the temperature drop of fish caught by traditional boats, the temperature drop of fish caught by the CSW boats were gerater (table 3). The internal temperatures of fish caught by CSW boats were in the range of 8.8–17.6 ^{O}C and the temperatures of chilled sea water were in the range of 5.3 – 18.9^{O}C. Actually those temperatuer were higher than the actual temperature, because according to Nasran and Arifuddin (1982) CSW system can keep the temperature of fish about 0^{O}C and has a capability to keep the low temperatue of fish for 48 hours.

The high temperature of fish caught by CSW boats might be due to fisherman did not bring enaugh ice, and they did not consider the penetration of heat, melting of ice during transportation, quality of ice, and they have difficulty to determine the ratio among ice, fish and sea water (Nasran, 1985). In this experiment, it was difficult to determine the exact ratio between ice and fish on board of the CSW boats since some ice had already melted before being used. The rate of ice melting is further accelerated by high ambient temperature and crushing of ice to reduce their bulkiness.

B. Disposition of Landed Fish

The quality comparison between fish caught by traditional and CSW boats is shown in table 4 and table 5, and the complete information can be seen in appendix 1 and 2. The fact showed that the fish quality of CSW boats was better than that of traditional boats. This fact indicated that the temperature of chilled sea water affected the quality, price and end use of the fish. The price of fish from CSW boats was twice to three times as much as that from traditional boats. The traditional boats sometimes have a good quality of fish which may be caught in the short distance of fishing ground, so that the fish has short time on board. Actually, fish quality is also affected by the keeping time on board: the longer the time, the lower the fish quality will be.

It could also be seen that the end use of fish from CSW boats was canned fish, dried salted fish, boiled salted fish and fish meal, while the end use of fish from traditional boats was fish meal, dried salted fish, boiled salted fish and canned salted fish. Most of fish caught by CSW boats was canned, because most of them was good quality, and most of fish caught by traditional boats was processed into fish meal and dried salted fish.

Table 4. Quality, Price, and End Use of Landed Lemuru from Traditional Boats (34 samples)

Fish Quality	Percentage (%)	Price (Rp)		End use
		range	mean	
Good	12.12	100–130	120	Canned
Moderate	27.27	60–135	117	dried and boiled salted fish
Poor	60.61	50–100	64	meal

Table 5. Quality, Price, and End Use of Landed Lemuru from CSW Boats (50 samples)

Fish Quality	Percentage (%)	Price (Rp)		End Use
		range	mean	
Good	90.00	100–200	133	Canned
Moderate	8.00	65–200	113	dried and meal
Poor	2.00	60	60	meal

CONCLUSION

It was concluded that the fish quality was affected by the fish handling technique used. CSW system gave lower temperature of fish compared to traditional system. With regard to the quality, price, and use of fish, the CSW handling system revealed better than traditional handling.

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Appendix

Appendix 1. Data Recapitulation of Quality, Total Wight, Price and Fishing Time of Lemuru from Tradisional Boats

No. of ship	Quality	togal Weight (kg)	auction price (kg/Rp)	end use	fishing time (hours)
1	Good	2500	130	canned	14
2	Moderate	2500	60	dried s.	19
3	do	100	75	dried s.	14
4	Poor	2150	60	meal	15
5	do	725	60	meal	14
6	do	1222	60	meal	17
7	do	2724	60	meal	14
8	do	425	50	meal	13.5
9	do	270	50	meal	12.5
10	do	1735	60	meal	14
11	Moderate	170	130	boiled	15
12	Poor	1010	50	meal	14
13	do	2000	50	meal	15
14	do	980	50	meal	14.5
15	Moderate	200	100	dried s.	13.5
16	do	500	135	dried s.	18.5
17	Good	4000	100	canned	18
18	do	2075	150	canned	18.5
19	Moderate	455	135	dried s.	12
20	do	1825	100	dried s.	16
21	Poor	1250	100	meal	13
22	do	2375	80	meal	12
23	do	1500	80	meal	12
24	Moderate	1825	100	dried s.	12
25	Good	815	100	canned	15
26	Moderate	2000	100	dried s.	16.5
27	Poor	1050	75	meal	–
28	do	1740	75	meal	–
29	Moderate	1150	75	dried s.	–
30	Poor	2620	85	meal	–
31	do	3840	80	meal	–
32	do	2310	80	meal	–
33	do	3200	80	meal	–

Appendix 2. Data Recapitulation of Quality, Price and Fishing Time of Lemuru from CSW boats

No. of ship	Quality	togal Weight (kg)	auction price (kg/Rp)	end use	fishing time (hours)
1	Good	2500	100	canned	13.5
2	do	3000	100	canned	19
3	do	2000	130	canned	14
4	do	2500	130	canned	17
5	do	2500	130	canned	14
6	do	2130	130	canned	13
7	do	3255	100	canned	13.5
8	do	4129	130	canned	16
	Poor		60	meal	16
9	Good	8300	150	canned	15.5
10	do	4000	150	canned	15
11	do	1800	100	canned	12
12	do	3510	130	canned	17
13	do	1337	130	canned	17
14	do	1500	130	canned	16
15	do	10500	130	canned	15
16	do	2753	150	canned	14
17	do	5500	150	canned	15.5
18	do	1537	150	canned	15
19	do	1500	125	canned	17.5
20	do	5000	130	canned	13
21	do	360	130	canned	–
22	do	1325	130	canned	–
23	do	525	100	canned	12
24	do	3574	125	canned	14.5
25	do	2000	170	canned	13
26	do	3000	130	canned	13
27	do	2750	130	canned	15
28	do	7000	130	canned	15
29	do	3500	130	canned	14
30	do	3000	130	canned	14.5
31	do	53 baskets	130	canned	14.5
32	do	10000	130	canned	17
33	do	600	150	canned	15.5
34	do	2100	150	canned	17
35	Moderate	576	65	dried s.	18
36	Good	850	130	canned	21
37	do	600	150	canned	11
38	do	1500	200	canned	16

Continuation

39	Moderate	1750	100	dried s.	20
40	Good	1000	150	canned	18
41	do	2375	200	canned	18
42	Moderate	2000	100	meal	21
43	do	80	200*)	boiled s.	13
44	do	2600	100	meal	14
45	Good	77	125	canned	–
46	Good	4635	125	canned	–
47	do	750	125	canned	–
48	do	5890	125	canned	–
49	do	1300	125	canned	–
50	do	1850	100	canned	–

*) processor 's price