Quality Audit of the Port of Ardglass

Confidential Report No. CR 169

September 1999

The Sea Fish Industry Authority

Seafish Technology

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Summary

This report presents the findings of a Quality Audit of the fishing port of Ardglass that examined the quality of raw material supplies to the port, standards of physical infrastructure, operating practices and management controls.

The freshness quality of fish and prawns (whole and tails) was excellent and typical of boats working only one or two days. Gutting and washing of whitefish, however, and temperature control at sea of both whitefish and prawns was poor.

The standards of physical infrastructure; of fishmarket, quays, transport etc are generally very good. The standard of cleaning of the market, staff facilities, equipment, quay aprons and loading bay areas is excellent but cleaning of fish boxes could be improved.

The report supports plans for the development of an off-dock distribution centre to improve traffic flows and safety on the dock.

Contents

1. Introduction

The increasing demands of the corporate food sector and the requirements of food safety legislation have given impetus to the need to raise quality and operating standards within the fish industry.

In the ports sector where responsibility for structures, equipment, services and the conduct of staff is vested in numerous and diverse organisations, the lack of unitary command and authority can give rise to problems of control, particularly over standards. It is essential in such an environment that standards affecting food safety are clearly defined and effectively enforced, not only to meet statutory requirements, but to protect and promote the image of fish as a safe and wholesome food.

Beyond the basic requirements of food safety, high standards of care are necessary when handling fish products of a perishable and delicate nature in order to achieve the quality of product demanded by the market.

In response to the recommendations of the Industry Task Force and Trade demand, Seafish has introduced an initiative targeted at raising standards in the ports sector by means of Quality Audits. The audits examine and report on; the quality of raw material supplies to the port, standards of physical infrastructure, operating practices and management controls. Action is then encouraged and supported at a local level as necessary.

The scope of the audit covers the operations from landings at the quayside (or overlanded deliveries to the market) to the despatch of fish from the market after sale. It does not cover standards on fishing vessels or within fish processing factories. The report is confidential to the trade, Local Authority and the Northern Ireland Fishing Harbour Authority (NIFHA) and is not for publication.

This report presents the findings of a quality audit of the port of Ardglass undertaken in June 1999. It was carried out with the full collaboration and participation of fishermen, salesman, buyers/merchants, NIFHA, DANI and the operators of ancillary services.

2. Survey Procedures

Over the period 8th to 10th June, 1999 a small team of fish technologists and quality assurance officers monitored the landing and sale of fish on Ardglass market. During this period landings were entirely from prawn boats working either one or two day trips.

Eleven boxes of whitefish, thirteen boxes of whole prawns and seven boxes of tails were sampled from landings made by nine boats and an assessment made of; freshness quality, standards of washing and gutting (whitefish), temperature control and evidence of physical damage. The assessments were made immediately the boxes were landed. Freshness quality was judged using the Torry Sensory Assessment techniques (Appendix I). Temperatures were also taken throughout each box and notes made of icing practice and of the care and technique used in laying out the fish. Discussions were also held with crew members to establish trip length and any vessel operating practices or equipment that may affect fish quality (e.g. fishroom insulation/chilling, fish handling systems, washing/gutting machines, etc).

Assessment of the standards of physical infrastructure, operating practices and management controls was undertaken using a structured approach of observations and discussions with; fishermen, salesmen/agents, buyers/merchants, port management and producer organisations.

3. Raw Material Supplies

3.1 Freshness Quality

The overall average freshness of fin-fish landings was 9.0 on the Torry Assessment scale (for details of Torry scoring and its relationship with eating quality and EU grades see Appendix I). For prawns, the average (five point scale) was 4.71 for tails and 4.85 for whole.

The quality ranges were 8.5 to 9.5 for fin-fish and 4.5 to 5.0 for both whole and tailed prawns.

The results represent excellent standards of freshness typical of boats working one to two days.

3.2 Gutting and Washing

Spoilage of fish after death is caused by enzymic and bacteriological action, particularly within the gut cavity. By removing the gut contents (fin-fish) and washing the fish, the rate of spoilage may be reduced. It must, however, be undertaken efficiently or the bacteria from the gut cavity can be spread to the cut flesh which promotes spoilage.

Standards of gutting in the samples examined are shown in Table 1. Whole/round fish are not included.

Table 1 - Gutting and washing standards

	Whole Prawn	Prawn Tails	Whitefish	
	Washing	Washing	Washing	Gutting
Good	85%	100%	70%	50%
Poor	15%	0%	30%	50%

The standard of washing of prawn tails was excellent but that of whole prawns and whitefish could be improved. Standard of gutting of the whitefish was poor, but unfortunately typical of the lack of care by many prawn boats of their fish by-catch. Gutting was judged poor if parts of liver or gut were left in or if the cut extended into the fillet material of the flesh thereby affecting yield.

3.3 Temperature Control

Temperature control is far the most significant factor affecting the rate of deterioration of fish. Typically, whitefish remains acceptable for about 10-11 days after capture when well iced, but this can be reduced to a day or two if left unprotected at summer ambient temperatures. Prawns spoil much quicker but remain acceptably fresh for up to five days provided they are well iced.

The average temperature of whitefish on landing was 9.0°C in a range 3.6°C to 12.6°C. For whole prawns the average temperature was 7.8°C in a range 1.0°C to 11.7°C and for prawn tails, the average was 9.0°C in a range 4.5°C to 13.5°C.

Although the freshness quality of landings is acknowledged as high, the temperature checks on landing indicate that temperature control at sea is poor (Figure No. 1). The high standards of freshness are achieved only by nature of the short trip lengths involved. More significantly unless the temperatures are brought down quickly after landing the fish and prawns will continue to deteriorate rapidly. Note that re-icing the top of boxes has very little cooling effect on the fish and prawns toward the bottom of a box. See Appendix II for the effect of icing technique on the quality of prawns.

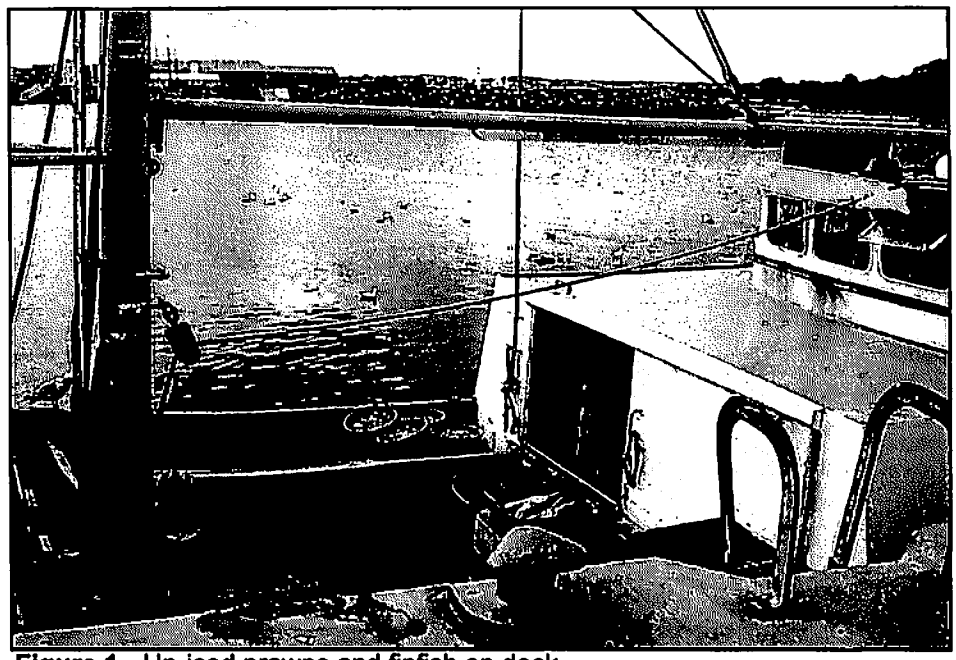


Figure 1 - Un-iced prawns and finfish on deck

3.4 Box Filling

Standards of boxing practice at sea are also critical to quality. Fin-fish should be aligned within the box to prevent distortion, with their belly cavities down to facilitate drainage. To prevent crushing and to allow sufficient ice to cool the fish, the boxes must not be overfilled.

Fish and prawns are supplied to the market in a 70 litre capacity stack-nest plastic box. The recommended maximum weight for these boxes is 50kg for fish, 20kg for whole prawns and 23kg for prawn tails. The average weight of fin-fish in a box landed to the market was found to be 55kg in a range 46 to 65kg. The average weight for whole prawns 19.8kg in a range 15kg to 25kg and for tails 31.1kg in range of 26kg to 38kg. (Note that these are not necessarily the box weights at sale as the agents check-weigh and adjust).

The results show a degree of overfilling of boxes for prawn tails and fin-fish although there was little evidence of any physical damage associated with crushing possibly because of the low level of ice used.

4. Physical Infrastructure

4.1 Background

Ardglass Harbour serves a local fleet of 29 fishing vessels, all prawn boats bar one 'pelagic' whitefish vessel. It also serves a small number of visiting vessels, mostly from the Clyde and the Isle of Man. Annual value of landings is in the order of £3 million. Principle species are; prawns, cod, haddock, whiting and herring. Prawns are a year round fishery with cod showing in the spring and herring in the autumn.

During the past five years the NIFHA has invested in; upgrading and chilling (part) of the fish market, a new ice plant and the repair and extension of the South Pier to provide better protection from weather from the South-East.

Figure No. 2 shows a plan of the harbour. The North Harbour, Inner Dock and the Quay adjacent A. Cochranes Fish Processing Factory are tidal and dry-out. The North Harbour area is used for working on nets and for gear storage.

4.2 Unloading Quays and Equipment

This fish market quay (51.6m) affords two unloading berths for prawn boats. The South Pier (130m) provides lay-by but may also be used for unloading if necessary. Depth of water at the market and South Pier is not a problem for prawn boats but larger pelagic boats may be restricted a few hours either side of low water on some berths. Provided boats move off after landing to the market, landings are not normally unduly delayed. The quays are of mass concrete construction with no fendering system. Because of the height of the market quay two electro-hydraulic cranes re provided for unloading to the market. Each crane has capacity for lifting up to five boxes at a time. Transfer of boxes into the market is undertaken manually using hooks to drag boxes.

The market quay meets statutory requirements of lighting, safe ladder access and provision of life-saving equipment. Public access to the market quay is restricted by fencing at either end of the market. The quay is graded and drains to the dock.

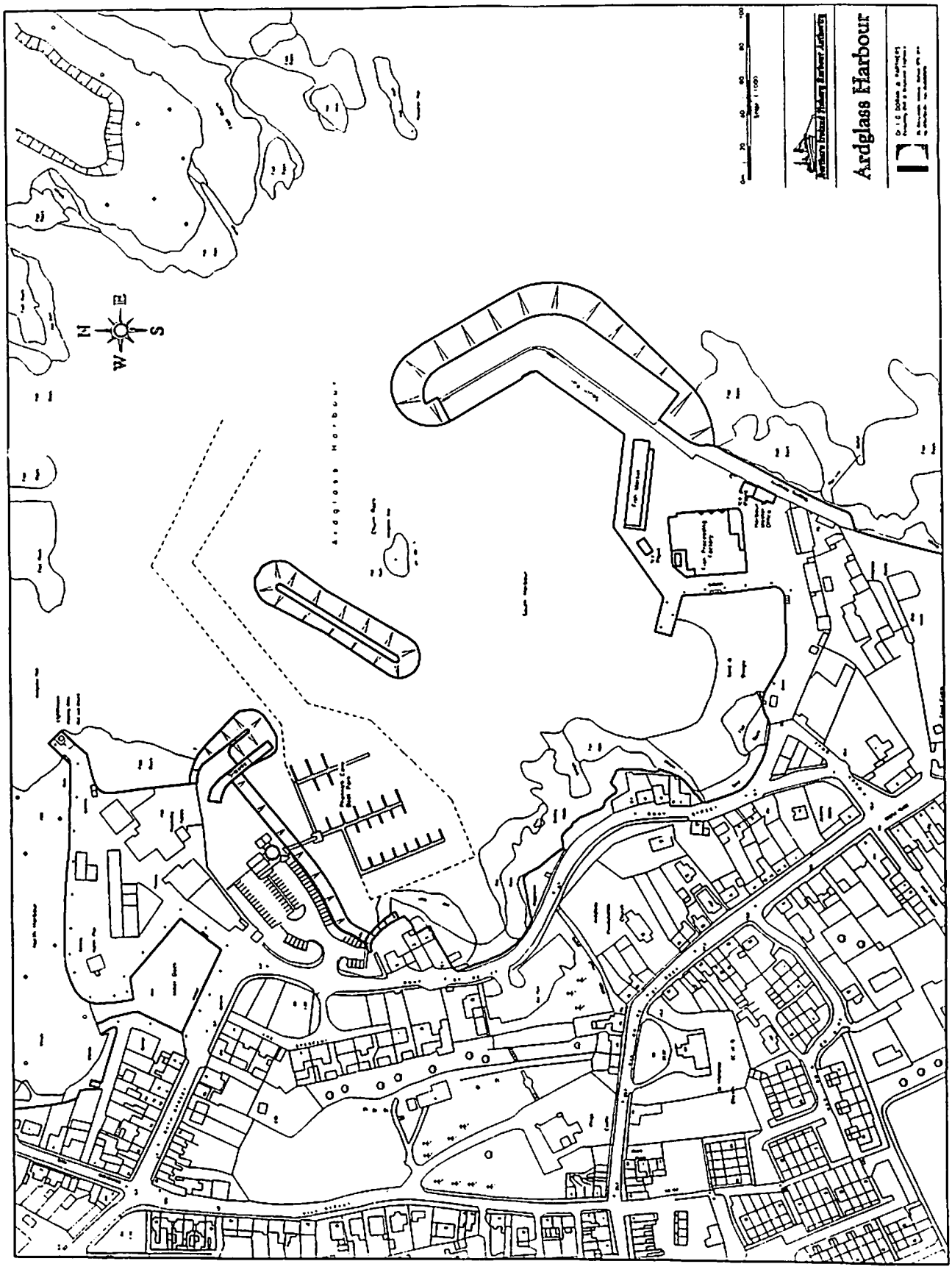


Figure 2 - Plan of Ardglass Harbour

4.3 Fish Market

The fish market is of approximately 500m^2 floor area inclusive of office/staff facilities; having adequate capacity for current levels of operation. It is of steel-frame construction with brick/block walls and has a sheet-clad roof. Internal wall surfaces are hard rendered and finished with epoxy paint. The building is insulated and the last two bays converted to provide a refrigerated chill store. A temperature indicator is located adjacent the chill door. Floor surfaces are graded toward the quayside of the building and services are in good condition. Drainage through holes in the market wall is a poor design feature (Figure No. 3). Potable water is provided within the market for washdown. Lighting is good and required signage of prohibited practices prominently displayed.

Figure 3 - Poor drainage design

The building and services are well maintained. One light fitting however was out [1]and the chill door slightly damaged (but functional).

4.4 Market Equipment

Most fish and prawns are graded at sea and sold on the market in the same box and other than two platform weighing scales there is little other equipment used on the market. The two platform scales are mounted off-the-floor on painted steel frames that enable efficient cleaning (Figure No. 4). The scales have suffered some corrosion but otherwise are well maintained. Two small tables of unhygienic wooden construction are used as desks for recording weights or for checking the count of prawns (Figure No. 5). Handling from the market to road transport is undertaken manually using hooks to drag boxes or by barrows or hand-pallet equipment provided by buyers.

[1] the light fitting was replaced that day and arrangements for repair of the chill door were in hand and subsequently completed.

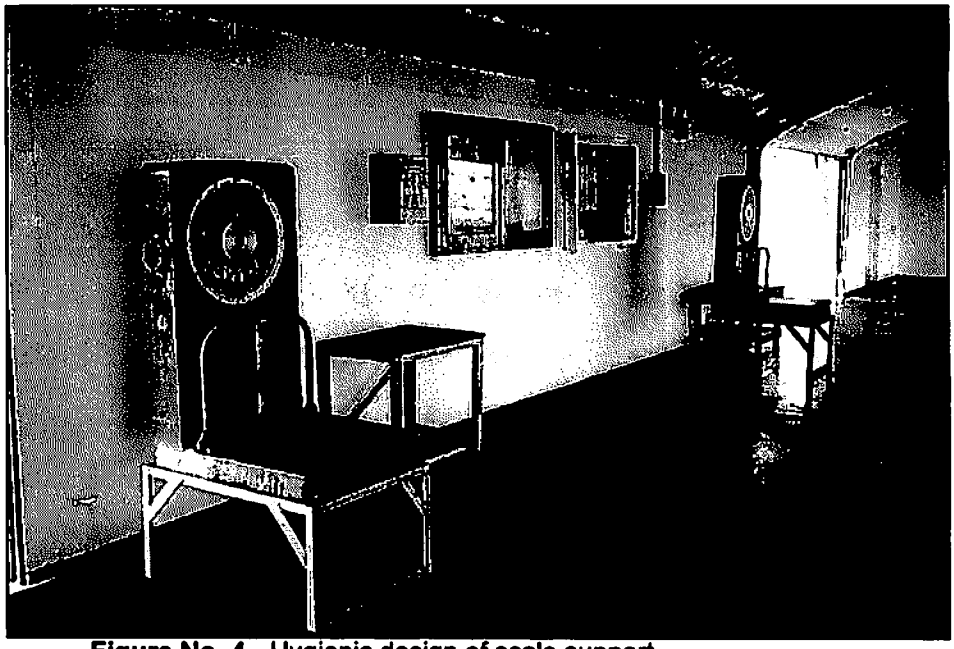


Figure No. 4 - Hygienic design of scale support

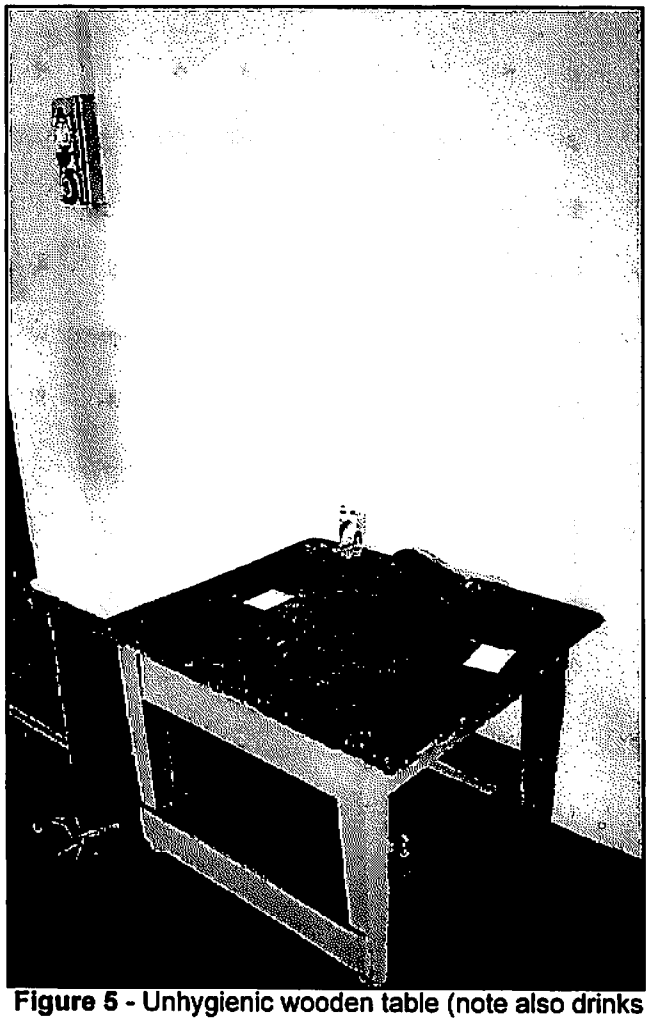


Figure 5 - Unhygienic wooden table (note also drinks bottle)

4.5 Cleaning and Waste Facilities

A portable pressure washer is provided by the NIFHA for washdown of the market, quay apron and loading bay areas. Box washing is also undertaken using a pressure washer by Denholms in their yard. For collection of general waste oil drums are located around the harbour and a large skip located in the NIFHA yard. Plastic bags are provided to boats for galley waste etc. A fork lift is used to transfer waste from drums to the skip. Waste lubricating oil from boats is placed on the quayside and collected by harbour staff and removed to a 300 gallon storage tank beyond the Harbour Masters office. A local contractor removes the oil from the tank on a regular basis.

4.6 Road Access and Parking

Road access to the harbour within the town is reasonable but the mix of public traffic to the supermarket and shops at the entrance to the harbour and HGV traffic results in congestion and nuisance and gives cause for concern for the safety of the public.

Many of the very large articulated vehicles accessing the harbour area however do so in connection with business with the fish processing/distribution company A. Cochrane Limited located next to the market. The family business would like to develop an off-dock facility that would provide an international distribution service to local merchants/processors. It has a site on Downpatrick Road and if planning could be secured it would ease traffic problems at the harbour and provide a valuable service to local merchants/processors etc.

4.7 Transport

The standard of transport used in the removal of fish and prawns from the market after sale was high, with no use of open flat-bed type of vehicles. All the vehicles used were insulated and all but one mechanically refrigerated. (Figure No. 6).

Figure 6 - High standard of fish transport

4.8 Ice Supply

Ice is available to boats and merchants from an automated plant located next to the market. It was commissioned by the NIFHA in late 1996 following initial teething problems with the delivery system. It has production capacity for 20 tonnes per day and storage for 60 tonnes which is more than adequate for local requirements.

5. Operating Practices

5.1 Landing and Handling

Landing and handling operations generally cause no problems, with landings transferred into the market from the market quay or South Pier with little delay or exposure to risk of contamination.

5.2 Market Operations

During the audit no landings were made into the chiller despite the warm weather, presumably because the timescale between landing and sale was relatively short. The chiller was originally intended for holding landings over for a morning sale but morning sales were unpopular with the fishermen. It is now mostly used for 'late-tows' and weekend landings. Due to the continuous process of landings to the market the quayside doors are constantly in use and open, but the doors to the rear were also often left open. Better control of the use of these doors and re-icing of fish on the market as necessary would assist in maintaining chilled product temperatures.

Handling operations on the market are essentially those associated with de-icing and check-weighing, as there is practically no grading conducted on the market. No abuse of fish or equipment was observed.

Sales at Ardglass are conducted in the evening (19.00 hrs+) for both whitefish and prawns with vessels landing through the late afternoon. Although most tails are sold on contract some buyers expressed a wish to have opportunity to bid for them in auction. The sales process was conducted quickly and fish removed from the market almost immediately.

5.3 Cleaning and Hygiene

The standard of cleaning of the market, staff facilities, equipment, quay aprons and loading bay areas is excellent and a credit to the Harbour Master and his staff who work to a detailed written cleaning and maintenance schedule. (Figure No. 7 and Appendix III). There was no evidence of fly-tipping and the arrangements for collection of waste seemed to work well. The only exception to the generally high standards was the cleanliness of fish boxes supplied to the boats some of which had not been cleaned adequately.

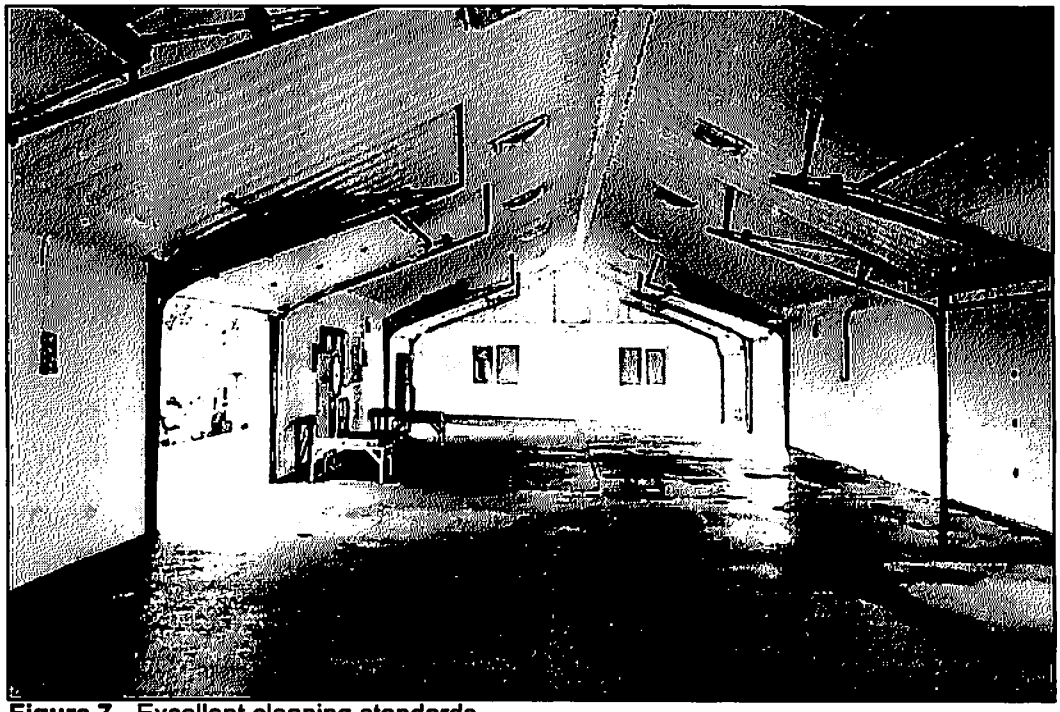


Figure 7 - Excellent cleaning standards

Standards of personal hygiene on the market are not as high. Smoking was observed on the market and some evidence of drinking was found (Figure No. 5). Although the sales agents wore white boiler suits, the standard of dress was otherwise poor.

There was no walking over boxes and no evidence of infestation.

6. Management Controls

Ardglass Harbour is owned and managed by the Northern Ireland Fishing Harbour Authority, a statutory body that also has responsibility for the two other main fishing ports in Northern Ireland. It is managed locally on a day-to-day basis by a Harbour Master and a staff of three. Staff duties include general maintenance, cleaning, operation of the ice plant, safety inspections and pest control. There are no written job descriptions for the staff but the duties are essentially defined by the cleaning and maintenance schedule (Appendix III). The existing schedule does not however appear to cover the ice plant, nor does it include inspection of pest control bait boxes. There is no documented record of checks other than the recording of faulty equipment in a diary. (Nonetheless standards of cleaning and upkeep are acknowledged as high).

In the past, harbour authority staff only received on-the-job training but it is understood that arrangements are in hand for all staff to receive training in basic hygiene. All Harbour Authority staff are certified fork lift truck drivers.

There is no code of practice that sets overall standards for the port and its operation in respect to quality control or food hygiene although it is understood that the Harbour Authority are in the process of preparing one. They are also developing a strategic plan for the future of the three ports under their control.

The Local Authority Environmental Health Officer attends the market twice a week (Tuesday and Thursday) although he does not seem to be quite so 'hands-on' as his colleague in Kilkeel.

Communications between the trade sectors and the Harbour Authority locally are informal. A Harbour-User Group exists but it is poorly supported on occasions by the industry.

A Waste Management Plan as required by the Merchant Shipping Notice M1659/MARPOL 73/78 has been submitted by the NIFHA and accepted by the M.C.A.

7. Recommendations

7.1 Producer organisations should encourage better care of the catch at sea, particularly temperature control, washing and gutting of fin-fish.

7.2 A Code of Practice be developed to define standards of hygiene and quality control procedures, including agreement on enforcement measures. This should be led by the NIFHA in association with the local authority Environmental Health Officer and trade associations.

7.3 NIFHA to produce job descriptions for all employees that define their duties and skill levels required and to provide training as necessary, particularly in food safety and quality control (this is currently being implemented).

7.4 Agencies, PO's and merchants etc whose staff are directly involved in handling of product, should likewise introduce training of staff in food hygiene and quality control/assessment as appropriate.

7.5 Try to revitalise the Harbour Users Group involving it in development of a Code of Practice and in strategic planning. It might also re-examine attitudes toward a morning sale, electronic marketing and improved provision of forward information of landings.

7.6 Expand the Harbour Authority Cleaning/Maintenance Schedules to include the ice plant and pest control inspections.

7.7 The Sales Agency should examine methods of cleaning and storage of fish boxes to ensure high standards of cleanliness.

7.8 Replace wooden tables in the market with stainless steel or similar hygienic material.

7.9 That the Local Authority support plans for the development of an off-dock distribution centre that would provide a service to local processors and improve traffic flows and safety on the dock.

7.10 That the harbour authority staff encourage more disciplined use of market doors to prevent wind born contamination and drying out of fish on display.

Acknowledgements

The assistance of the following is gratefully acknowledged, plus the many other skippers, crew, merchants, buyers and Harbour Authority staff.

C. Warnock	Chief Executive, NIFHA
D. Lindsay	Project Co-ordinator, NIFHA
John Smyth	Harbour Master, Ardglass
Tony, Harry & Paul	Harbour Authority Staff
John Smith	Denholms Sales Agency
R. James	NIFPO
J. McKee	Environmental Health Officer
J.McNeill	Environmental Health Officer
A. Cochrane	A. Cochrane Limited
E. Cochrane	A. Cochrane (Transport Division)
J. Rooney	J. Rooney Fish Limited

Appendix I
Torry Freshness Assessment Scoring System

Torry Freshness Assessment Scoring System

The Torry Freshness Assessment Scoring System judges freshness quality using external appearance and odours as indicators of freshness on a scale zero to ten. Figure 8 overleaf shows the relationship between Torry Score, the number of days the fish is held in ice and eating quality.

The Seafish Guidelines for Fish Processors recommend that the fish they purchase should preferably be of Torry Score 8 or above (EU freshness Grade E), in order that their products have a good chance of retaining sweet, desirable flavours when they reach the consumer and the fish should be no lower than Torry Score 7, so that their products should not have undesirable sour or bitter flavours by the time they reach the consumer.

Note that temperature control is by far the most significant factor affecting the rate of deterioration of fish and that at temperatures above that of melting ice, spoilage is greatly accelerated, see Figure No. 9 overleaf.

Typically white fish remains acceptable for about 10-11 days after capture if well iced, but this can be reduced to a matter of a few days if left unprotected at summertime ambient temperatures.

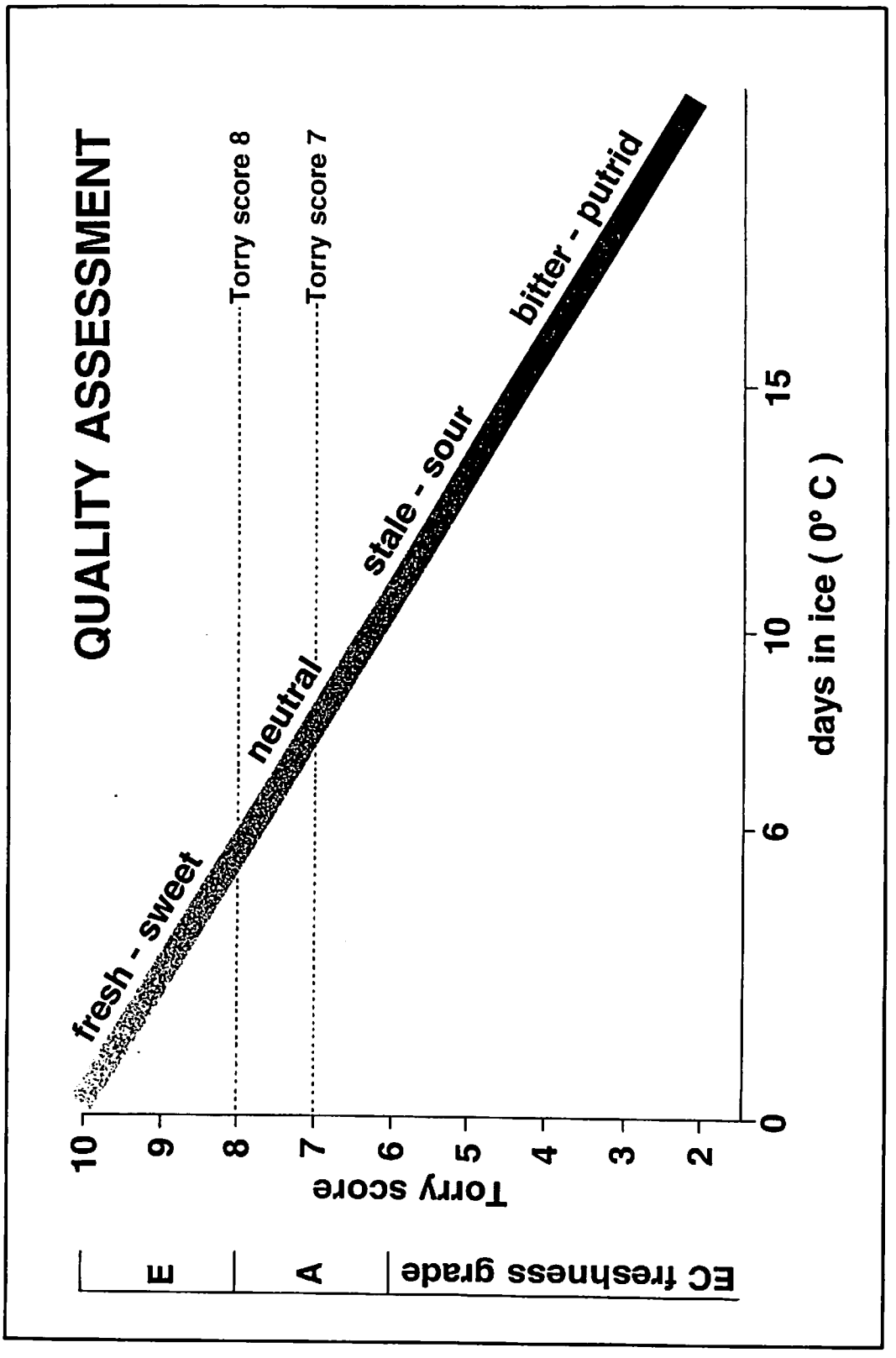


Figure No. 8 - Freshness quality assessment

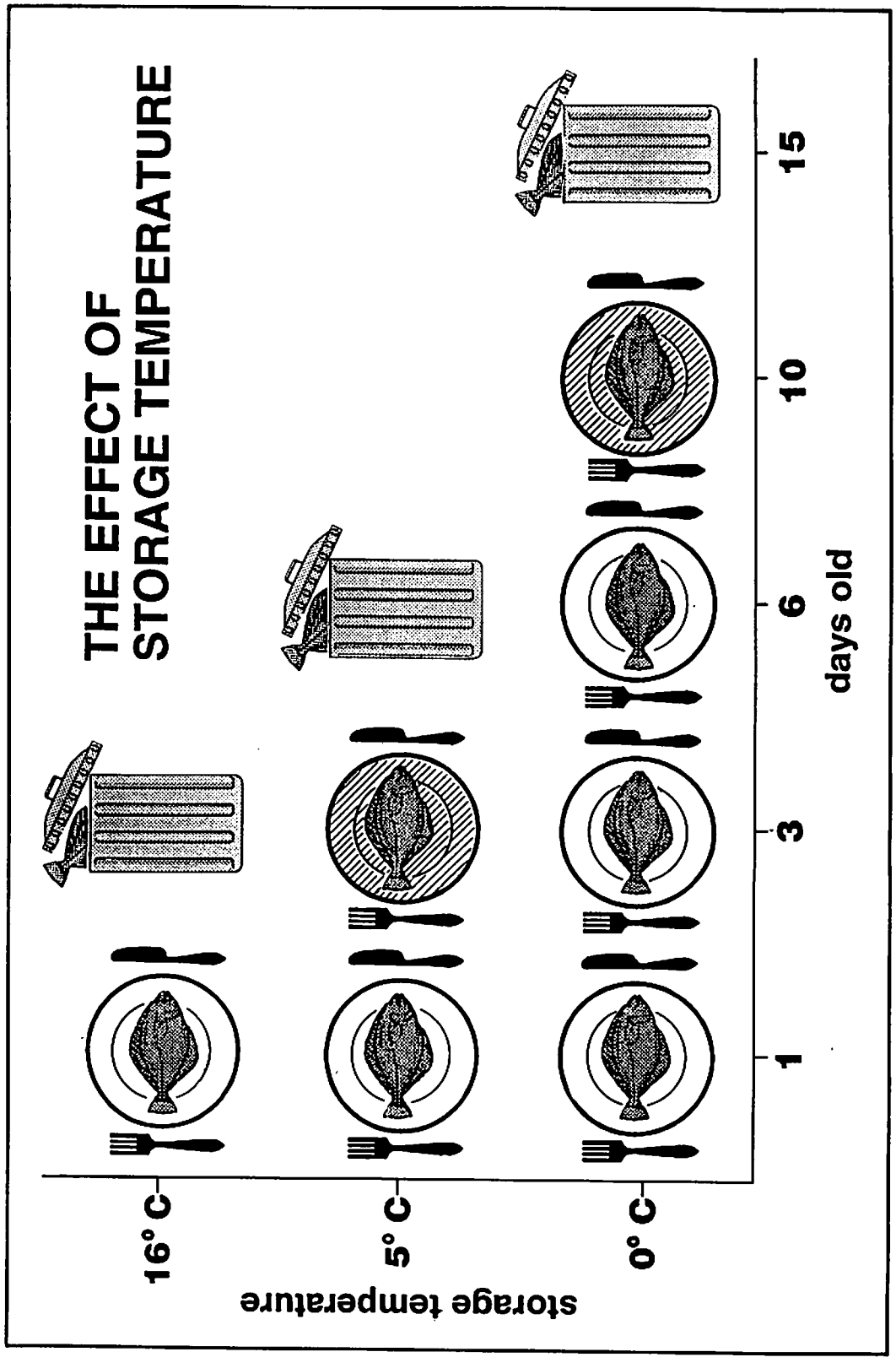


Figure No. 9 - The effect of storage temperature

Appendix II
The Effect of Icing on the Quality of Trawled Whole Nephrops

TECHNICAL INFORMATION SERVICE

SEAFISH

The Effect of Icing on the Quality of Trawled Whole *Nephrops*

Ref No:1994/29/FT

The Need for Ice

Nephrops are a highly rated seafood because of their succulence and flavour - when in good condition. Ice has been little used on short trips as it was considered that *Nephrops* need to be kept alive to maintain quality whereas icing killed them. The practice of weighing when landed also required the removal of ice which resulted in delay and physical damage to the *Nephrops*. However, trials have shown that trawled *Nephrops* deteriorated rapidly at high ambient temperatures with resulting loss of freshness and reduced yield of premium product. Correct icing minimises this deterioration in Nephrops which are due for some form of fresh or processed product. *Nephrops* destined for the live trade should not be iced.

Seafish Trials with Icing at Sea

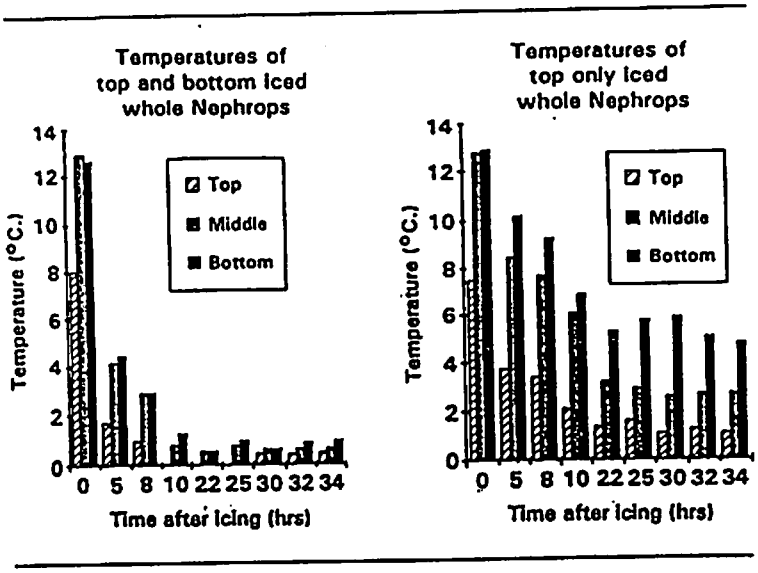
- Comparative commercial trials were carried out from Mallaig on the West Coast of Scotland during the summer. Correct icing to the top and bottom of the boxes was compared with the usual practice of not icing at sea on day boats and top only icing on two day trips.
- To remove the need for weighing ashore, *Nephrops* were weighed at sea using a mechanical check weigh scale (developed by Seafish). All the boxes were further top iced as necessary at landing, as is usual commercial practice.
- The *Nephrops* were then consigned in the usual refrigerated transport to arrive at an East Coast processor within 12 hours of landing.
- The processing of the catches was monitored to compare product quality and commercial yields when sorted by the processor. *Nephrops* not suitable for the premium whole *Nephrops* product were diverted to lower value tail meat products.
- Further trials were carried out to establish the effect on the eating quality of whole *Nephrops* when subjected to delays of 12 and 24 hours at ambient temperatures before icing. These particular samples were dipped in 3% sodium metabisulphite 24 hours after capture.

Sea Fish Industry Authority, Seafish House, St. Andrew's Dock, Hull HU3 4QE. Tel: 01482 327837 Fax: 01482 223310

Findings

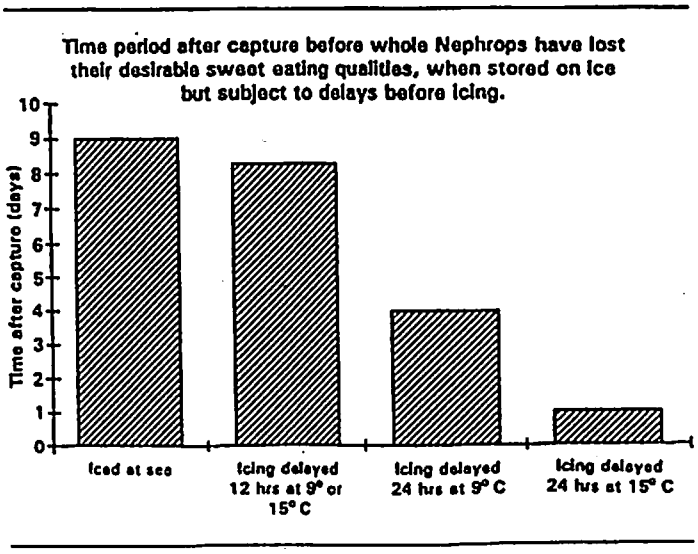
Temperature

- Direct top and bottom icing chilled *Nephrops* to less than 2°C within 10 hours.
- Top only icing was only partially effective as *Nephrops* in the middle and the bottom of the boxes remained poorly chilled through the processing.
- *Nephrops* left uniced aboard and beyond landing remained above 14°C.



Quality

- On arrival at the factory the observed standard of freshness of the correctly top and bottom iced *Nephrops* was markedly better than those handled without adequate icing.
- A delay of 12hrs before icing resulted in some loss of freshness and a 24hr delay can result in the loss of all the desirable sweet eating qualities of the *Nephrops*.



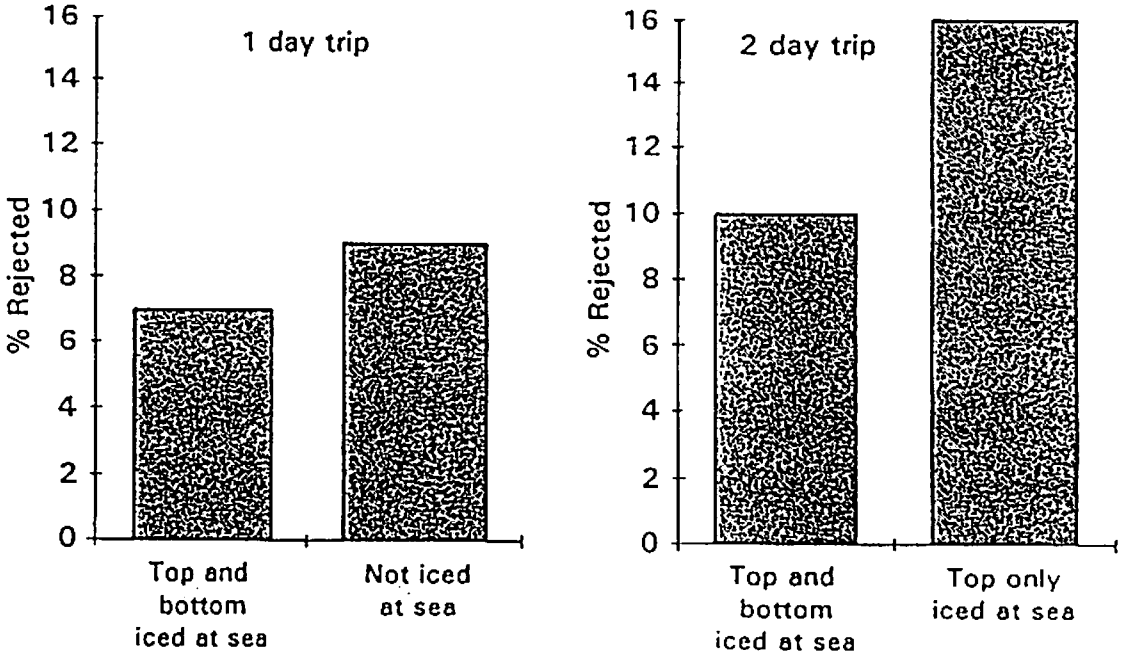
- Sodium metabisulphite dipping of whole *Nephrops* reduced blackening but did not prevent spoilage of the flesh.

Yields

- Delays before icing and inadequate icing increased the commercial rate of rejection from the premium whole *Nephrops* product.

Whole *Nephrops* being graded for quality and size at factory.

Percentage of Nephrops rejected for premium product



- Weighing at sea returned weights at factory consistently within 4% of the 19kg (3 stone) unit with no boxes under weight.

- Following the trials the processor involved arranged with their trawled *Nephrops* suppliers for the catches to be properly iced at sea and not tipped until weighing at factory.

Recommendations

- Trawled *Nephrops* are highly perishable and need to be promptly iced at sea and landed soon after catching to ensure high yields of best quality product.

- *Nephrops* (both whole and tailed) should be top and bottom iced with sufficient ice to maintain chill temperatures. For a standard 70 litre box this corresponds to a box loading of about 19kg (3 stone) of whole *Nephrops* and 22kg (3.5 stone) of tails.

- The use of papers between the ice and *Nephrops* is generally not recommended as it will reduce the effectiveness of chilling.

- The practice of tipping and de-icing of *Nephrops* at the quayside is not recommended as it causes damage to the *Nephrops* and reduces chilling. It can be avoided by weighing at sea and/or at factory.

For further information and reports on this work please contact the Fish Technology Group at the address below. Guidelines on good live handling practice can also be obtained from the Marine Technology Group at the same address.

The Sea Fish Industry Authority
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Appendix III
Ardglass Harbour Fishmarket
Cleaning/Maintenance Schedule

Ardglass Harbour Fishmarket - Cleaning/Maintenance Schedule

Task	Remarks - Personnel Jobs
Daily	
Power Hose Market Floor/Walls, including Chill Room and Plinths	Harry
Clean roadways at lorry loading plinth	Paul
Wash out toilets and office alleyway floors	Tony
Empty toilet bin as necessary	Tony
Ensure plentiful supply of toilet rolls, soap and hand towels	Tony
Check temperature of chill, when operating (+1 to +2°C)	Harry/John
Clean and check operation of shower	Tony
Weekly	
Check operation of Fish Market doors	Tony
Check Fish Market lights	Paul
Check operation of Chill fans	John
Check operation of hoists, including condition of wires, chains and box hooks	Paul/John
Monthly	
Apply cleaning agent (chloros) to market floor, scrub in with deck scrubbers and power hose off.	Harry/Paul/Tony
Apply cleaning agent (fairy liquid or deodorising disinfectant) to market walls, scrub in with deck scrubbers and power hose off.	Harry/Paul/Tony
Check and clean out drains lorry loading bays	Harry/Paul
Check and clean fish market spoutings	Harry/Tony

Task	Remarks - Personnel Jobs
Monthly (cont.) Grease fish market door runners and hinges with food quality grease	Tony/Paul
Check oil level in hoists	Tony/Paul
Annual Paint Fish Market inside walls	Harry/Paul/Tony
Paint Fish Market door columns	Harry/Paul/Tony
Paint toilets and office alley way	Harry/Paul/Tony
Scrub and wash down Fish Market inner ceiling using Fairy Liquid and hoses	Harry/Paul/Tony