A Technical Study of Fish Processing in the United Kingdom

Technical Report No.328
December 1987

SEA FISH INDUSTRY AUTHORITY
Industrial Development Unit

A TECHNICAL STUDY OF FISH PROCESSING IN THE U.K.

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SUMMARY

The Authority are engaged in a programme in participation with industry to improve the standards of quality of fish from catcher to consumer. Part of this work involves the production of Sectorial Guidelines which will set the minimum standards which are sensible to maintain the U.K.'s position vis-a-vis other food producing industries and competing fish processors abroad.

This particular study provides the basis of hard data on which a set of Guidelines can be prepared for the primary processing sector.

The report concerns chilled fish and emphasises from the outset the importance of strict temperature control from catcher to consumer. It is pointed out that this is rarely achieved and therefore there is greater quality loss over the time the fish is in storage or in transit than there needs to be.

Chilled fish is defined as that fish which ought to be kept at chill temperatures i.e. just above freezing. The study has concentrated on the primary processors dealing in this product and has included a detailed survey of the conditions and practices within the processing premises over a wide ranging variety of establishments. The study has examined the practices, the quality control methods which are adopted,

the hygiene practices, the equipment in use, the structure of the building including walls, roofs, and floors and the attitude of workers and management in these premises.

For obvious reasons the premises are not identified and the analysis is essentially one of a subjective nature except where measurements can be undertaken such as temperature or spoilage as a Torry freshness score.

The report is not meant to be a indictment of the fish processing industry. It merely makes a frank appreciation of the current state of the industry which is an essential prerequsite from which realistic Guidelines can be prepared.

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1. INTRODUCTION

1.1 Purpose

The Seafish corporate policy is to assist the sea fish industry raise the overall levels of quality of fish and shellfish at all stages from catching to consumer.

It is well known that the industry has very variable standards towards quality and in some instances it is losing business to competing food industries and to other fish producers abroad.

There is a genuine desire to put these matters to right but it is important to take measures which are cost effective rather than Draconian in nature and possibly founded on incorrect assumptions. A prerequsite of taking these measures is therefore to fully appreciate the present situation in a frank and objective manner.

The main purpose of this particular study was to provide a basis of hard data upon which a set of guidelines can be written to improve the conditions and practices, and hence product quality, of chilled fish handled by primary processors. In addition the study has provided information on secondary and shellfish processors together with much useful background information on the problems and the trends within the fish procesing sector.

1.2 The Quality Problem

The rate of spoilage of fish is dependent primarily on temperature. When held in ideal conditions at $0^{o}C$ in melting ice white fish typically remains acceptable for about 10 days after capture. After that time sour and then bitter flavours develop and the acceptability to the consumer drops rapidly. However, even in these ideal conditions the sweet and intrinsic flavours of the fish liked by the consumer are lost after about 6 days from capture, leaving a bland, relatively tasteless product. Using the TRS 10 point quality scale the sweet intrinsic flavours are lost at a score of about 7.5, and the fish become unacceptable below about score 6. The degree of spoilage at which fish are condemned on grounds of health hazard is ill-defined and varies according to circumstances, but the fish must be obviously spoilt and thus well below the limit of acceptability. At higher temperatures the limit of acceptability to the consumer is reached more rapidly. At $+5^{o}C$, $+10^{o}C$ and $+20^{o}C$ it is reached in approximately 5 days, 3 days, and 1 day respectively.

An initial study (Ref. 1) of time-temperatures in distribution of wet fish in the summer of 1983 produced the data shown in Table 1:

TABLE 1

THE TEMPERATURE OF WET FISH DURING DISTRIBUTION IN THE SUMMER OF 1981

	Landing & Auction	Port Merchant		Delivery to Wholesaler	Delivery to Retailer	Display to Retailer
		Before Filleting	After Filleting			
Maximum Temp. Deg C	22.7	14.5	16.4	20.0	10.5	24.0
Average Temp. Deg C	5.7	6.3	10.3	3.6	0.2	11.3
Minimum Temp. Deg C	-0.5	-0.5	1.5	0.0	-8.5	-2.0

Poor temperature control was evident throughout the industry from fish capture to retail sale. It was concluded that the actual period from landing the fish on the quayside to consumption is likely to be in the order of 3 to 4 days, and that at average temperatures the quality loss during that period is likely to be the equivalent of 7 to 8 days on ice.

Further studies (Refs. 2 and 3), involving the assessment of the quality of chilled fish at retail level in the summer of 1983 and in the winter of 1982/83, produced the data shown in Tables 2 and 3:

TABLE 2

QUALITY EVALUATION OF CHILLED FISH (COD & HADDOCK) AT RETAIL LEVEL IN THE SUMMER OF 1983

	Average Quality Score	Range of Quality	% Below Score 6	% Above Score 7.5	Numbers Sampled	
					Fish	Outlets
Mobile	7.3	6.5 -8.0	0	25	12	8
Frier/Monger	6.7	5.0 -8.25	11	5	37	20
Market Stall	6.7	5.25-8.00	14	17	36	18
Fishmonger	6.6	3.5 -8.75	19	14	572	298
Grocer/Monger	6.5	3.0 -9.0	22	13	158	100
Supermarket (wet fish)	6.5	5.25-8.0	22	6	32	17
Supermarket (CAP)	6.1	2.0 -8.25	35	5	79	27
Overall	6.6	2.0 -9.00	20	13	926	488

TABLE 3

QUALITY EVALUATION OF WET FISH (COD & HADDOCK) AND MEASUREMENT OF WET FISH TEMPERATURE AT RETAIL LEVEL IN THE WINTER OF 1982/3

	Average Quality Score	Range of Quality	Average Fish Temp. Deg. C	Range of Fish Temp. Deg. C	Numbers Sampled	
					Fish	Outlets
Mobile	6.8	6.0 -7.5	3.9	2.0 -5.5	6	3
Fishmonger	6.6	4.0 -8.25	7.0	0.5 -20.5	166	70
Supermarket (wet fish)	6.3	5.5 -7.3	6.2	3.0 -10.0	13	6
Overall	6.6	4.0 -8.25	6.8	0.5 20.5	185	79

This data confirms the estimates of quality loss based on the time-temperature measurements. The consumer stands a significant chance of purchasing chilled fish below the limit of acceptability and considerably less chance of purchasing fish with sweet and intrinsic flavours, whilst the majority of the fish is bland with little taste.

1.3 The Production of Guidelines

Seafish has already produced "Guidelines for the Handling of Fish Packed in a Controlled Atmosphere" and "Guidelines for the Handling of Chilled Fish by Retailers". In both cases the Guidelines give the advice and recommendations which, if followed will ensure the customer receives a satisfactory product, together with all the relevant background information.

An essential requirement before writing Guidelines - for any sector of the industry - is a thorough understanding of the state of that sector to include the technical and economic problems, limitations and capabilities. Seafish carried out comprehensive and detailed studies of the CAP industry and of fish retailing before drafting the Guidelines. The next essential step in the process was to set up a panel of representatives from the trade and legal organisations. This panel then discussed and ratified the contents of draft documents produced by Seafish making suggestions for improvements based on their extensive knowlege of the trade. By following these steps was it possible to guarantee the Guidelines set realistic and achievable standards.

1.4 Definitions of Terms Used

Chilled fish is defined as that fish which ought to be kept at chill temperatures, i.e. just above freezing. It includes wet fish and shellfish, smoked fish, pre-packed fish (including CAP fish) and other products which are not frozen, canned or otherwise preserved.

For the purpose of this study five major categories of fish processing were defined:

Primary Processors*

In these factories basic fin fish products such as fillets and steaks, were produced for human consumption without any preservation other than chilling.

Secondary Processors

In these factories further added value processing such as freezing, cooking, smoking and enrobing were carried out.

Primary and Secondary Processors

In these factories both primary and secondary operations were carried out.

Shellfish Processors

These factories included processors of molluscan and crustacean shellfish.

Freshwater Fish Processors

In the study a small number of factories processing freshwater fish were visited, although the techniques employed were those for primary processing of marine fish they have been considered separately as standards were notably higher.

*Footnote: An alternative definition sometimes used in the trade would be "the preparation of fish as a material suitable for further processing". This definition would cover the preparation of frozen blocks but has not been used for the purposes of this study.

1.5 The Scope of this Study

The study consisted of detailed surveys of the conditions and practices within fish processor's premises, plus background information on the type and size of each business. Wherever possible measurements of fish temperature and quality were taken.

The major fish processing areas of England and Scotland were visited to include large, medium and small sized factories.

A diversity of operations and standards were encountered during the study. At one extreme was the one man operation using old and decrepit shared premises and at the other large factories owned by multinational organisations operating with the latest technical equipment in purpose-built premises. This diversity is reflected in the results and although the sample size is relatively small and unlikely to be valid in a strict statistical sense, the data does provide an illustrative overview of conditions within primary processing.

1.6 Integration with Other Studies

Simultaneous studies were being carried out by the Robert Gordon Institute of Technology (RGIT) on the training needs of young entrants to the seafish processing industry in the Grampian area and by the Fisheries Economic Research Unit (FERU) on financial aspects of fish processing in the U.K. This has now been reported in Fish Processing in the U.K. : An Economic Analysis.

For the Grampian region agreement was reached with RGIT that no duplication of visits would be made to keep disruption of factory routine to a minumum.

The FERU study involved a postal questionnaire sent to processors by a firm of consultants, plus visits by Seafish staff to selected factories. Because of the low numbers of factories in the South West region of England it was agreed that joint visits would be made to factories in that region.

2. METHODOLOGY

2.1 Sample Selection and Data Collection

During the spring and summer of 1986 visits were made to the major fish processing areas in England and Scotland, and a random sample of factories was investigated. For the larger factories an appointment was made, but for the smaller factories unannounced calls were found to be more successful.

Background information was obtained from structured interviews with a principal of the factory, usually the owner or manager, and was followed by detailed observations of premises, facilities and handling practices.

2.2 Background Information

This data covered the nature and size of the operation.

Data were recorded on a form, as shown in Appendix I, to give the following information.

2.2.1 Type of Processor

Factories were classified according to the major type of processing being carried out as defined in Section 1.4. Further classifications were also possible based on the types of product.

Primary processors
- filleting (including skinning),
- whole fish preparation.

Secondary processors
- battering and breading,
- smoking pelagic fish,
- smoking white fish.

(Operations, or facilities, for freezing, deboning, mincing etc. were noted but not used as a basis for further classification).

Shellfish processors - The methods of shellfish processing encountered were boiling of crabs, shucking of scallops and

peeling of scampi. For the purpose of this study they were all included in the same category.

Freshwater Fish Processors - These were processors of rainbow trout and salmon.

2.2.2 Geographic Area

Factories were classified by area within the U.K., either by port, if in a major fish processing location, or by region if processors were sparse.

2.2.3 Factory Size

Factories were classfied on the basis of the number of employees into small, medium and large.

Small 1 - 9 employees
Medium 10-49 "
Large 50 or more employees.

Employees included processing staff, office and managerial staff, maintenance engineers, and quality control staff. Part time staff were included on the basis of being equivalent to one half a full time employee.

2.2.4 Factory Location

The location of each factory was classifed as:

Dockside - premises adjacent to the fish dock.

Industrial estate - units on an estate away from the fish dock.

Other - factories situated in neither of the above, for example in the suburbs or countryside.

2.2.5 Product Information

Information was obtained on the types and numbers of the different products processed in each factory. Raw material was classified on the basis of species, form and method of purchase and preservation. The final product was classified on the basis of form, preservation and method of presentation. Many factories were handling more than one product type resulting in problems of classifying patterns of operation within the factory.

2.2.5.1 Types of Outlet

The types of outlets supplied were classified as follows:

Retail - Mongers, mobiles, freeze-centres, supermarkets
Catering - Friers, canteens, hotels/restaurants
Inland Market
Secondary processor
Export

An estimate was given of the relative quantities of fish sent to each type of outlet.

Information was requested on throughput (by quantity and value) for each product type but this was rarely available and has not been included in the report.

2.2.6 Quality Standards

Information was requested on the nature and extent of quality control over the selection of raw material, processing standards, cleaning and hygiene and inspection of final products. Very few factories were operating to written standards and those that did were reluctant to divulge details. All factories operated with some degree of implicit quality control (i.e. the standards were in the minds and actions of the staff) and an attempt was made to further classify quality control the selection of raw material. These standards were classified as:

Written - defined standards from end-user (usually supermarket).

Consistent - size and freshness quality of fish bought always to a certain standard.

Variable - size and freshness quality standards of fish bought vary with price and supply.

2.3 Collection of Factory Data

The interview was followed by detailed observations in the factory. The information was recorded to take account of the sequence of events as the material for each product passed through the factory. Thus a typical sequence in a primary processor would be:

Reception
Filleting
Packing and dispatch

At each stage details of the following were recorded using the aide-memoire shown in Appendix II.

Construction and design features
Fish handling conditions and procedures
Cleaning and Hygiene
Quality control
Subjective rating

2.3.1 Construction and Design Features

Materials of construction were noted together with design features for floors, walls and ceilings using the codings of the aide-memoire. Details were recorded at each stage in the factory, including chills and cold stores.

2.3.2 Fish Handling Conditions and Procedures

Details were taken of each processing operation, the use and types of machinery and equipment, delays and temperature conditions, use of chills and wherever possible fish quality and temperature.

2.3.3 Cleaning and Hygiene

The facilities and methods for cleaning were noted for each area in the sequence of operations. A subjective rating (see 2.3.5) for the effectiveness of cleaning was also given.

2.3.4 Quality Control

The application and facilities, if any, for quality control of the fish and products at each stage were noted.

2.3.5 Subjective rating

For each area of operation a rating was given on a six point scale ranging from excellent, A, to very poor, E. The rating was based on the subjective impression given by a range of criteria such as construction, design, suitability for purpose, standards of cleanliness and efficiency of use.

This subjective rating has proved useful in the past for making comparisons, for example when analysing data from retail shops.

By cross-checking between assessors it has been shown that ratings are surprisingly consistent.

2.4 Data Analysis

All data was coded and recorded on an Apple-Mac microprocessor spread sheet for analysis and data presentation. This report presents the major findings from simple analysis of the data. Further and more complex analysis of the data would be possible.

Figure 1

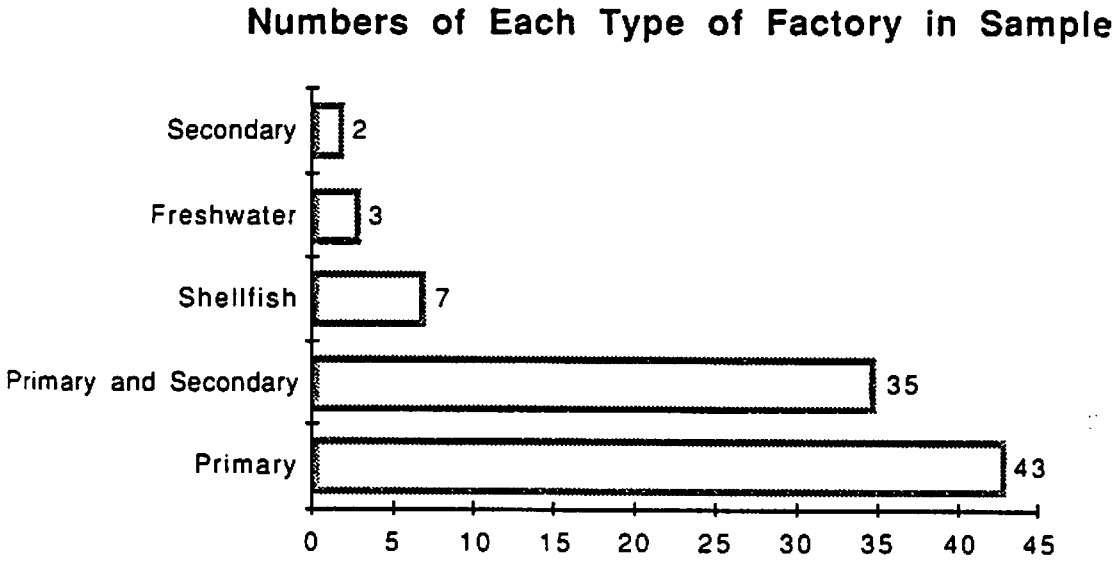
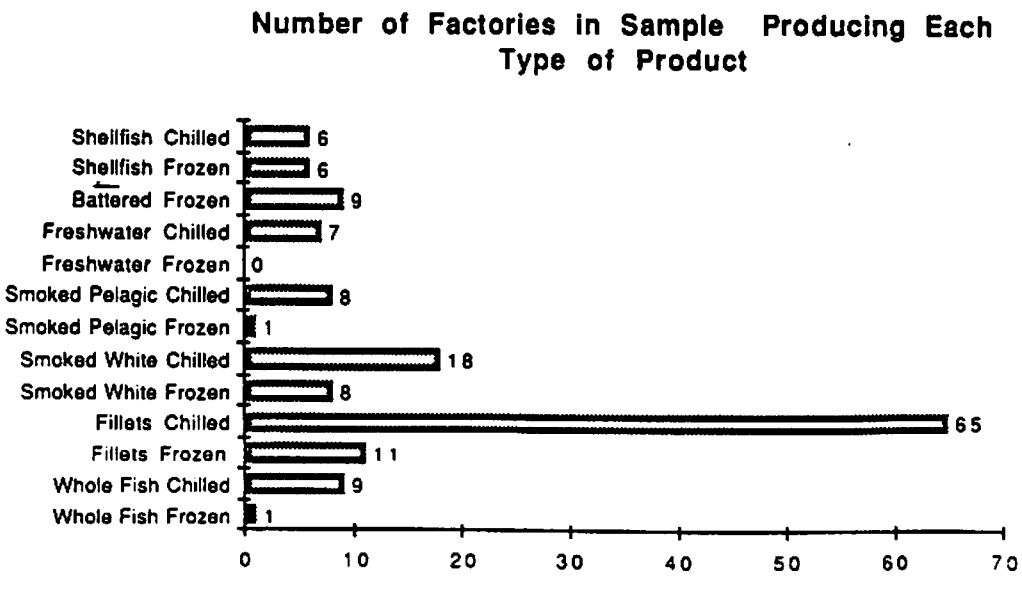


Figure 2



3. PROFILE OF THE SURVEY SAMPLE

The total number of factories successfully visited was 90 out of an estimated UK total of approximately 1000 for all processors of fish (IDU and FERU estimates ref. 4).

3.1 Types of Processor

Factories were classified by the major types of processing in operation and by major types of product. On this basis a total of 43 primary processors were included in the study (Fig. 1), and a further 35 processors combined primary and secondary processing.

Figure 2 shows the numbers of factories in the sample producing each type of product.

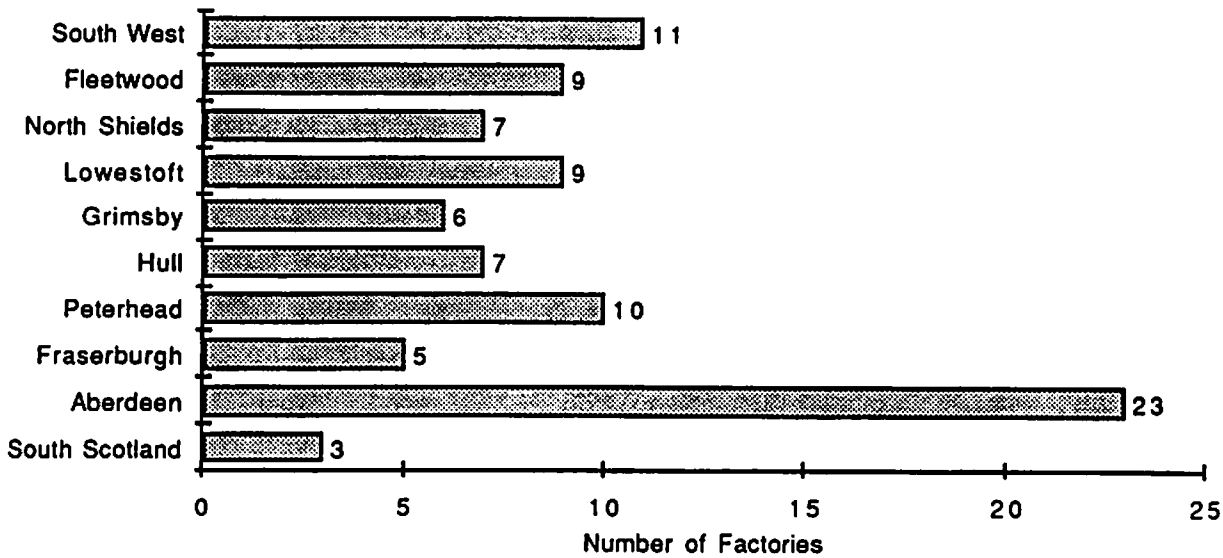
In Humberside and Grampian regions some factories were processing fish on behalf of another company, sometimes in addition to processing their own fish.

However it must be emphasised many factories were producing or were capable of producing a range of products in more than one category.

This diversity of capability was a major problem when classifying some factories.

Figure 3

Geographic Location of the Sampled Factories



3.2 Geographic Location

The study concentrated on the major seafish processing areas of England and Wales and included 3 factories processing freshwater fish in South Scotland (Fig. 3).

An indication of the total numbers of seafish processors in each of these areas (based on IDU and FERU estimates) is:

South West	70*
Fleetwood	60
North Shields	40
Lowestoft	40
Grimsby	200
Hull	60
Peterhead	30
Fraserburgh	20
Aberdeen	180

*Includes approximately 50% one man operators who fillet fish at the dockside with the minimum of facilities, then retail the fish locally.

Figure 4

Size of the Factories Sampled

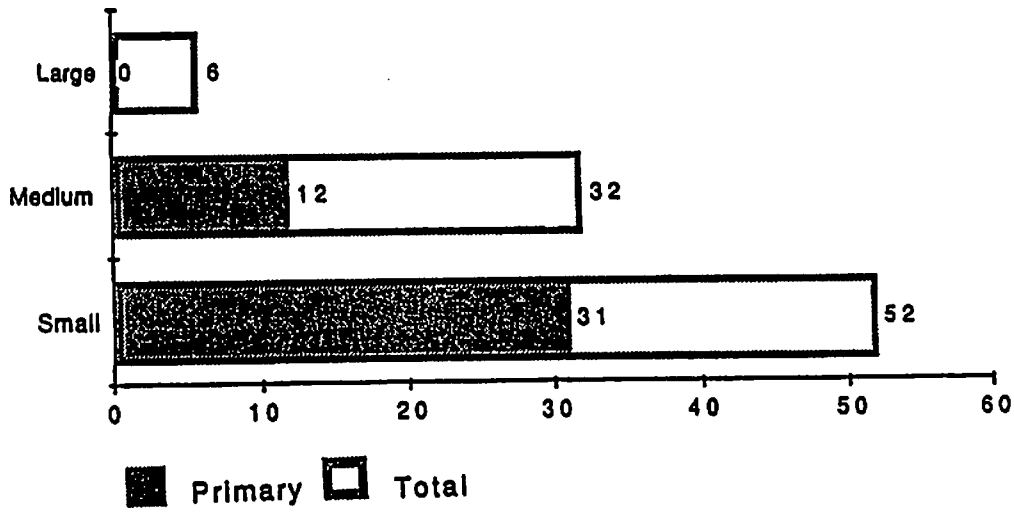
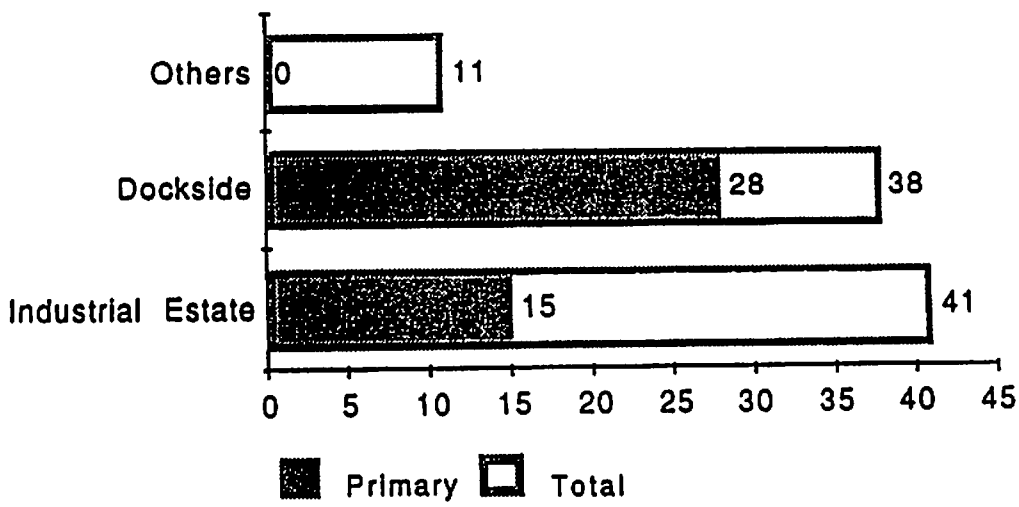


Figure 5

Industrial Location of the Sampled Factories



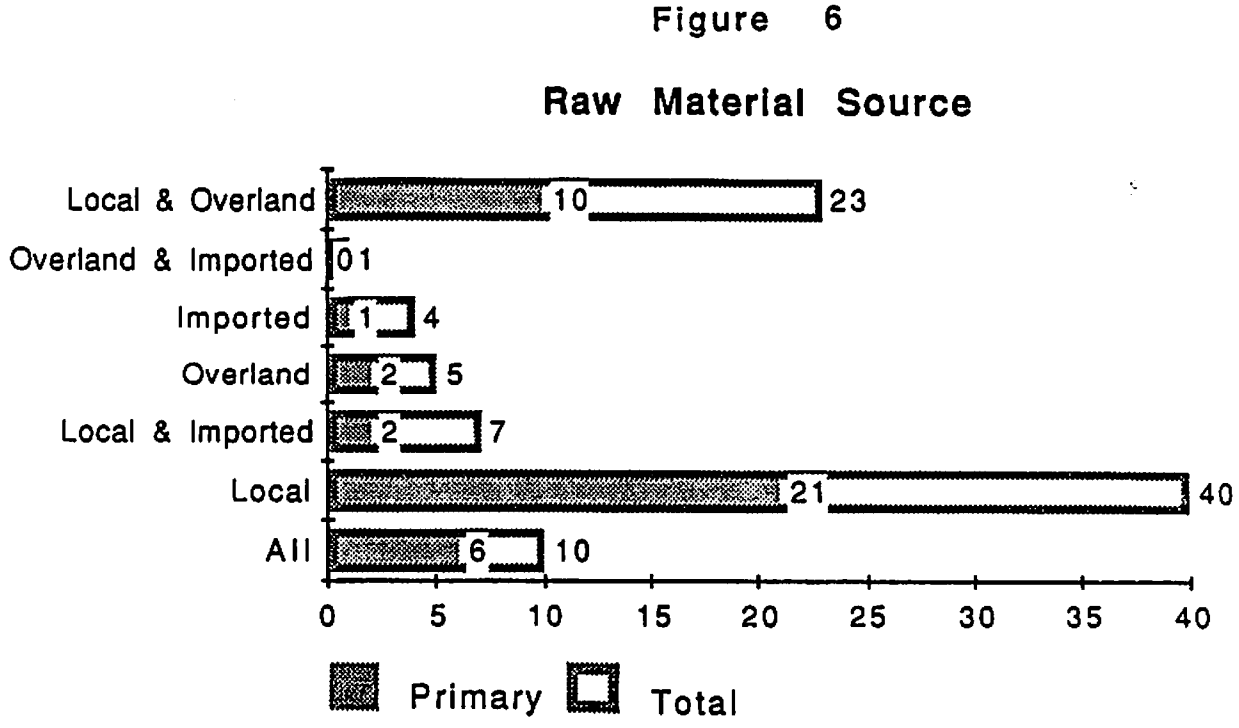
3.3 Size of Factories

Over 50% of all factores visited were small, i.e. employing less than 9 staff. Three quarters of all primary processors were small, and none were classed as large, i.e. over 5 staff (Fig. 4).

3.4 Factory Location

By tradition fish processors are situated adjacent to the fish docks for ease of supply. Two thirds of primary processors were located dockside, and the remaining third were on an industrial estate next to the docks area (Fig. 5). These dockside areas were frequently adjacent to derelict spaces used as dumping grounds. As a consequence it was difficult to keep the surroundings clean and well-maintained. Where custom-built units were provided these were usually at a higher rent than the older buildings with consequent reluctance by some processors to locate in such premises.

Figure 6


Raw Material Source
Local & Overland
10
23
Overland & Imported
0
1
Imported
1
4
Overland
2
5
Local & Imported
2
7
Local
21
40
All
6
10
0
5
10
15
20
25
30
35
40
Primary
Total

3.5 Raw Material Supplies

Problems of supply were a constant cause of complaint at all areas visited. The major complaints were erratic, unpredictable supplies and lack of information on landings. An attempt was made to determine major sources of supply but these inevitably vary with availability. The pattern shown in Figure 6 and Table 1 is that most small primary processors are heavily dependent on local supplies. This was particularly noticeable with the Grampian processors. In other areas of the country shortfalls in local supplies were made up with overlanded fish and imported fish.

TABLE 1

FACTORY SIZE AND SOURCES OF RAW MATERIAL

FACTORY SIZE	NUMBER OF FACTORIES BUYING FROM EACH SOURCE							
	LOCAL	OVERLAND	IMPORTED	DEFROSTED	LOCAL & IMPORTED	LOCAL & OVERLAND	OVERLAND & IMPORTED	ALL SOURCES
Small	27	3	2	0	4	12	0	4
Medium	12	1	2	0	2	10	1	4
Large	1	1	0	0	1	1	0	2

None of the factories visited were buying in defrosted fish.

Figure 7

Number of Factories Supplying Each Type of Outlet

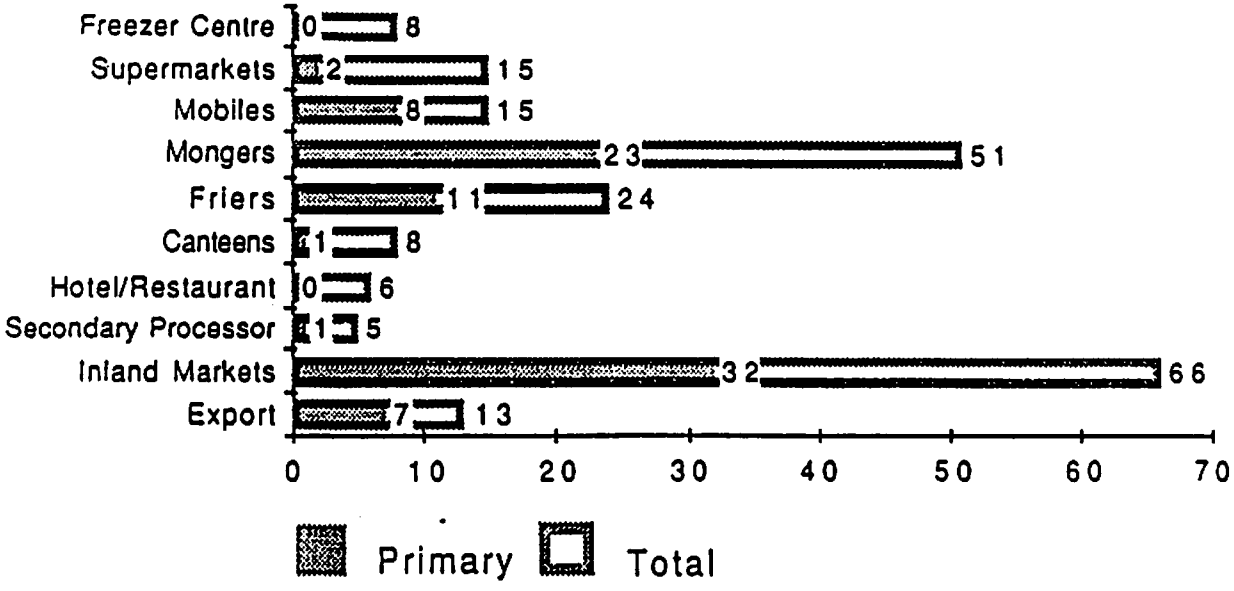
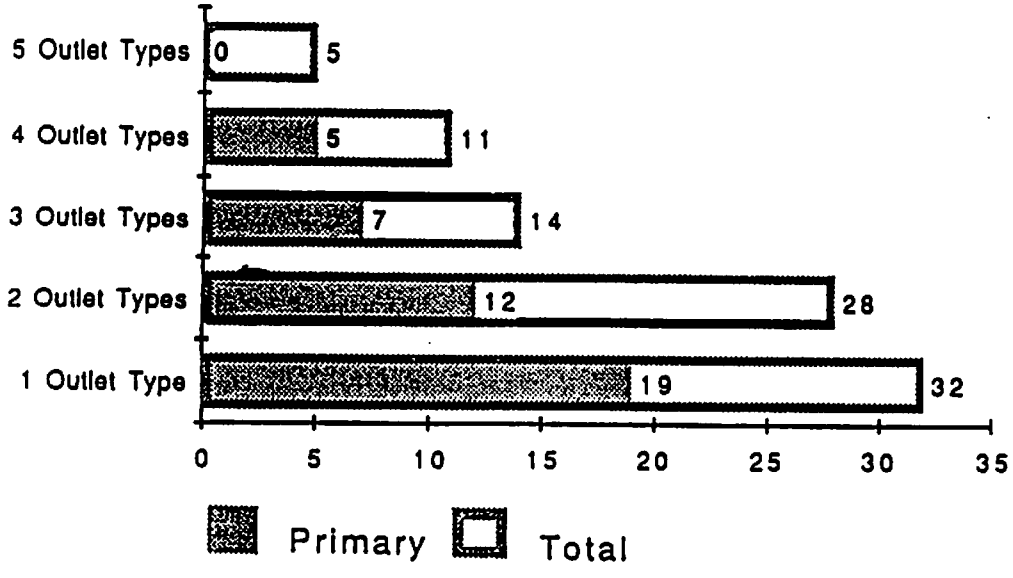


Figure 8

Number of Different Outlets Supplied



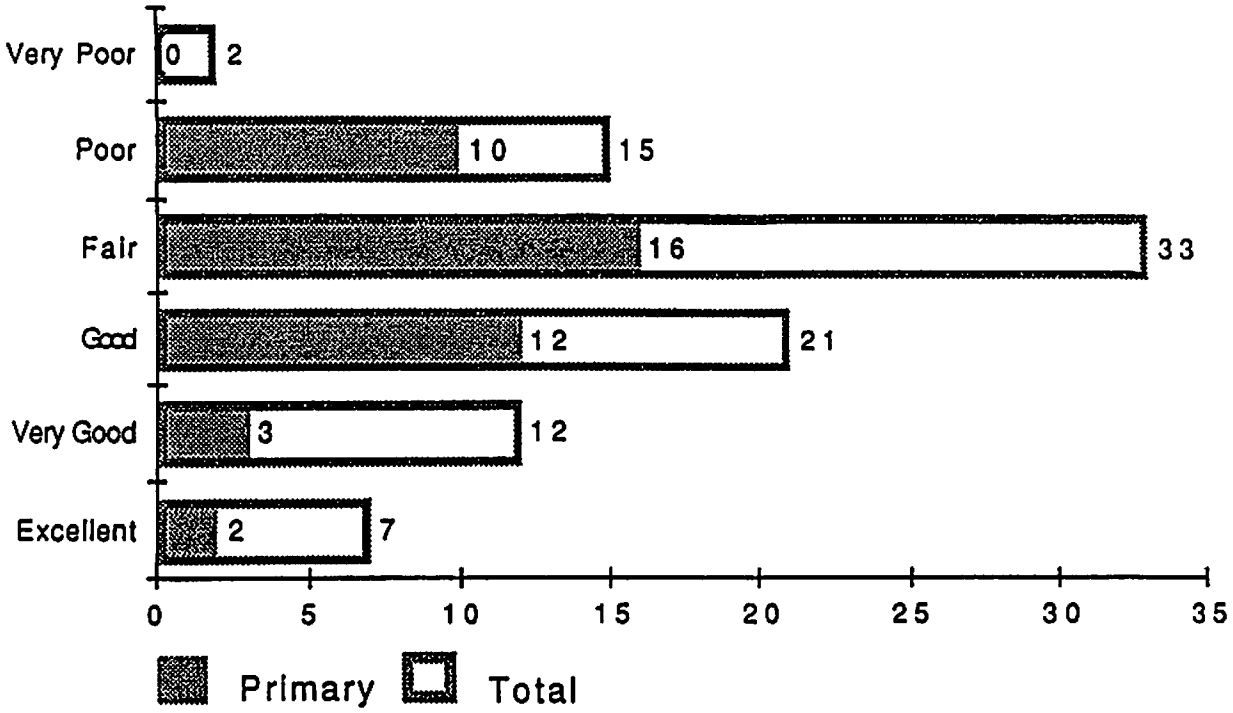
3.6 Outlets Supplied

The number of factories supplying each type of outlet is shown in Figure 7. Primary processors were supplying principally to inland markets and fish mongers. The 7 primary processors sending fish for export were in Grampian and the South West supplying whole fish to the Continent.

Factories tended to be limited to a particular type of outlet, as shown in Figure 8. Two thirds of the factories supplied only 1 or 2 types of outlet.

Figure 9

Appearance Rating of the Sampled Factories



3.7 Factory Ratings

Figure 9 shows the overall ratings for the 90 factories visited and Table 2 the ratings by type of factory. The majority of primary processors were in the good to fair categories, with one quarter classified as poor. Not all old premises were down-rated but only new, purpose-built premises justified a very good or excellent rating. The two factories classed as very poor were both old premises handling smoked fish.

TABLE 2

FACTORY RATINGS AND TYPE OF FACTORY

TYPE OF FACTORY	NUMBER OF FACTORIES IN EACH RATING					
	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Secondary Processor	1	0	1	0	0	0
Freshwater	2	1	0	0	0	0
Shellfish	1	1	1	3	1	0
Primary & Secondary	1	7	7	14	4	2
Primary	2	3	12	16	10	0

It is significant that the 3 freshwater fish factories all received excellent or very good ratings, reflecting the higher standards operated in these factories.

Table 3 compares the effect of factory size on rating. The large factories were all excellent or very good, none of the medium sized factories were very poor, and most of the small factories were fair to good but with a full spread from very poor to excellent.

TABLE 3

FACTORY RATING AND SIZE

FACTORY SIZE	NUMBER OF FACTORIES IN EACH RATING					
	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Small	3	3	13	23	8	2
Medium	3	4	8	10	7	0
Large	1	5	0	0	0	0

Table 4 compares the factory rating with quality of fish for primary processors. The table illustrates that factory rating was not a reliable indicator of the quality of fish handled. The lowest freshness score was given to fish in a factory rated as good and some of the freshest fish was seen in factories rated as fair or poor.

TABLE 4

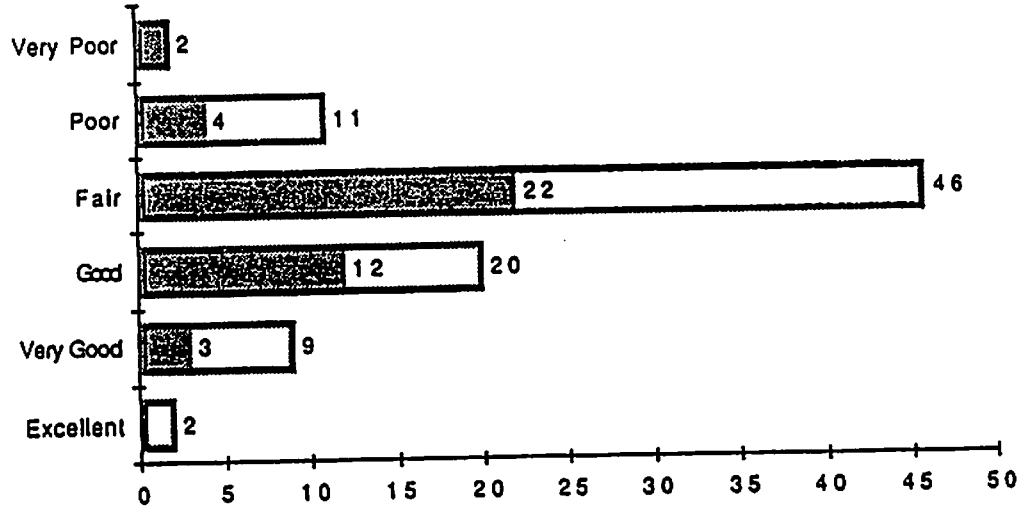
FACTORY RATING AND FISH QUALITY

FOR PRIMARY PROCESSORS ONLY

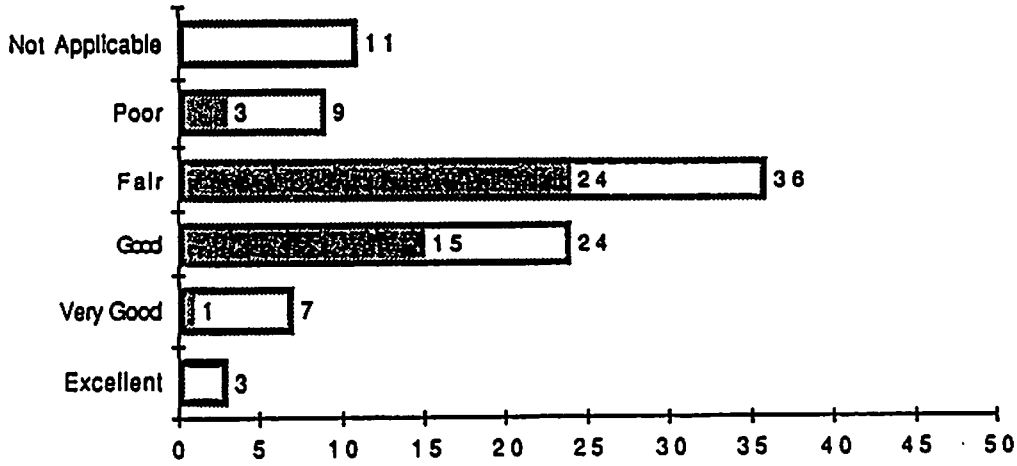
FISH QUALITY (Torry Score)	NUMBER OF FACTORIES IN EACH RATING					
	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
6			1			
6.5				1	1	
7			2	3	2	
7.5		1	5	4	1	
8	1		3	6	2	
8.5					1	
9	1	2		1	3	

Figure 10

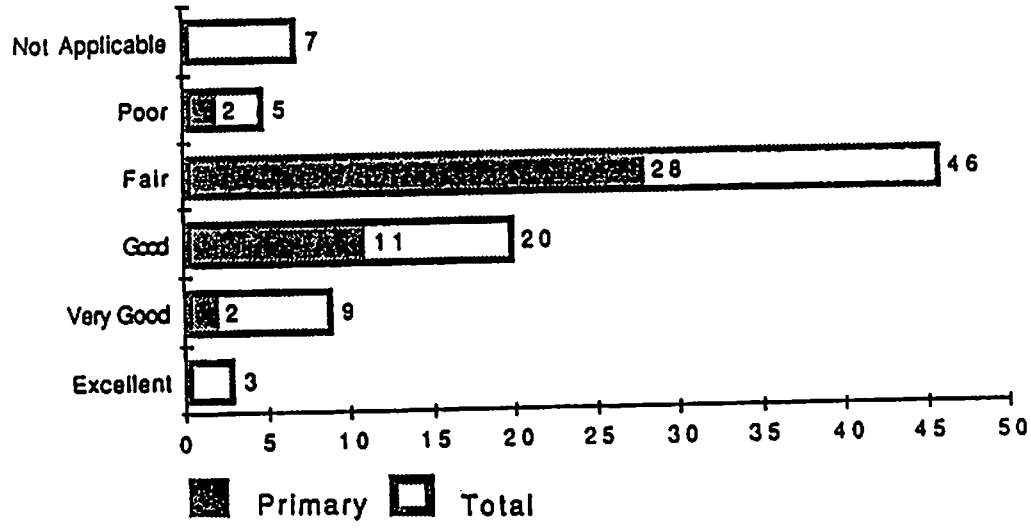
Rating - Reception



Rating - Processing Area



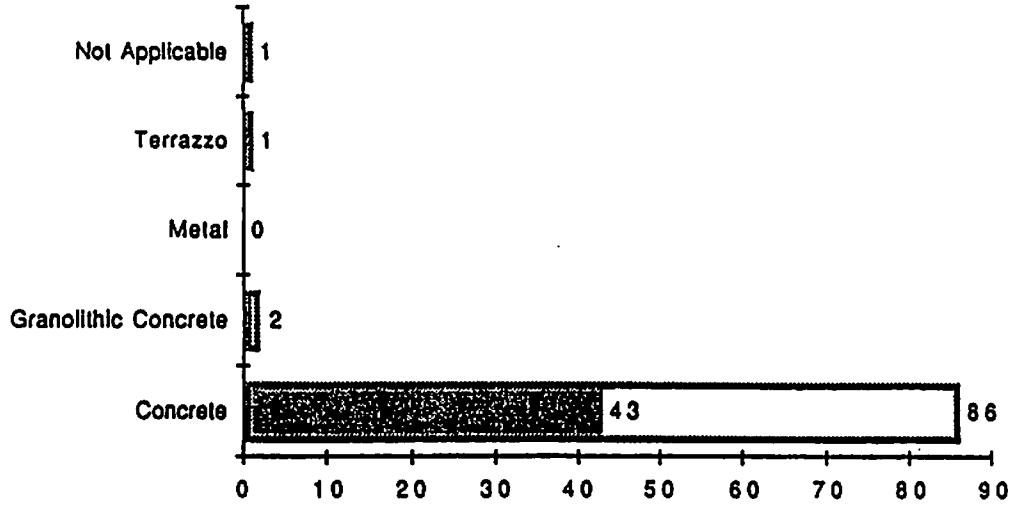
Rating - Packing and Dispatch



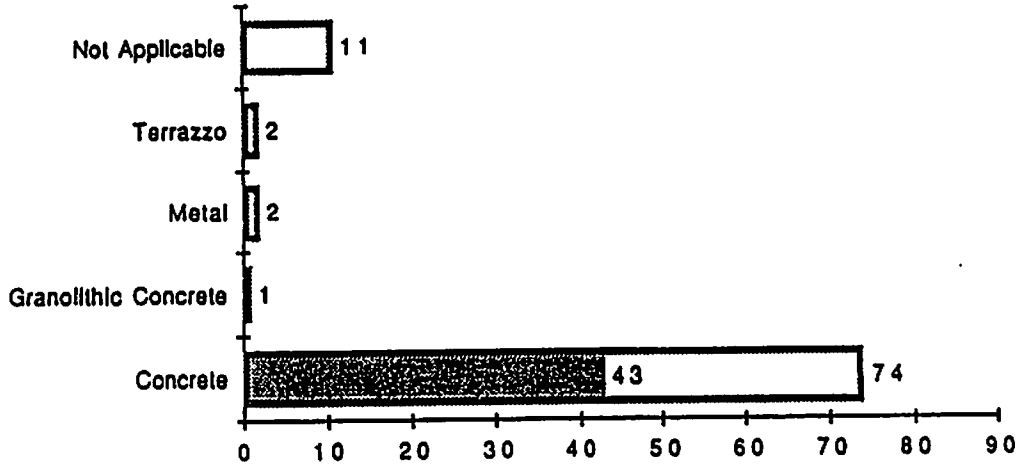
Within the factory a rating was given to the areas for reception, processing, and packing and dispatch, although for many primary processors there was no distinction between the areas. Figure 10 illustrates that the majority of areas were fair to good with a very small number classified as very good. The very poor ratings for the reception area indicate a total lack of reception facilities in some primary processors.

Figure 11

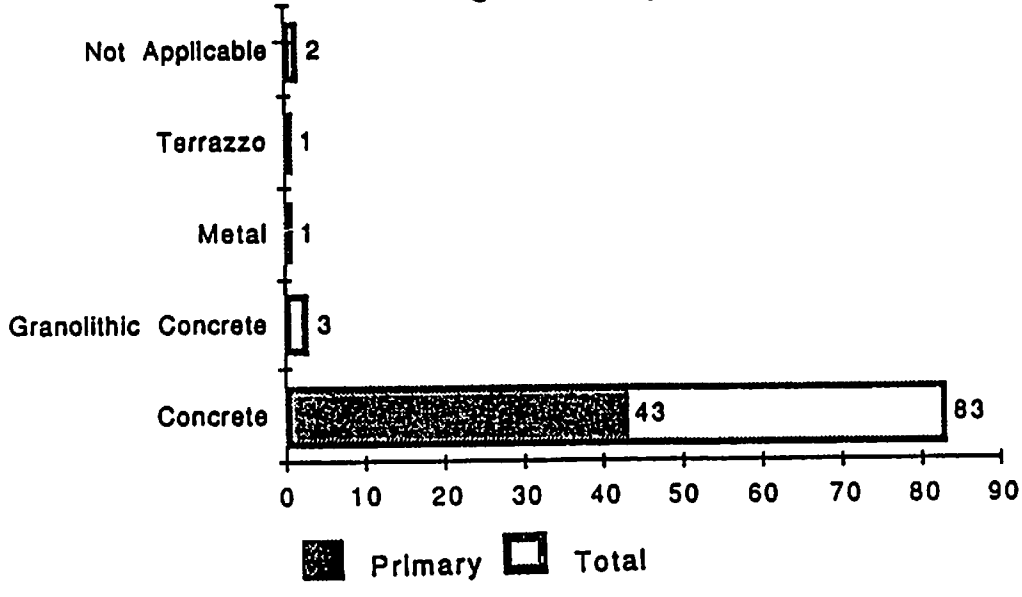
Construction of Floors - Reception



Processing Area



Packing and Dispatch



4. THE FABRIC OF THE FACTORIES

The materials of construction and design features for the floors, walls and ceilings were recorded within each factory at the areas used for reception, processing and packing and dispatch. For the majority of primary processors there was usually little difference in the conditions between each area.

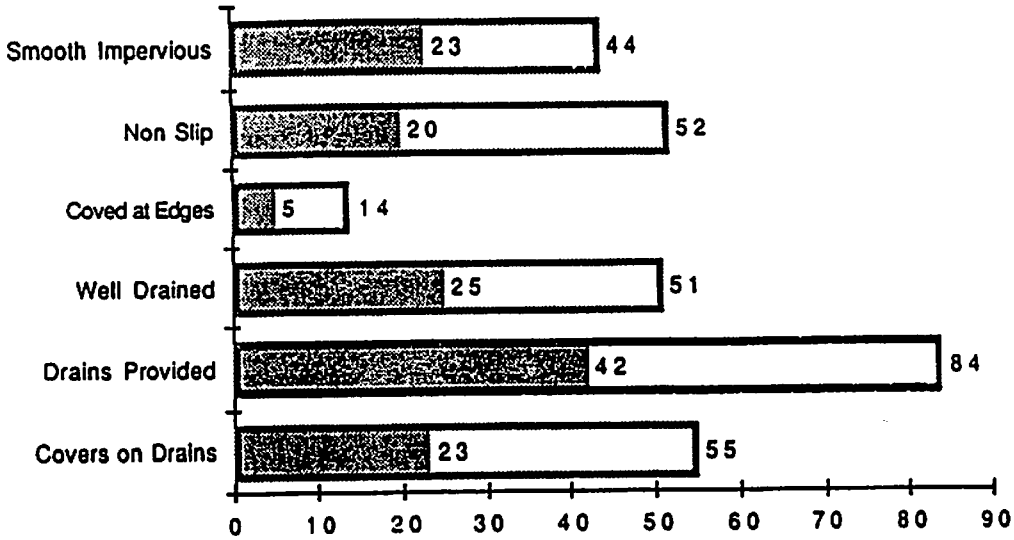
4.1 Floors

The majority of factory floors were constructed from concrete (Fig. 11). Two factories had terrazzo floors, these were very smooth, easy to clean and were not slippery. The two metal floors seen were of alloy treadplate, slippery and not easy to clean.

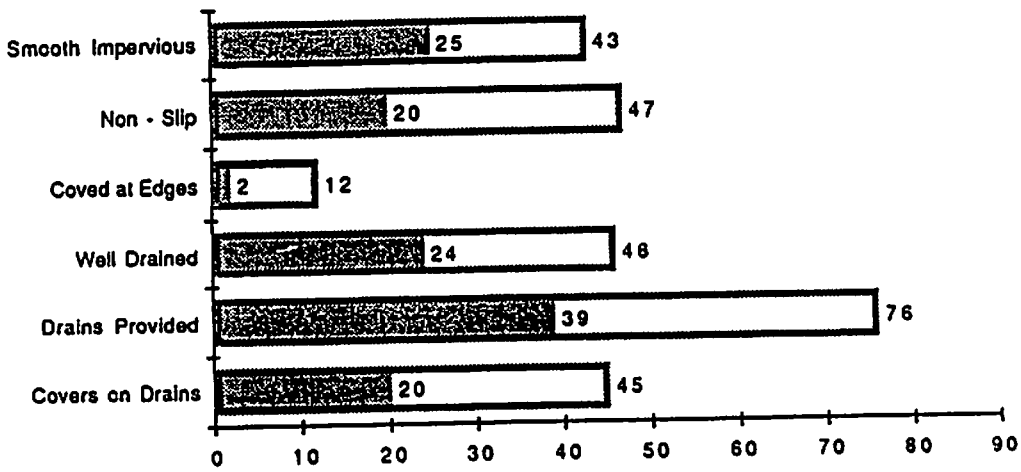
Very few floors were coved at the edges to assist cleaning (Fig. 12). Over half the floors were not smooth and impervious i.e. they were cracked and porous, however most were non-slip with a good slope to permit drainage. For some dockside processors there was no drain provided, all the waste water and any filleting waste drained directly into the dock. About half the factories with drains provided had covers on the drains, otherwise open gullies were used for drainage.

Figure 12

Design Features of Floors - Reception



Processing Area



Packing and Dispatch

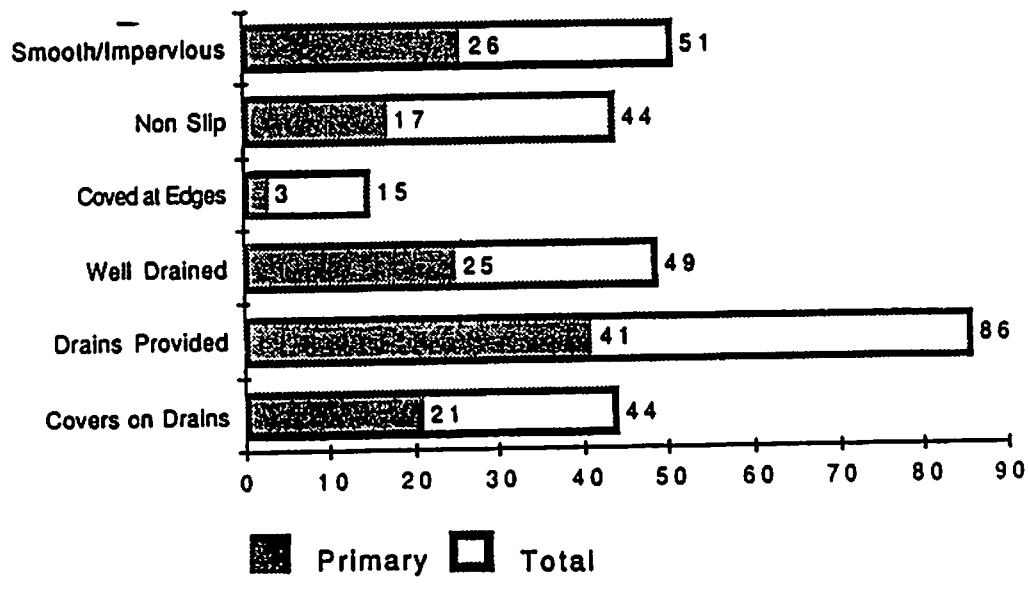
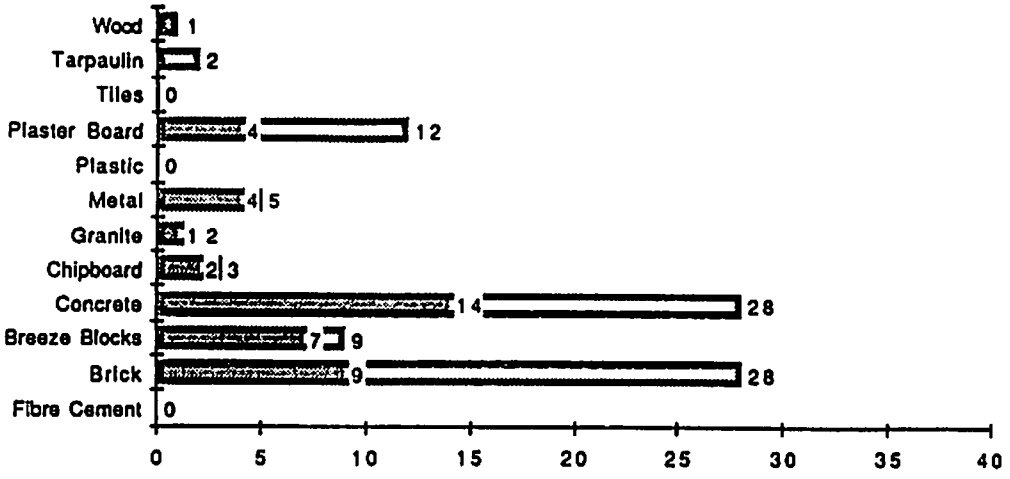
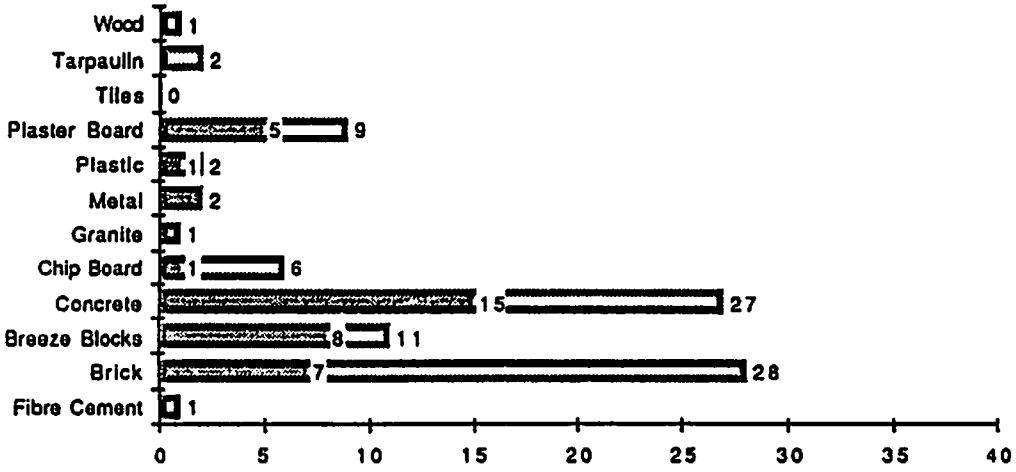


Figure 13

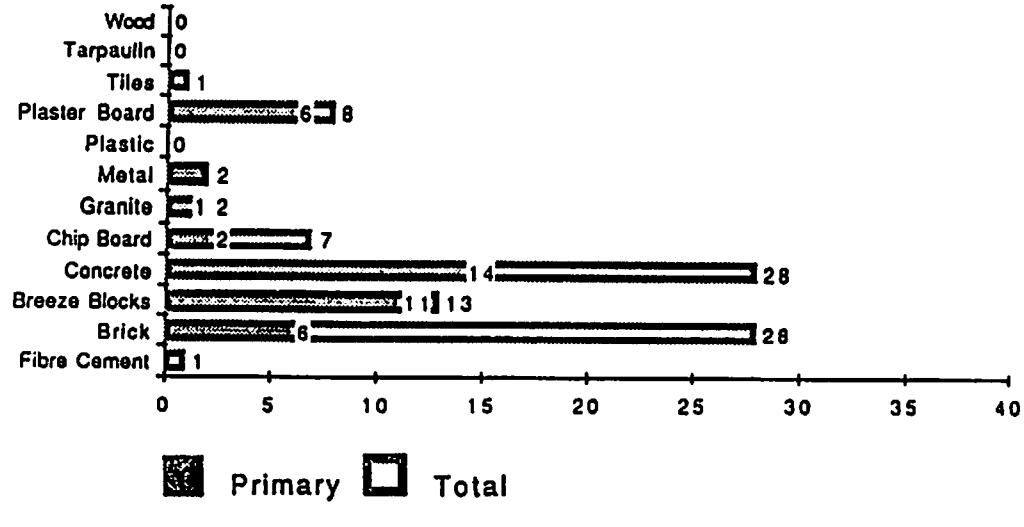
Construction of Top Half Of Walls - Reception



Processing Area



Packing and Dispatch



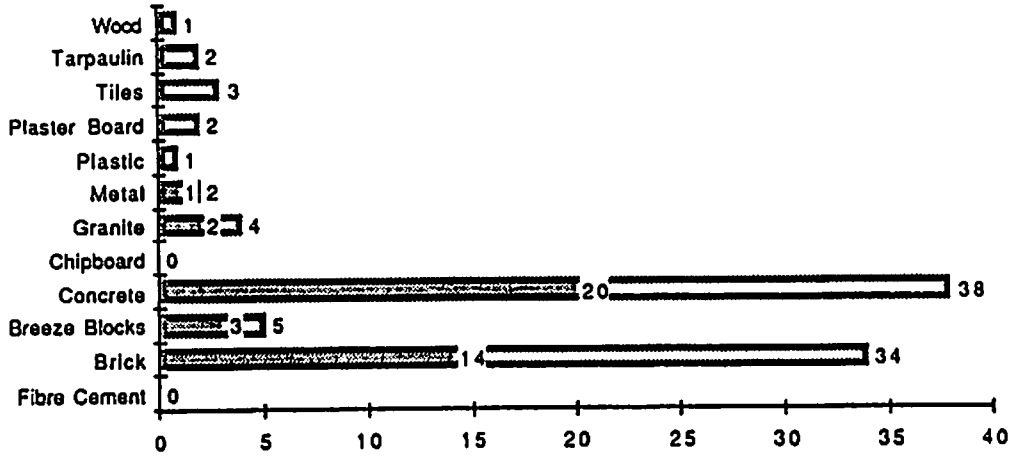
4.2 Walls

Not only was there a wide variety in the materials used in wall construction but also within approximately half the factories visited there was a difference in the materials used for the top and bottom halves of the walls (Figs. 13 and 14). As may be expected most walls were constructed of traditional building materials such as brick, breeze-block or skimmed concrete, then painted. However wood, chipboard, metal and even tarpaulins were used in some factories. Tiles were used for the bottom half of walls in one quarter of the primary processing factories, but only in the processing area, i.e. not in reception or packing and dispatch.

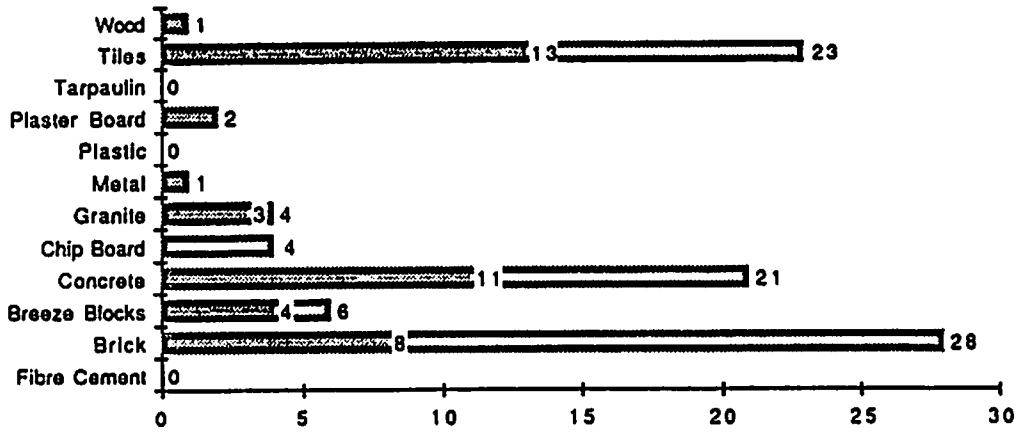
Only one quarter of the primary processing factories had pipework etc. boxed in, and the surfaces of approximately half the walls seen were considered smooth, impervious and easy to clean (Fig. 15). Glass was used in the walls of over half of the primary processors. Eight factories used wall mounted heaters.

Figure 14

Construction of Bottom Half Of Walls - Reception



Processing Area



Packing and Dispatch

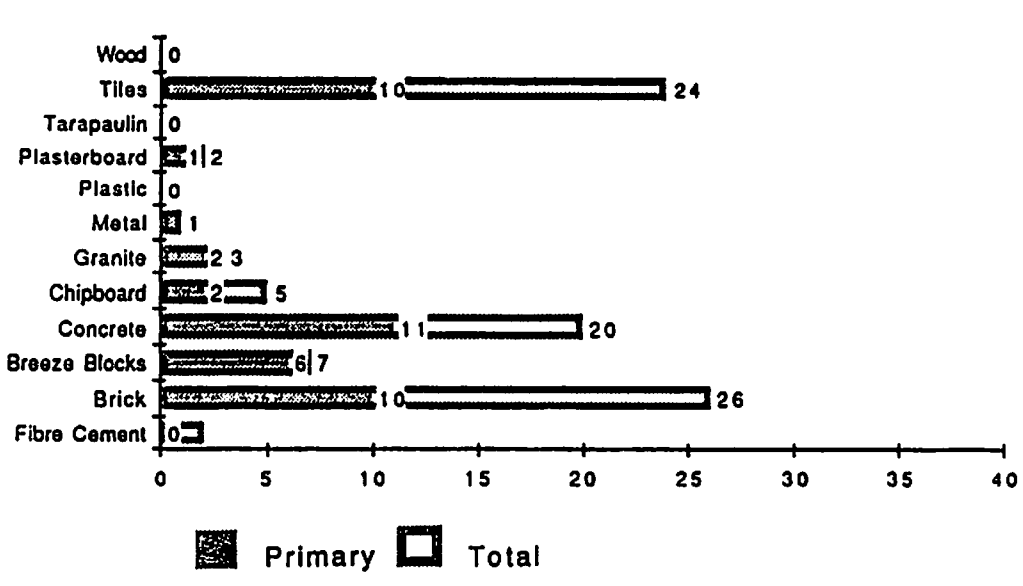
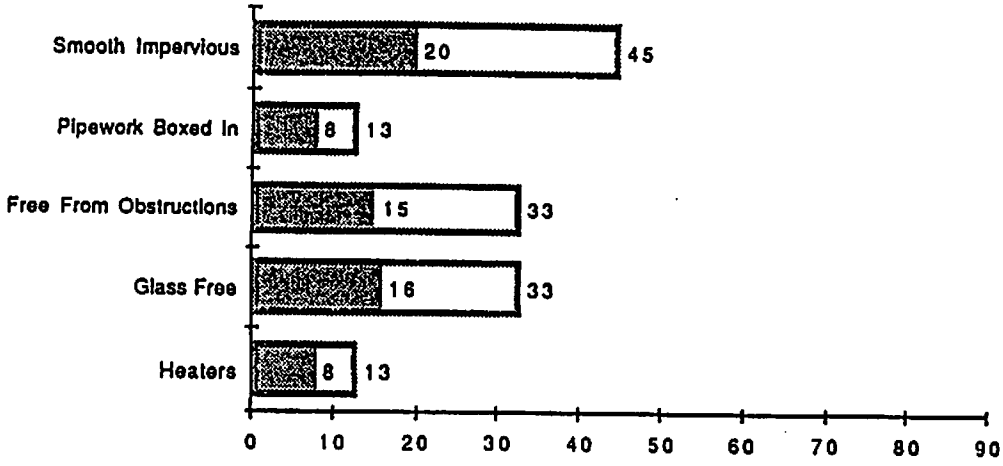
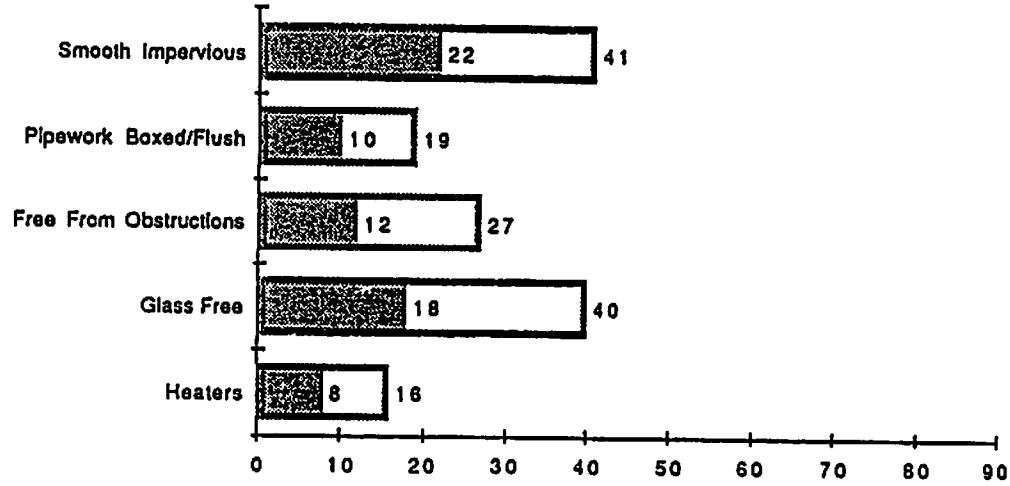


Figure 15

Design Features of Walls - Reception



Processing Area



Packing and Dispatch

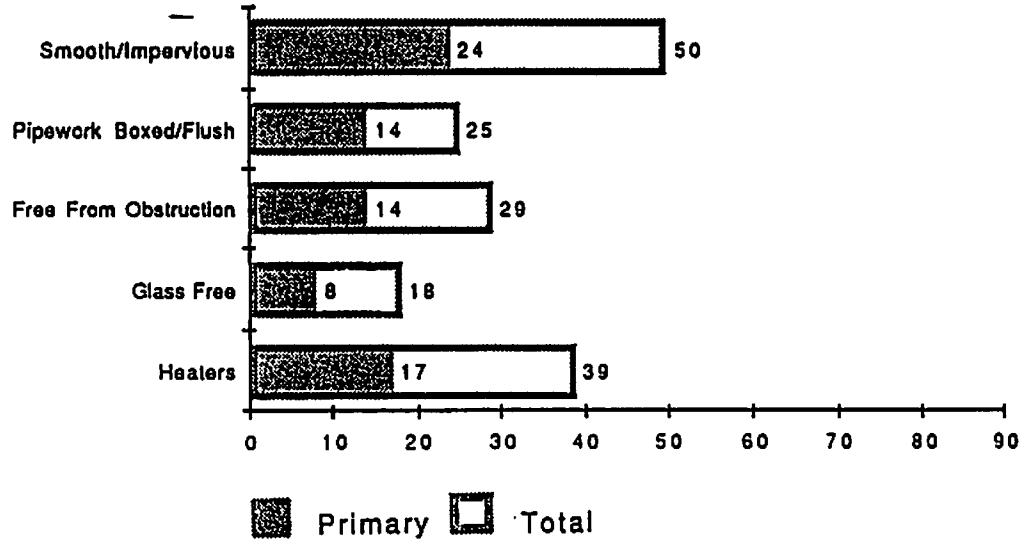
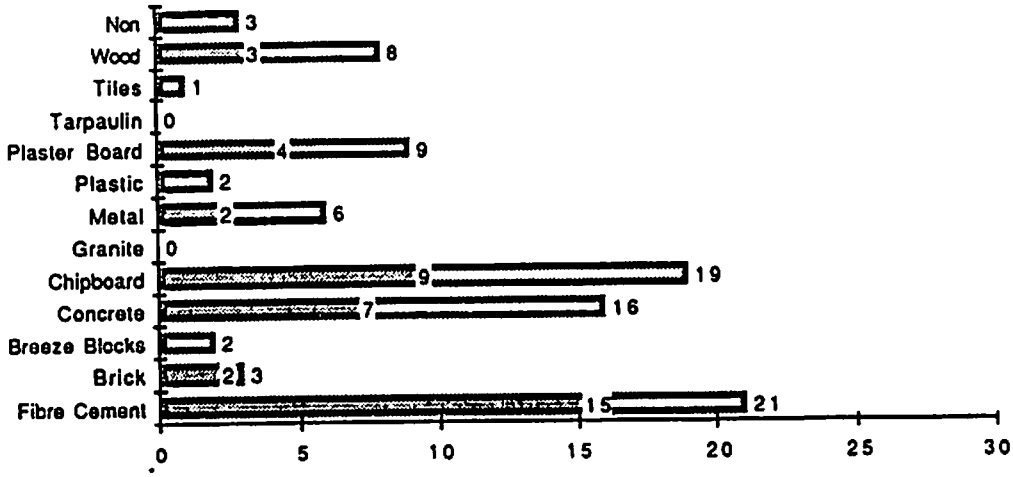
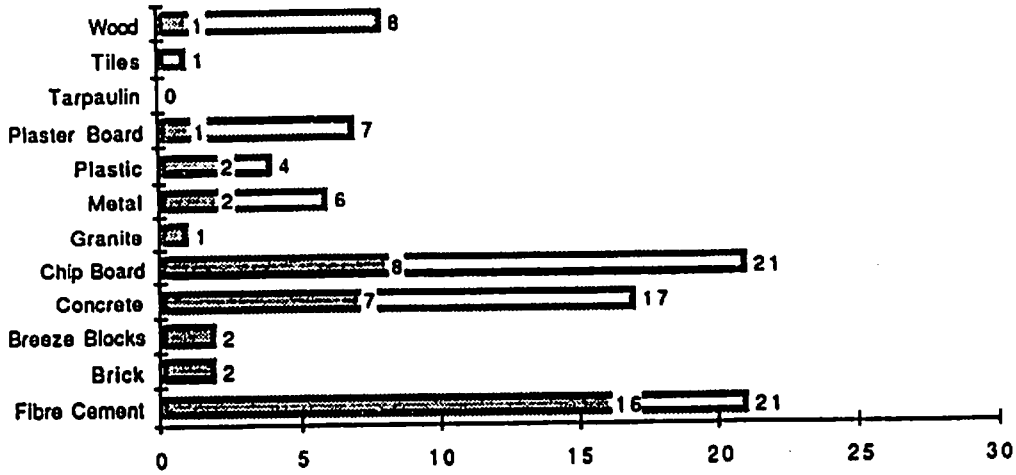


Figure 16

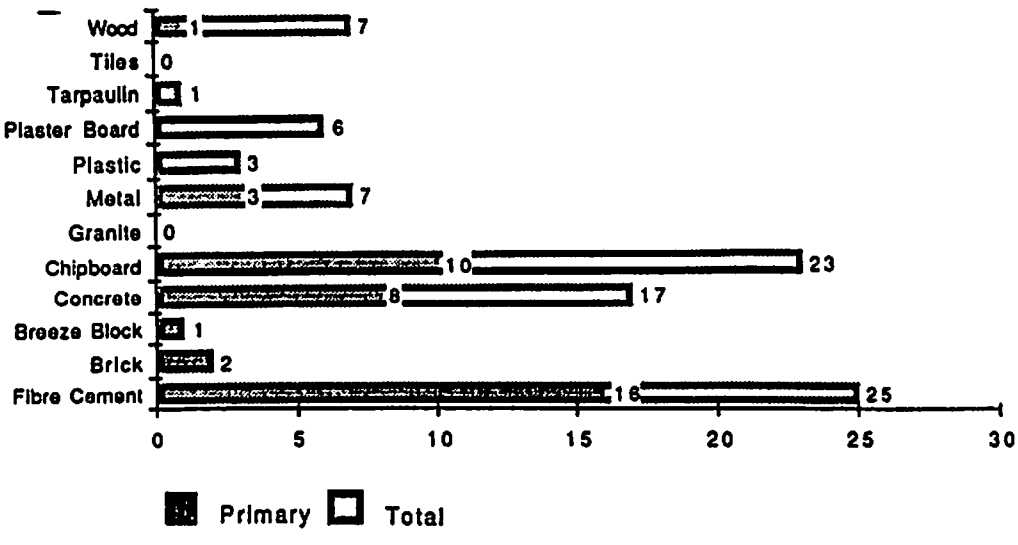
Construction Material of Ceiling - Reception



Processing Area



Packing and Dispatch



4.3 Ceilings

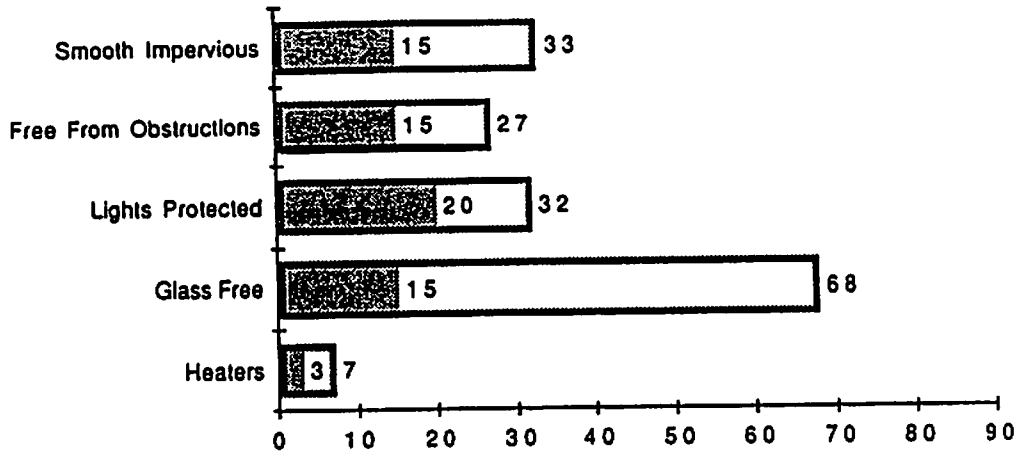
For single storey buildings the ceiling was typically formed by the underside of the roofing materials. In the majority of cases this was fibre cement sheeting supported by metal trusses (Fig. 16).

Note: Fibre cement is the term used by the trade for what is commonly termed asbestos sheeting.

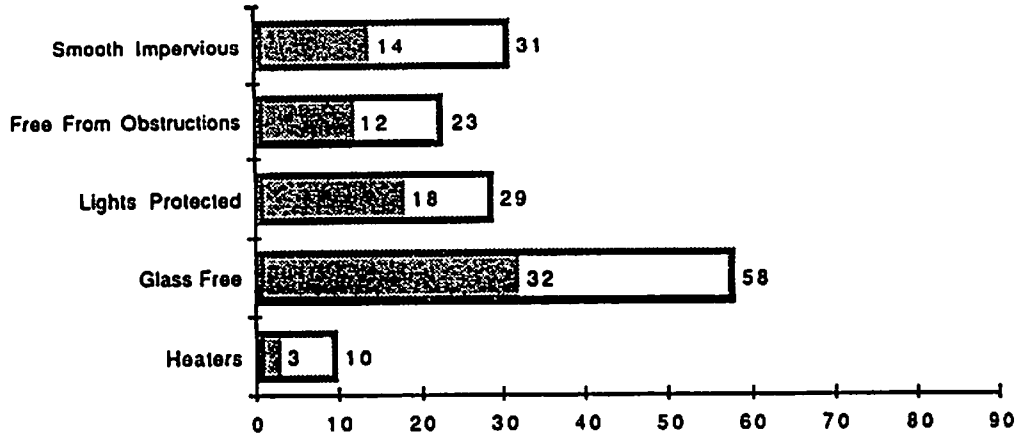
A wide variety of materials were used for ceilings, but very few were designed and custom-built for a food factory. However approximately half the light fittings used in primary processing factories were protected in some way to prevent broken glass falling into the work area and one third of ceilings were obstruction free (Fig. 17). One third of ceilings were smooth and impervious, and very few factories had ceiling-mounted heaters.

Figure 17

Design Features of Ceilings - Reception



Processing Area



Packing and Dispatch

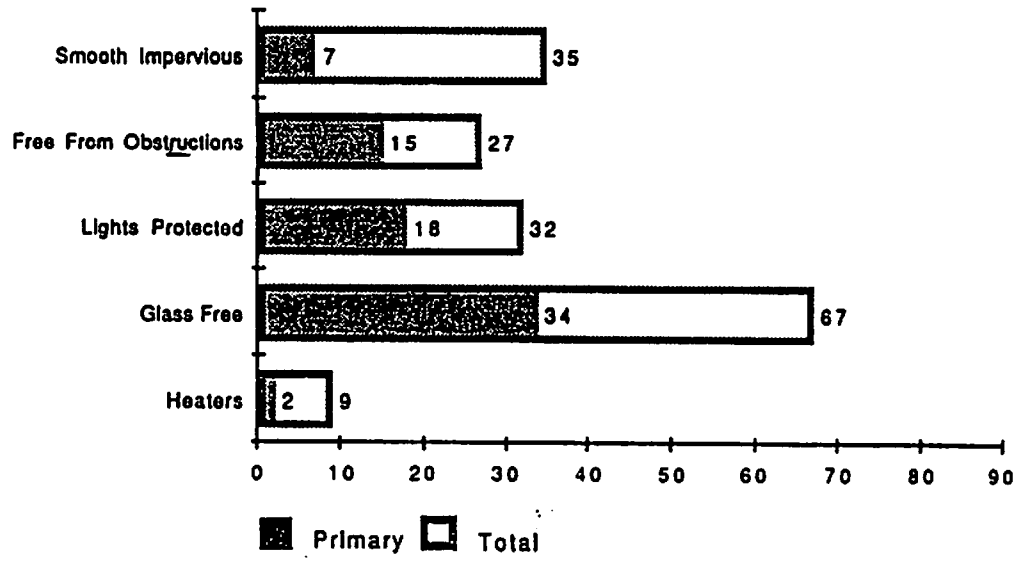
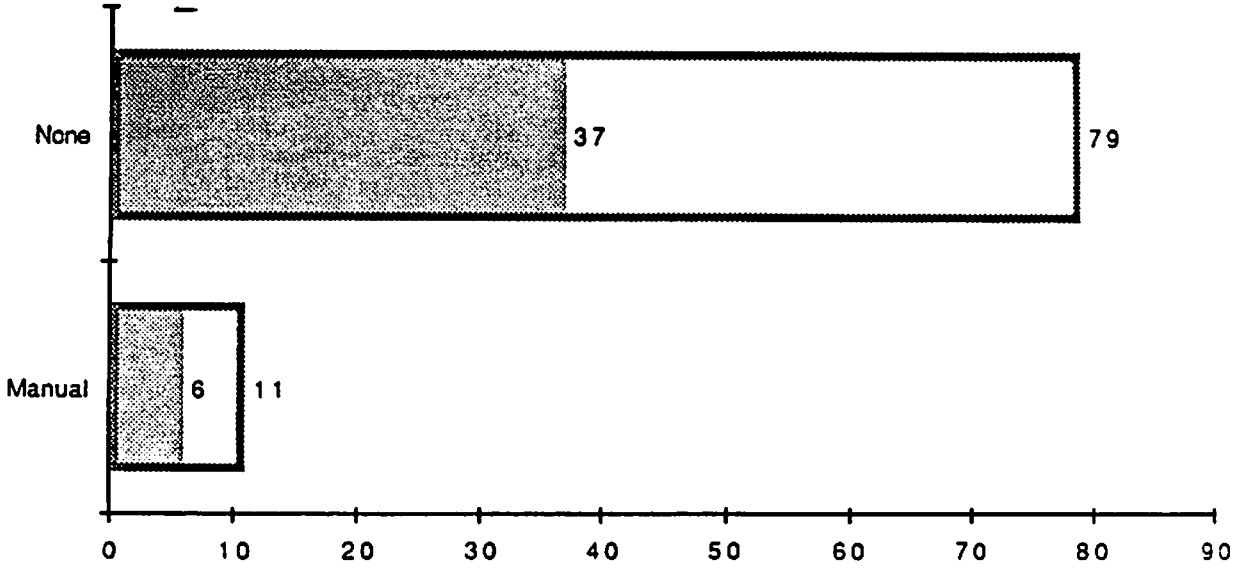


Figure 18

Sorting Methods at Reception



APPENDIX I

FACTORY CHECKLIST - BACKGROUND INFORMATION

FACTORY CHECKLIST BACKGROUND INFORMATION DATE _____

Company _____ Address _____ Telephone _____

_____ _____

Contacts 1 _____ Position _____ Factory _____ External

2 _____ _____ Location _____ Rating R _____

PRODUCT INFORMATION

	RAW MATERIAL		FINAL PRODUCT	
Product Number	Species Source Material Preservation		Presentation Material Preservation Outlets	
			Value Quantity & Output	

QUALITY STANDARDS INHOUSE/OUTLET

RAW MATERIAL	PROCESS	FINAL PRODUCT

STAFF NUMBERS

Managerial	Admin/ Clerical	QC		Processing		MAINTENANCE	TOTAL
		Manag/Super	Support	Part-Time	Full-Time		

CLEANING AND HYGIENE INHOUSE/OUTLET

Facilities	Detergent/Disinfectant	Pest Control	Training

FACILITIES FOR PROCESSING STAFF

Changing Rooms	Toilets Male	Toilets Female	Handwash/Drying	Protective Clothing	Laundry	Shop Floor Restrictons

APPENDIX II

FACTORY CHECKLIST - AIDE MEMOIRE

AIDE MEMOIRE

RATING (R)		SOURCE	MATERIAL	PRESERVATION	PRESENTATION	OUTLETS
Excellent	A	Local	Whole	Chilled	Pure Fish	Retail (specify)
Very Good	B	Overland	Fillets	Frozen	Coated (B+B)	Catering (specify)
Good	C	Imported	Portions	Canned	In-sauce	Inland Market
Fair	D	Defrosted	Mince	Marinaded	Smoked	Secondary Processor
Poor	E		Blocsk		Fish Cakes	Export
Very poor	F				Pate	Co-packer
					Petfood	
					CAP	
					Vac-pack	

OPERATONS

Reception
Primary processing
Secondary processing
Shellfish
Packing
Transport
Disposal of Offal

Storage/Delay
Quality/Check

Ambient, Chill, Frozen
Weigh, Freshness, Temperature

PROCESS

Primary
Gut, head, fin, preskin, fillet, skin, trim.

Secondary
Freeze, saw/cut, coat, glaze, polyphosphate, salt, brine, smoke hot, smoke cold, marinade, can, debone, blocks, fish cakes, pate, pet food, vac-pack, CAP, Darfesh.

Shellfish
Live storage, boil, shuck, peel, pick.

FACILITIES

Hand
Machine (specify)
Conveyors
Working Surfaces

STRUCTURE

Concrete (specify)
Metal "
Paint "
Plastic "
Wood "

CLEANING

Hose down
High pressure
Detergent

Dinsinfect
Scrub
Soak

FEATURES

Floors	Yes/No	
Non-slip	1	7
Well drained	2	8
Coved at edges	3	9
Smooth/impervious	4	10
Open gullies	5	11
Grating on drains	6	12

Walls	Yes/No	
Impervious, no flaking/chipping	1	5
Pipework flush or boxed in	2	6
No shelves or protrusions	3	7
Heaters	4	8

Ceilings	Yes/No	
Smooth impervious ceiling	1	6
Free from obstructions	2	7
Free from glass	3	8
Reinforced/protected lights	4	9
Heaters	5	10

5. HANDLING AND PROCESSING - FACILITIES AND PRACTICES

On several occasions equipment and machinery were seen in factories which were not in use, usually because of a lack of fish either due to price or to seasonal effects on availability or size.

5.1 Reception Facilities

5.1.1. Handling at Reception

None of the primary processors had a designated chill store for keeping fish on reception. Typically boxes of fish were stacked outside the premises to be taken into the factory when required. In many cases this fish was a source of attraction to seagulls, although some factories did cover the top fish with empty boxes to discourage the birds. In a few factories boxes were top-iced if there was to be a delay before processing. Very few primary processors weighed fish at reception. Delays before processing varied between 0 to 5 hours depending on the throughput of the day. Only 1 factory had a mechanical conveyor for fish on reception. This was used seasonally by a factory handling sprats.

5.1.2 Washing and Sorting

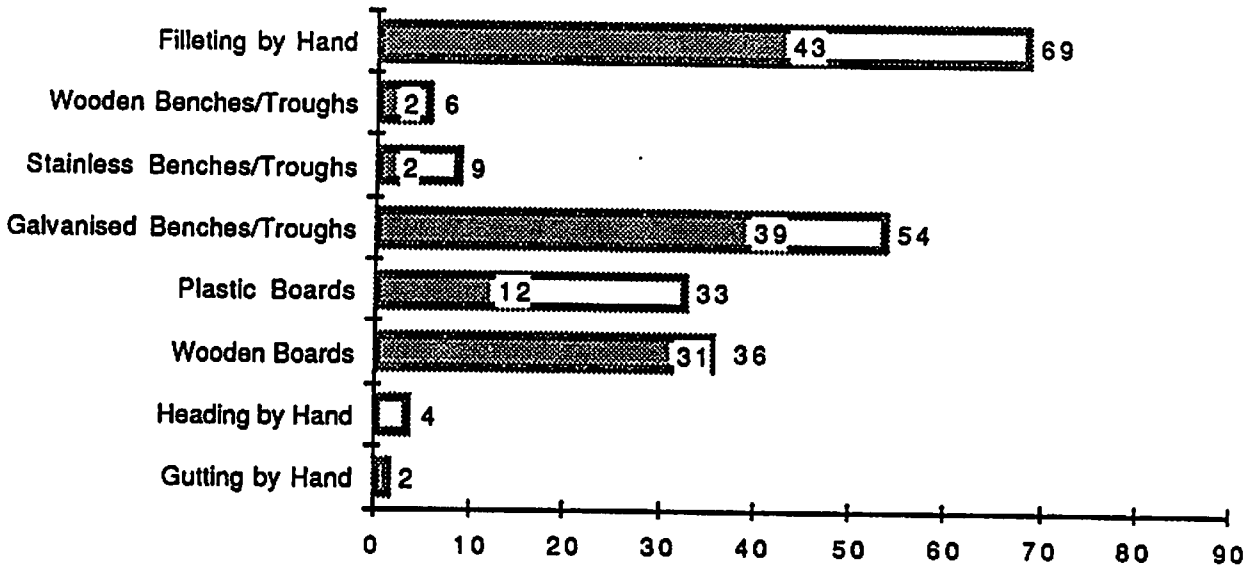
Eleven factories sorted fish by size at reception, of which six were primary processors (Fig. 18). These factories were handling higher value species or large whole fish for export.

Five factories routinely washed their fish on reception using a hosepipe. These factories washed either herring, to remove loose scales, or shellfish to remove mud.

None of factories visited had mechanical washers or sorters.

Figure 19

Hand Processing Facilities



5.2 Processing Facilities

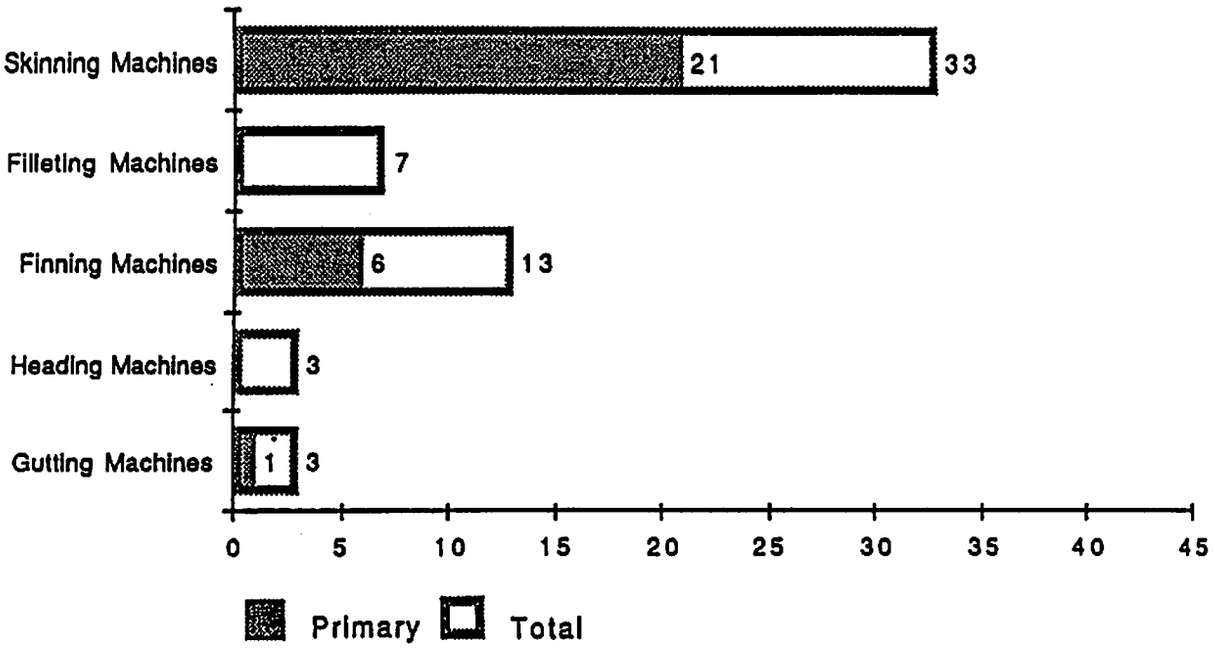
5.2.1 Hand Processing Facilities

The hand processing operations encountered were gutting, heading, filleting, skinning and trimming. Hand processing was typically carried out at a board fitted to a trough. A variety of materials were used for both boards and troughs (Fig. 19). A significant feature is the high proportion of wooden boards seen, and the low proportion of stainless steel troughs used by primary processors.

A prevalent feature in hand processing was the quantity of water used. In approximately half the factories the water was running continuously into a trough containing fish ready to be cut. This undoubtedly raised the temperature of the fish. In other factories whole fish lay in a trough of static water which rapidly became contaminated with slime and blood.

Figure 20

Mechanical Processing Facilities



5.2.2 Mechanical Processing Facilities

The commonest machine was for skinning fillets, usually of haddock or whiting (Fig. 20). The types of machine seen were:

Baader	32%
SKH	28%
Trio	25%
Arenco, Skinflint, Varlet, Teco, Townsend	15%

These machines were used in all sizes of primary processing factories, and in all regions.

None of the primary processors visited had a filleting machine, although 7 machines were seen in other factories. Factories with these machines were all medium to large sized. Several machines were not in use due to lack of suitable sized fish. The machines were all Baader model 184 or 188.

Finning machines were popular in the Grampian region for removing the dorsal fins of haddock and whiting. Again the factories with these machines were medium to large size and some factories had more than one machine. The machines were predominantly supplied by Intel with a few from Victoria Light Engineering.

5.2.3 Sorting

Only 1 primary processor sorted whole fish for size after processing. This factory gutted large whole fish ready for export. In some factories fillets were graded by eye and sorted into boxes after each fish had been cut.

Eight secondary processors had machines for size-grading fillets.

5.2.4 Secondary Processing Facilities

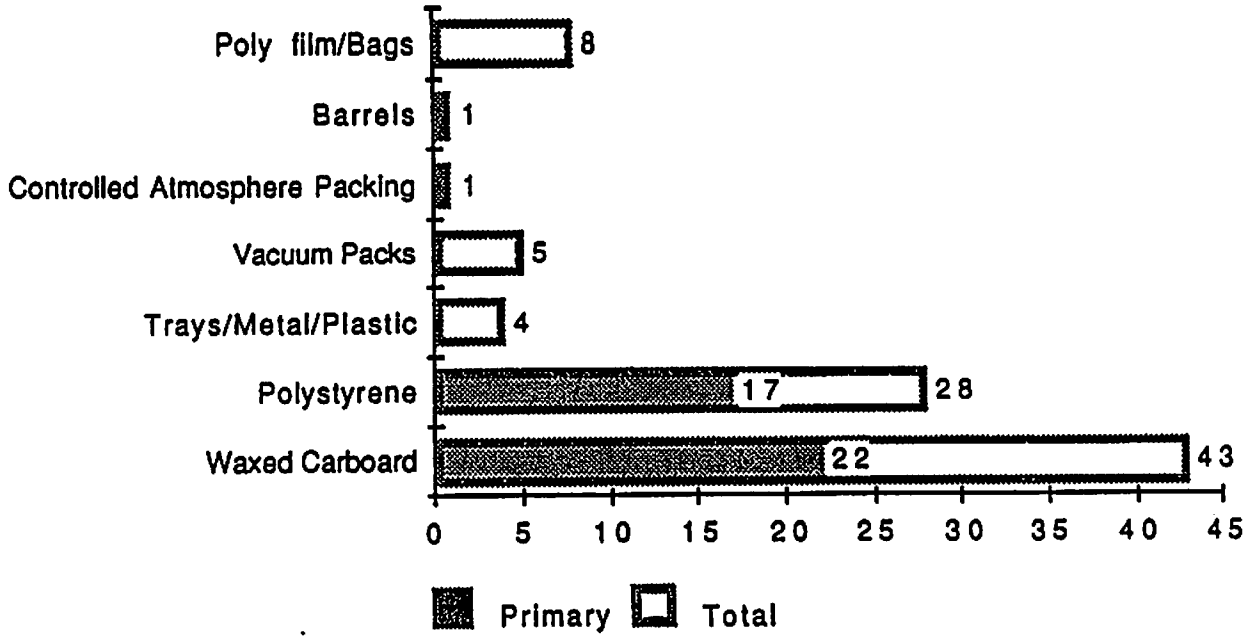
Table 4 summarises the processing equipment observed on the study.

TABLE 4

Equipment	No. of Factories
Coating machine	7
Glazing : by hand in tubs	3
: continuous machine	1
Brining : by hand in tubs	22
: continuous machine	2
Smoking : Torry kilns	15
: Traditional kilns	10
Deboner (Baader 694/5)	3
Vacuum Packing Machine	7
Salmon Slicer	2
Controlled Atmosphere Packaging Machine	1

Figure 21

Packing Material



5.3 Packing and Dispatch

In primary processors it was customary to leave boxes or trays of processed fish in the factory adjacent to the packing and dispatch area. It was very unusual for processed fish to be iced, or to be put in a chill, unless the fish was to be dispatched the following day.

5.3.1 Weighing

All factories weighed-off their fish before dispatch. Most primary processors used mechanical dial-type scales but 5 had electronic balances and 3 were using spring balances. Weighing-off was usually entrusted to a senior member of staff who would also have responsibility for labelling of boxes and ensuring all orders were complete and made up correctly.

5.3.2 Packing

Half of the primary processors were using waxed cardboard boxes (Fig. 21) and 40% were using expanded polystyrene boxes. The 4 primary processors packing into metal or plastic trays were supplying mobile retailers in Fleetwood where this is a common practice. The barrels were used by a processor of sprats in the South West.

Figure 22

Icing Method

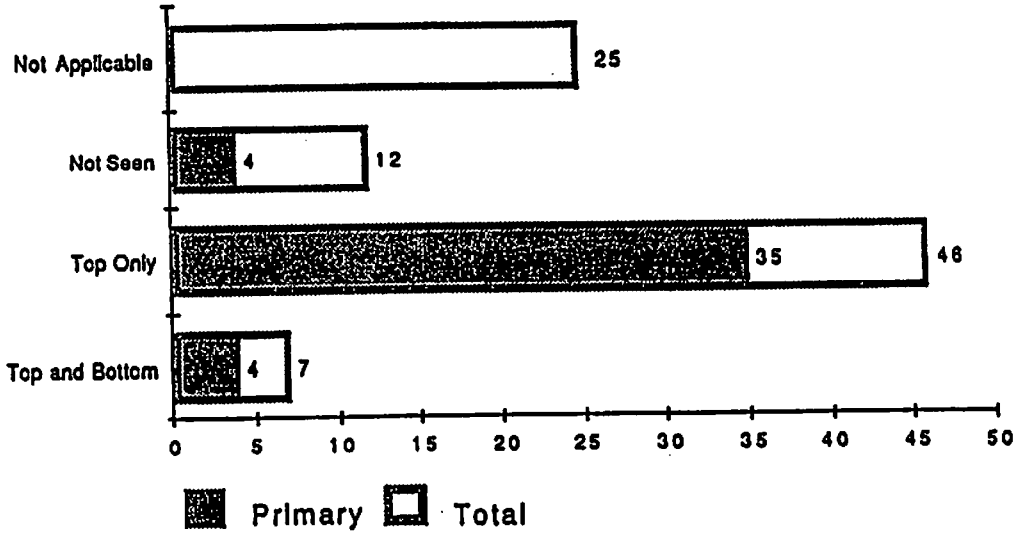
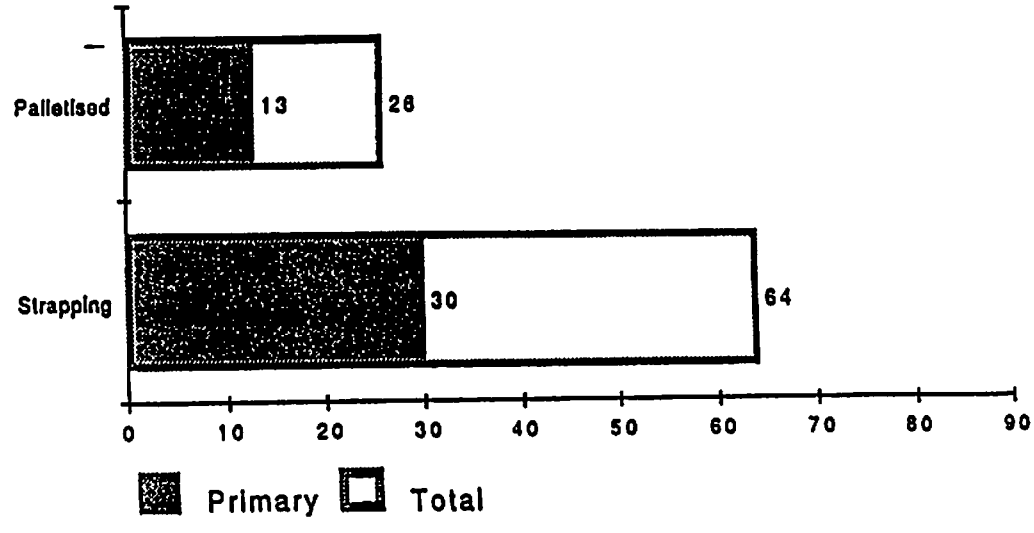


Figure 23

Strapping and Palletising



5.3.3 Icing Practices

The majority of primary processors were top icing their fish (Fig. 22), but 4 were icing the top and bottom of the boxes.

5.3.4 Strapping and Palletising

Two thirds of primary processors were seen to be strapping their boxes and one quarter were seen to be putting boxes on pallets prior to dispatch (Fig. 23). However packing methods did vary with the products being handled at the time. Pallets were usually moved in primary processors with a hand trolley, fork lift trucks were rarely seen inside the factories but were available for loading lorries.

5.3.5 Storage after Packing

In the majority of primary processors boxes of fish were spread out and orders made up in the packing area. This procedure generally resulted in problems of moving made-up orders and of bringing processed fish to the weighing point. It was unusual for boxes to be placed in a chill and typically the boxes remained in the packing area until transport was available. Typical delay times were between 30 mins. to 3 hours.

Figure 24

Storage of Offal - Processing Area

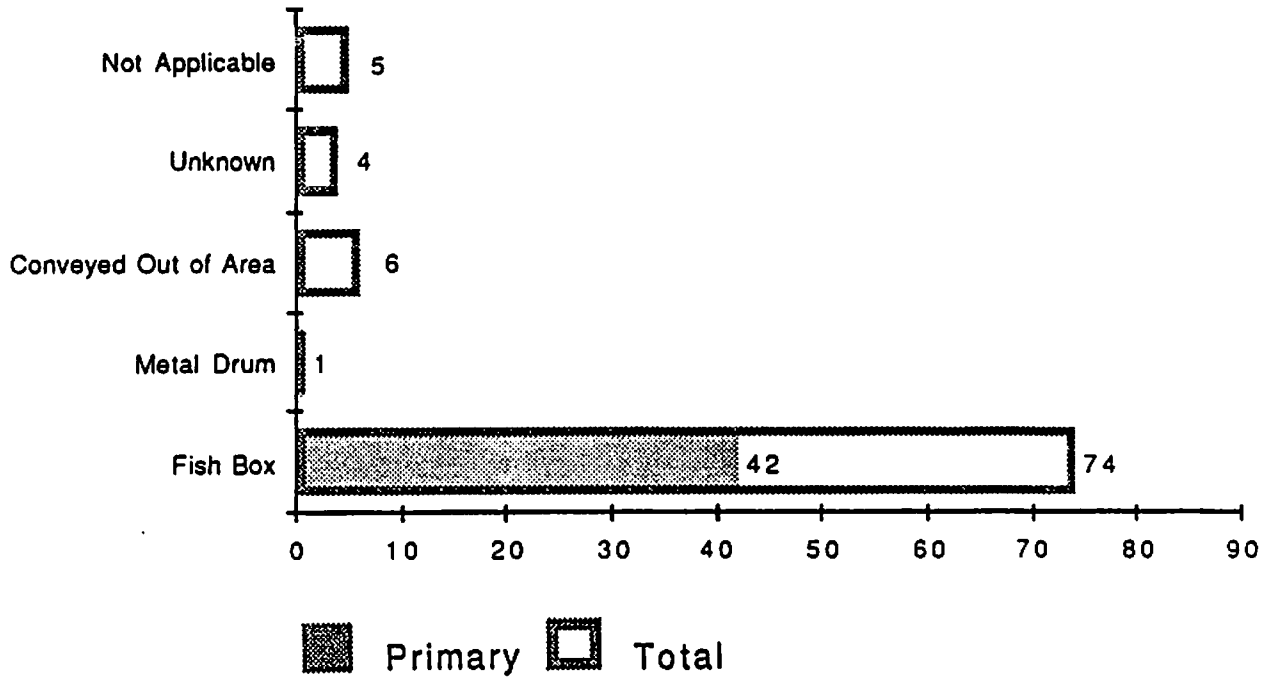
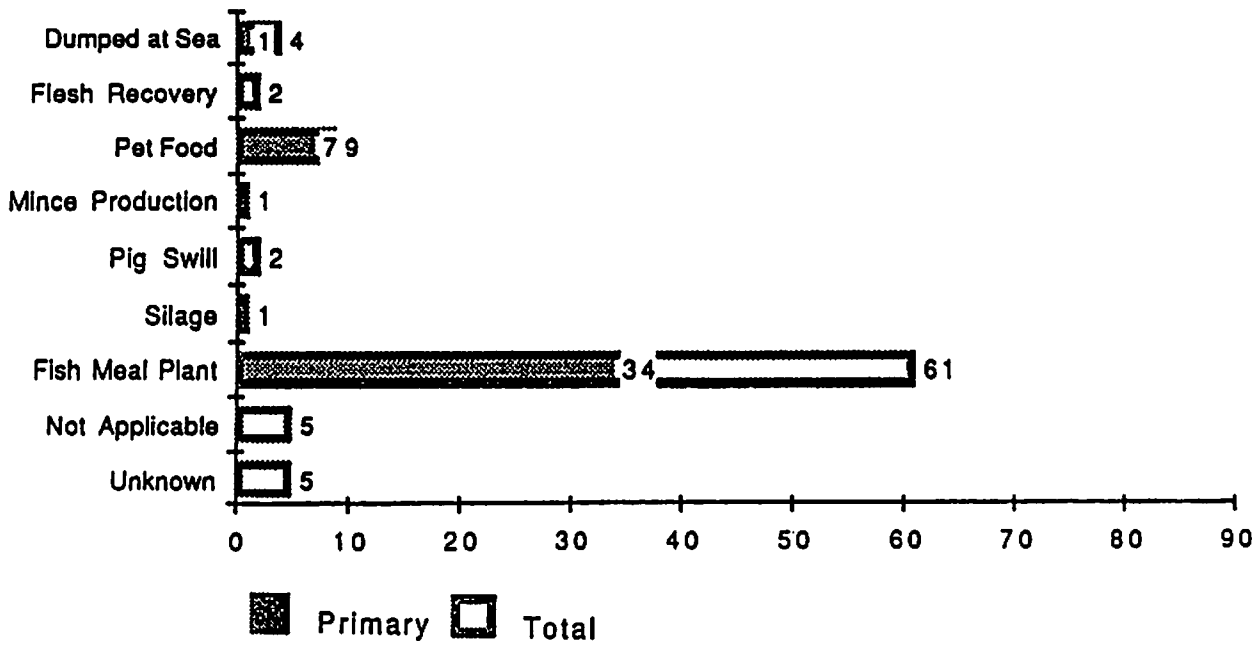


Figure 25

Offal Outlet



5.4 HANDLING OF OFFAL

5.4.1 Storage of Offal

Within the factory the majority of primary processors stored offal temporarily in the market boxes in which the fish were supplied (Fig. 24). Typically these boxes were kept next to the processing troughs and only moved when the area became congested.

Six factories did have mechanical conveyors for removal of offal from the processing area. These were all large factories carrying out primary and secondary operations.

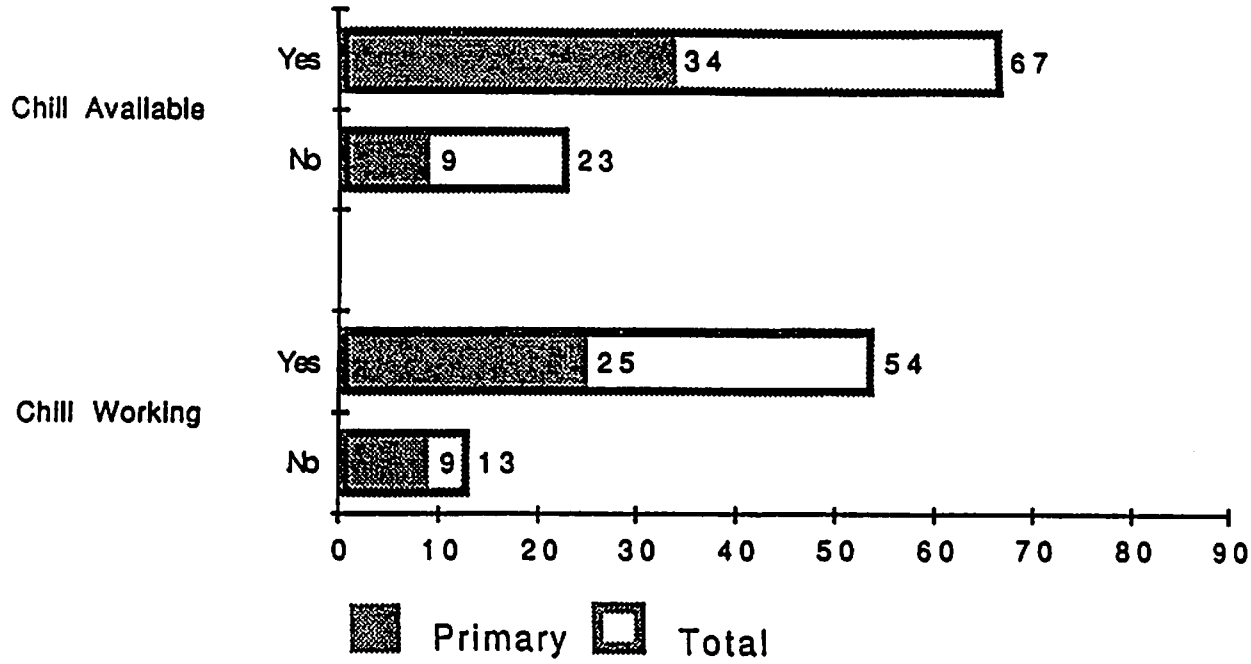
In the Grampian area offal was taken outside the factory for storage in a large plastic skip. This was emptied daily and the contents taken to the fish meal plant. As the skips were not covered they were a source of attraction to seagulls and flies.

5.4.2 Disposal of Offal

In the larger ports disposal of offal was not a problem as there was a local fish-meal plant. However in the smaller ports without such a facility various alternative methods of disposal were used (Fig. 25), including dumping at sea although a few factories could sell their offal for pet food or pig swill.

Figure 26

Use of Chills



5.5 USE OF CHILLS

A total of 67 factories possessed chills (Fig. 26), but of these 13 were either not working or were not switched on. Of the 43 primary processors visited only 34 had a chill and of these 9 were not operating. Despite the fact that a number of chills were not operational they were still used for the storage of fish.

Only the larger factories had designated chill storage facilities for fish on reception, and none of these were primary processors.

The typical use of a chill was when fish, either unprocessed or after packing, was to be delayed for more than a few hours and especially if kept overnight. Very few factories had mechanical handling facilities so boxes of fish had to be manhandled in and out of the chill.

5.5.1 Construction of Chills

The materials used in the construction of chills varied greatly. The best examples seen were custom-built chills of GRP materials or coated metal. Two of the worst examples seen were a painted chipboard box with antiquated refrigeration equipment and an air-lock of a defunct cold store with walls of brick covered in peeling paint and algae.

The floors of most chills in primary processors were of concrete (30 chills) but 4 were of metal treadplate. Most floors were badly drained with pools of water, and slippery.

Walls and ceilings in most chills were of the same material. The most frequent material was sheet metal (23 chills) either galvanized, painted or plastic coated. Other materials were of plastic sheeting, brick or wood.

5.5.2 Chill Design Features

Most of the chills seen in all factories were very basic with limited facilities.

TABLE 5

DESIGN FEATURE OF CHILLS

	All Factories (Total 64 chills)	Primary Processors (Total 32 chills)
Safety alarm	1	1
Safety handle	27	10
Temperature alarm	0	0
Plastic door strip	2	2
Air curtain	1	0
Temperature dial	27	10
Automatic defrost	26	7

Three quarters of the chills did not have a temperature dial and none had a continuous temperature recorder, a temperature alarm or an air curtain.

Very few chills were fitted with automatic defrost systems (or staff did not know) and most chills were defrosted as and when necessary, usually when icing-up was very severe.

5.5.3 Air Temperatures

During the study it was difficult to record valid air temperatures as the chills were either not functioning, or with work in progress the doors were frequently open and shut, or just left open. None of the chills had a recorder to show temperatures outside of work hours. The temperatures in Table 6 give an indication of the spread of temperatures encountered.

TABLE 6

AIR TEMPERATURES OF CHILLS IN PRIMARY PROCESSORS

Temperature Range	Number of Chills
5°C or higher	21*
2 to 4.9°C	1
0 to 1.9°C	10
-0.1 to -1.9°C	1
-1.9 to -4.9°C	1

*includes chill not working, not switched on or with doors open.

5.5.4 Maintenance of Chills

Only 2 of the chills in primary processors were maintained on a regular contract with a refrigeration company. All others in primary processors were maintained when required i.e. when a breakdown occurred and was noticed.

6. QUALITY CONTROL AND FISH QUALITY

Apart from noticeable exceptions in some secondary processors and all of the freshwater processors there was a general lack of formal quality control procedures in terms of specification for fish purchase, control of processing, final inspection of products and cleaning and hygiene. Only those factories supplying multiple retailers operated formal and comprehensive quality control schedules. This is not to say that control of quality did not take place in other factories but rather it was an implicit part of management's responsibility. Consequently it was difficult to define the degree and application of quality control in most factories.

6.1 Quality Control Staff

Only 7 of the 90 factories visited employed designated QC staff. These were all medium or large sized factories and none were primary processors. The greatest QC presence was in processors of freshwater fish.

6.2 Quality Control Standards

Eleven factories claimed to be supplying fish to written and defined standards covering raw material, processing requirements and end-product quality. None of these factories were primary processors. Factories were reluctant to reveal details of written standards as these were confidential between the supplier and his customer, but some were seen. Typically a standard would define requirements for structural details of the factory, cleanliness, and staff hygiene. Requirements for product quality were in terms of minimum freshness levels, usually based on Torry scores and typically score 7, with requirements for minimum weight, ratio of fish to breadcrumb, and freedom from taints etc. In a very few cases routine bacteriological testing was required with sensory testing of the final product.

Figure 27

Factories - Buying Methods

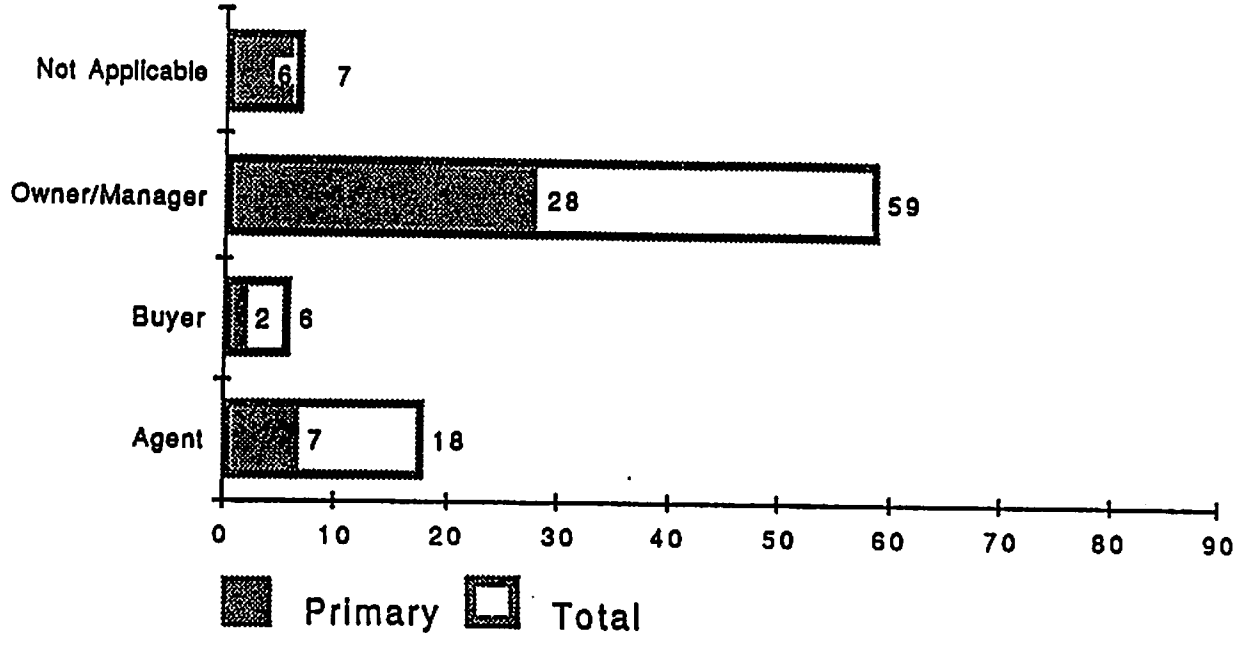
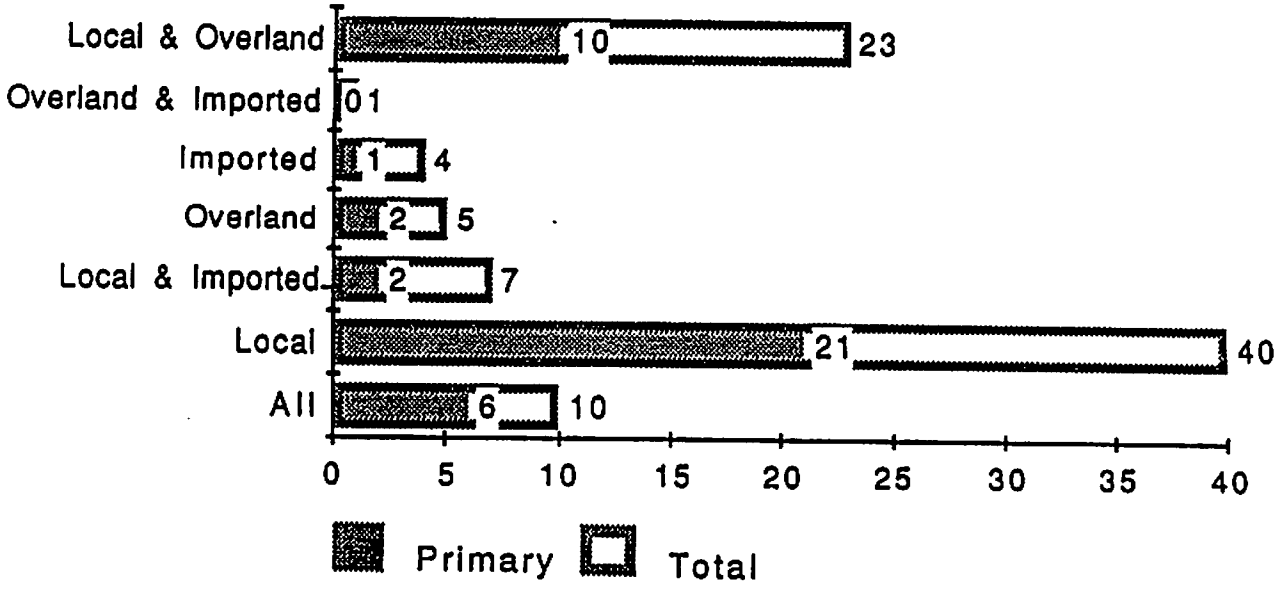


Figure 6

Raw Material Source



6.3 Application of Quality Control

6.3.1 Raw Material

A high degree of control was attempted by all factories over the selection and purchase of raw material. For the majority of primary processors the decision to purchase was taken by the owner/manager (Fig. 27). This control over raw material by primary processors was only possible because of the high proportion of locally caught fish purchased (Fig. 6 repeated opposite).

Figure 28

Size Standards at Time of Buying

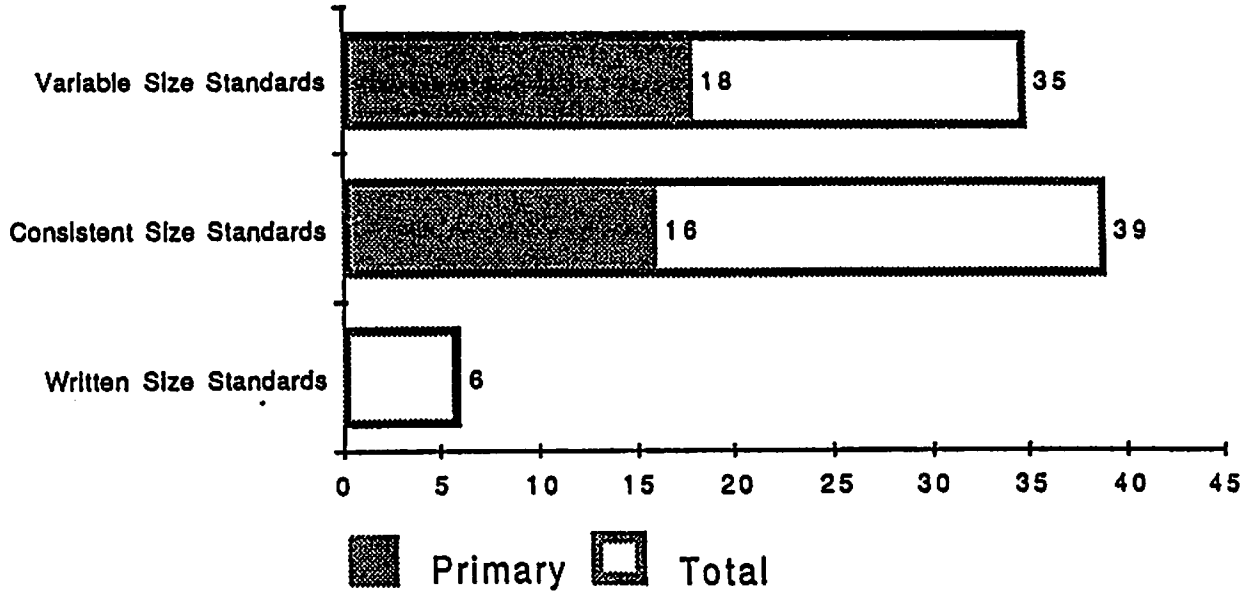
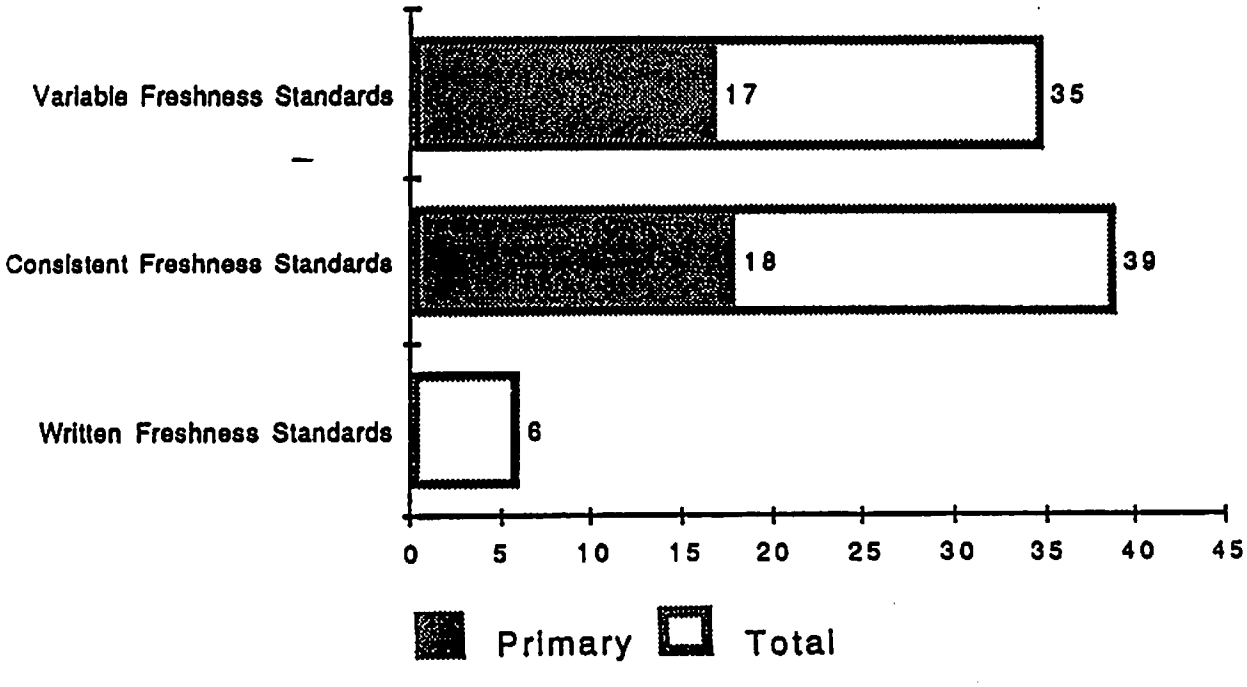


Figure 29

Freshness Standards at Time of Buying



Based on discussions with owner/managers and buyers an attempt was made to classify buying standards of fish for freshness and size depending on whether they were consistent or varied with price and availability. A consistent standard ensured that fish outside a certain size or freshness level would not be purchased. Buyers with variable standards were those who aimed to buy fish of a specified standard but who lowered their standards depending on the price and availability of fish (Figs. 28, 29).

All buyers of chilled fish relied on their own skill and judgement when selecting fish and did not rely upon EEC grade labels. The larger secondary processors buying in blocks of frozen fish would assess a sample before purchase. This typically involved a visual inspection of the block for defects such as freezerburn or discolouration. On defrosting the thaw drip was measured by QC staff and the fish examined for bones by sorting through by hand. A cooked sample was tasted to ensure freedom from undesirable flavours.

6.3.2 Reception

Only the freshwater processors operated a QC system for fish on reception. This included fish temperature, a sensory analysis, plus occasional chemical and bacteriological testing.

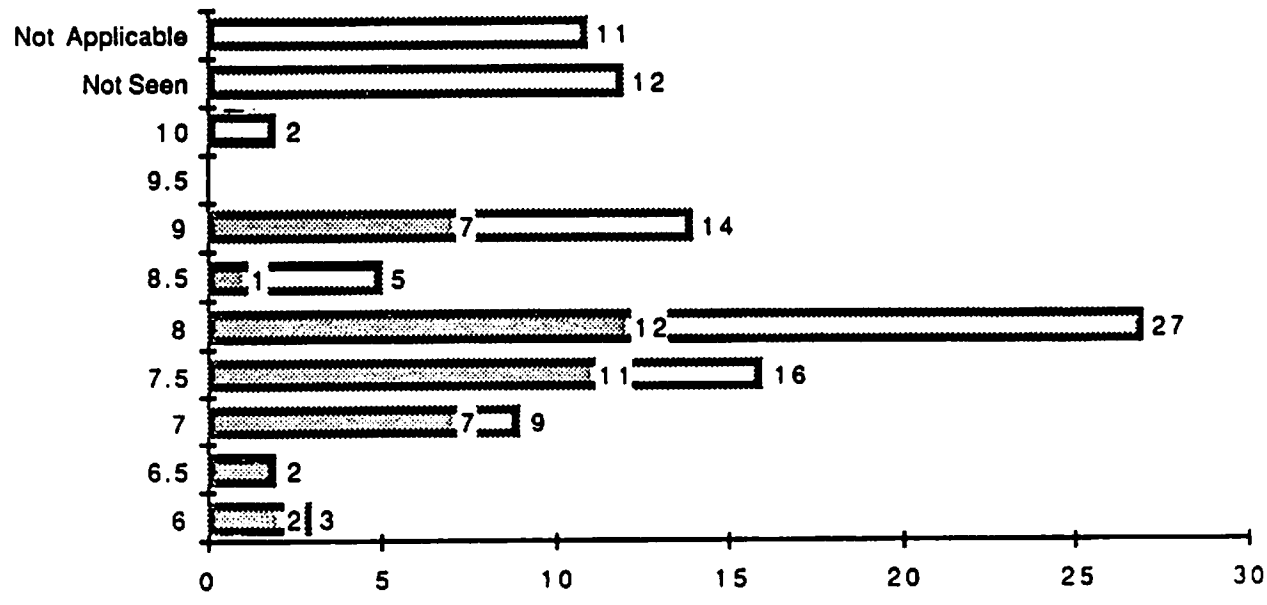
None of the other factories measured fish temperature on reception.

A few factories did weigh-off batches of fish at reception. For white fish factories this was usually as a check on market box weights and for shellfish processors these weights were used as a basis for payment to the fisherman. Only 17 primary processors had weighing facilities for boxes of fish on reception.

Figure 30 illustrates the quality of fish on arrival at the factory as assessed by the study teams.

Figure 30

Assessed Fish Quality (Torry Score) - Reception



6.3.3 Processing

All factories operated implicit standards of quality control during processing and all freshwater and some secondary processors monitored some aspects of quality.

In primary processors both staff and management were operating to standards that were understood but were difficult to describe and define in precise terms. The only specific measurements occasionally carried out by some processors were for fillet yields. However in the factories visited where yields were measured it was customary to take an initial nominal market weight of fish in a box so results would not have been accurate.

The implicit quality standards covered a range of features where it was apparent that the owner/manager or foreman was keeping a surveillance on standards. For major defects such as excessive damage or bruising, or stinkers, the filleter would normally discard the fish. For other criteria such as standards of trimming the owner/manager or foreman would inform processing staff if standards were slipping.

The main function of QC staff in secondary processing was to check weights of products at each stage. A typical procedure was to measure pick-up of batter and breadcrumbs at hourly intervals and determine average weights and variations to keep within a tolerance. Many secondary processors claimed to carry out routine sensory assessment of their products but there was little evidence that this was carried out on a routine basis.

Some smokers did check the strength of brine and weight loss of fish in the kiln but most relied on experience and the "feel" of the product.

In addition to weight control and inspection of processing standards freshwater processor QC staff carried out routine sensory and bacteriological testing of products during processing.

On-line metal detectors were used by the freshwater processors and 2 secondary processors of breaded products, both of which were large processors.

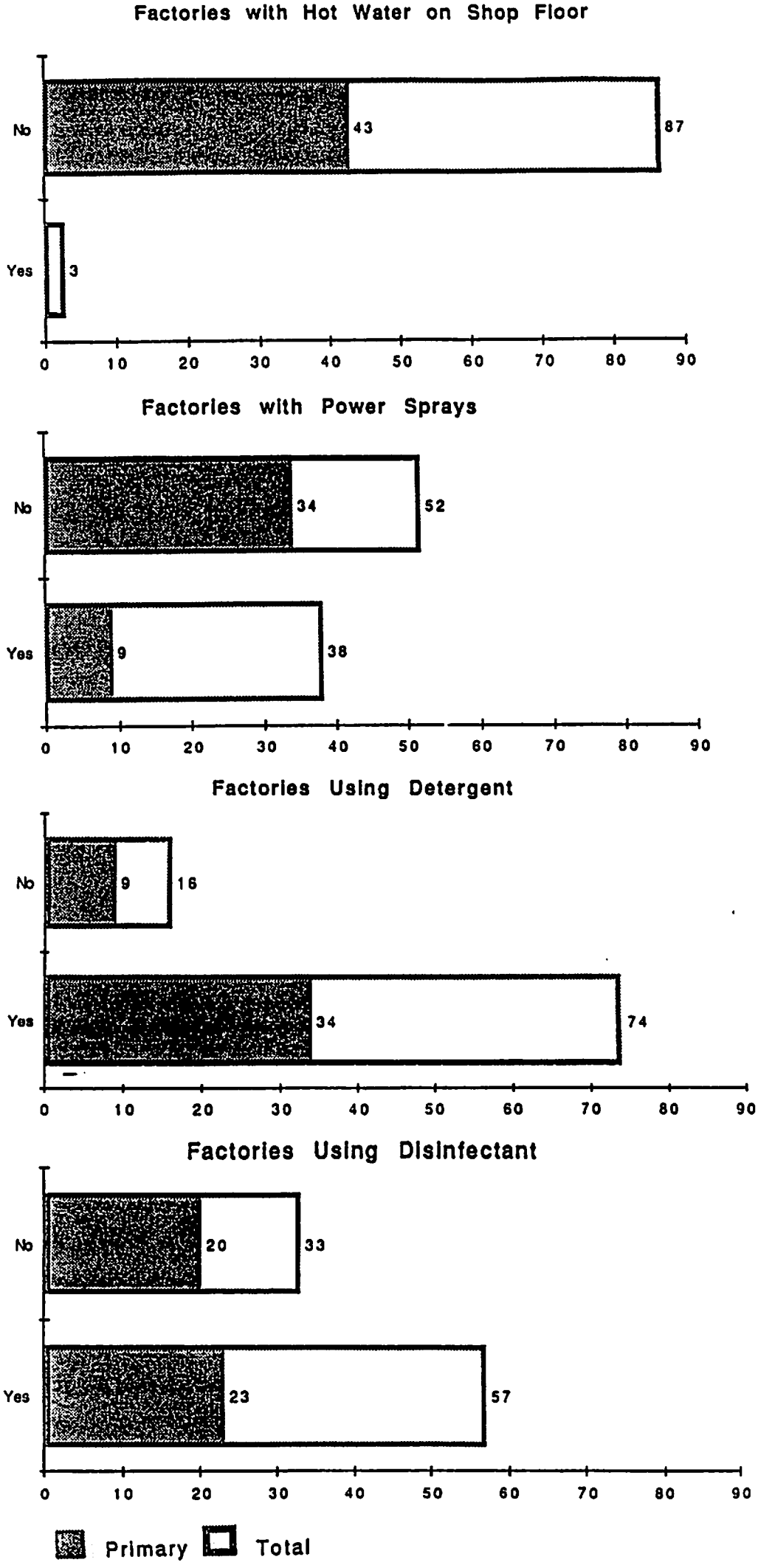
6.3.4 Final Product

In all primary processing factories products were given a superficial inspection at the time of packing. Fillets were checked as they were weighed-off for discolouration, blood-clots and worms but it was unusual for any fillets to be rejected. Whole fish for export were also given a final inspection to ensure they were free from damage and had been cleanly gutted and properly washed.

It was customary for battered and breaded products to be check-weighed at packing and sensory assessments were occasionally carried out.

The freshwater processors carried out a range of tests on the final products including temperature, weight, sensory testing plus routine chemical and bacteriological testing.

Figure 31


Factories with Hot Water on Shop Floor
No
43
87
Yes
3
0 10 20 30 40 50 60 70 80 90
Factories with Power Sprays
No
34
52
Yes
9
38
0 10 20 30 40 50 60 70 80 90
Factories Using Detergent
No
9
16
Yes
34
74
0 10 20 30 40 50 60 70 80 90
Factories Using Disinfectant
No
20
33
Yes
23
57
0 10 20 30 40 50 60 70 80 90
Primary
Total

7. CLEANING AND HYGIENE

7.1 Cleaning Facilities and Equipment

All factories had general cleaning equipment such as hand and yard brushes. For the smaller processors these were usually made of natural bristle set in a wooden handle, but the larger secondary procesors and freshwater processors used synthetic materials with brightly coloured bristles designed to show up in case they contaminated the fish.

All factories had supplies of cold mains water for washing down. Hot water for washing down equipment and working areas was only available in the larger secondary processors and freshwater processors (Fig. 31). Thirty-eight factories used high pressure power sprays for washing down, of which nine were primary processors.

A wide variety of makes of detergent and disinfectant were seen on the survey. These were usually selected on the basis of cost. About one half of the primary processors did not use a disinfectant and one third did not use a detergent but relied on water and a brush.

A frequent comment by the larger companies was that they were singled out by environmental health officers to check that they were maintaining hygiene standards. Although they had no objection to EHO's inspecting their factories they did consider that smaller premises should also be subject to the same standards of inspection as they were of the opinion that smaller premises achieved lower standards of hygiene. The indications of our subjective ratings (see Table 3 repeated overleaf) tend to confirm the relationship between factory size and standards.

TABLE 3

FACTORY RATING AND SIZE

FACTORY SIZE	NUMBER OF FACTORIES IN EACH RATING					
	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Small	3	3	13	23	8	2
Medium	3	4	8	10	7	0
Large	1	5	0	0	0	0

7.2 Cleaning Procedures

Only the larger secondary processors and the freshwater processors employed designated cleaning staff who carried out daily cleaning schedules which included equipment and working areas. In the majority of premises the task of cleaning was an accepted part of the job for factory staff.

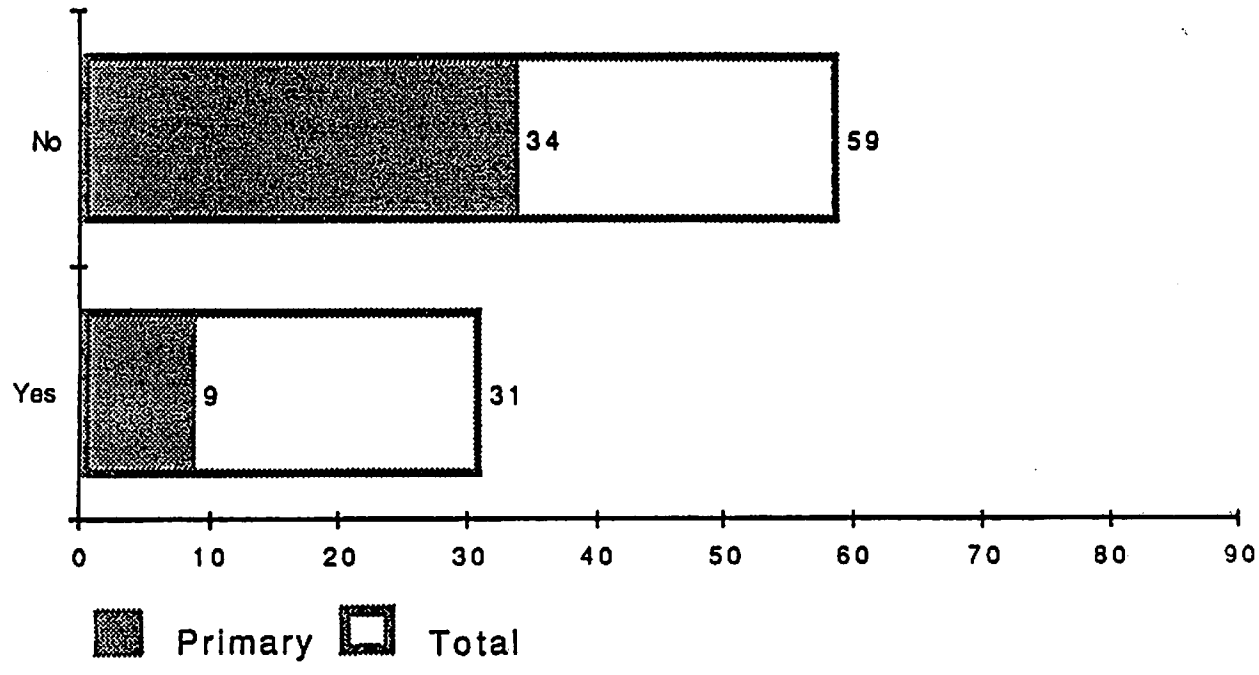
In primary processors the method and frequency of cleaning varied greatly. In the older factories with cracked floors and walls and ceilings of unsuitable materials it was virtually impossible to maintain clean and hygienic conditions that would normally be considered appropriate to a food factory.

Typically the floors of reception, processing and packing areas were swilled down at intervals during the day and given a thorough cleaning at the end of the day. Little attention was given to the cleaning of the upper parts of walls or to ceilings, although one or two factories did have a policy of painting these areas every 6 to 12 months.

(In one factory the wall/ceiling was painted regularly but because of the location of the factory damp penetrated all types of finish resulting in algal growth within a matter of weeks).

Figure 32

Factories with Hand Wash on the Shop Floor



A common practice in primary processors was to give the factory a thorough clean at the end of the week on Friday afternoon or on Saturday. Benches, floors and lower walls were thoroughly scrubbed and gullies and drains were disinfected.

7.3 Control of Pests

Electric fly killers were used by 21 factories, of which 3 were primary processors. This low number is not surprising as electric fly killers are unlikely to be effective in the majority of premises, and especially those in an open situation, for example, dockside.

Control of rats and mice was contracted to an outside agency by 24 factories, of which 6 were primary processors. Vermin control by an outside agency was a stipulation required by some buyers, and not necesarily an indication of infestation. In some factories feral cats were a nuisance.

7.4 Staff Facilities

The larger factories provided a full range of staff facilities including changing rooms with lockers, clean and well-maintained toilets, proper hand washing and drying facilities, a regular supply of clean protective clothing and a canteen or rest room. In the small and medium sized factories many of these facilities were either lacking or of a poor standard. Premises without on-site facilities were usually those on the dockside where staff used a communal toilet block. These were usually badly maintained and in a poor state of repair.

7.4.1 Hand Washing

Sinks for hand washing on the factory floor were provided by 31 factories, of which 9 were primary processors (Fig. 32).

Figure 33

Method of Hand Drying on Shop Floor

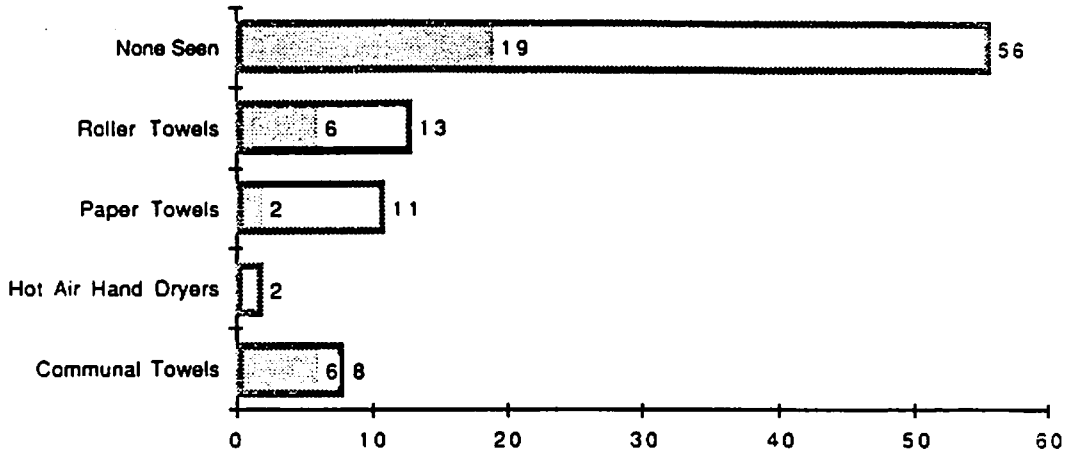


Figure 34

The Provision of Protective Clothing

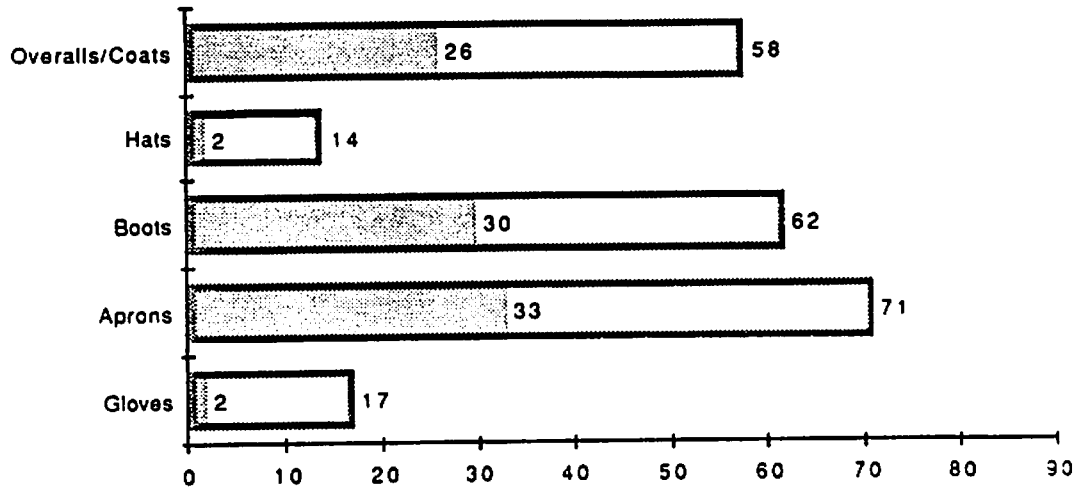
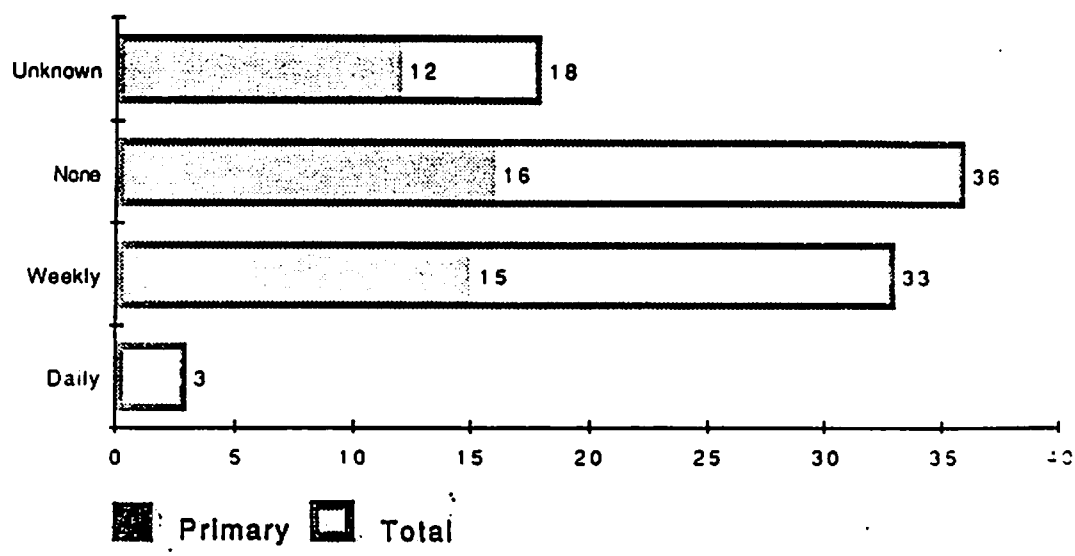


Figure 35

Frequency of Laundry



Hand drying facilities on the factory floor were provided by 34 factories, of which 14 were primary processors (Fig. 33). In the majority of primary processors at the same sink was used for hand washing as was used for washing fish and hands dried on coat tails or other items of clothing.

7.4.2 Laundry

A surprisingly large number of factories did protective clothing, especially in the smaller factc 34). Protective hats and gloves were only rarely su primary processors. Freshly laundered coats were supplied weekly but the freshwater processors provided laundry on a daily basis (Fig. 35).

Figure 36

Factories Allowing Staff to Smoke

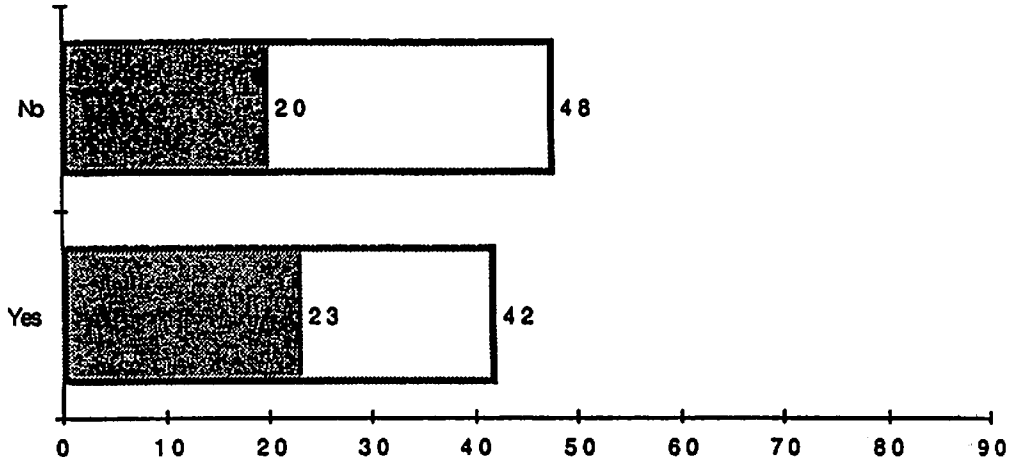
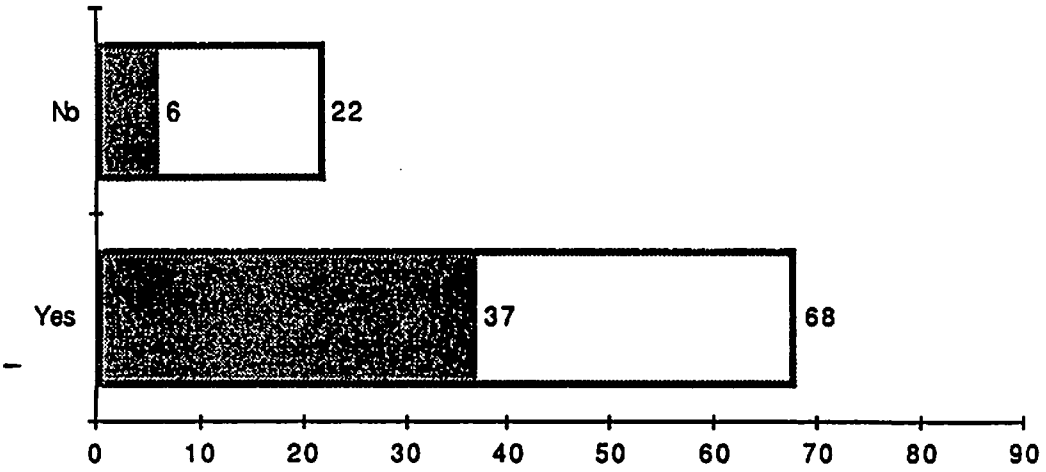


Figure 37

Factories Allowing Staff to Wear Jewellery



7.5 Staff Restrictions

7.5.1 Smoking

Smoking in the factory was positively prohibited in 46 factories, of which 20 were primary processors (Fig. 36). In the remainder smoking was not actively prevented and it was not uncommon to see staff smoking as they were handling fish.

7.5.2 Jewellery

The majority of factories did not impose restrictions on the wearing of jewellery (Fig. 37). Those factories that did, usually the larger secondary processors and the freshwater processors, allowed staff to wear ear sleepers and wedding rings but did not allow watches or any other types of jewellery in the factory.

8. DISCUSSION OF SURVEY FINDINGS

8.1 The Nature of Fish Processing

The study has highlighted the wide range of operations and the diversity of standards within the fish processing industry as a whole. Fish processing can vary from a simple handling and packing operation for whole fish to operations involving cutting, grading and packing using the latest sophisticated machinery. A fish processing business may be owned and run by one man, or the busines may be owned by a multi-national company employing hundreds of staff. All these factors influence the nature of the business and the standards achieved.

The purpose of the study was to examine primary processing in the U.K., however many factories are not restricted to one type of processing. Many primary processors have diversified into other processing methods to add value to the raw material. In addition the throughput of a factory can vary seasonally in quantities and types of fish processed depending on the availability of supplies.

These factors resulted in problems when attempting to classify some of the factories visited but their inclusion has achieved what is thought to be representative coverage and has enabled some comparisons to be made between categories.

In a survey of such a diverse industry, it is difficult to draw hard-and-fast conclusions but the features of major significance resulting from discussion with the processors and observation are summarised below.

8.2 The Importance of Supplies

Primary processors were highly dependent on local supplies of chilled fish. Traditionally processors set up business in the major landing ports but with changing patterns of landing many processors, and especially those on Humberside, have become increasingly dependent on supplies of overlanded and imported fish. Although the quality of this fish is generally superior to that of the traditional distant water

vessels the quantities at some ports are much reduced and many primary processors were operating well below their potential levels of throughput. Defrosted frozen fish was not readily used as an alternative source of supply by primary processors.

Small processors buying on the market claimed to be vulnerable where large processors were buying. Particularly at the major ports it was claimed that one or two companies could sweep the market, leaving insufficient quantities of fish often of inferior quality, for the smaller processors who are dependent on their local supplies.

A number of processors specialised in certain species of fish, or in supplying top quality whole fish for export. These processors had additional problems of obtaining consistent supplies, but claimed that the bonus of higher prices paid by these markets justified the extra efforts involved in obtaining supplies.

Shellfish processors were particularly vulnerable to erratic supplies and there was often a close relationship between processors and the fishermen.

Only the freshwater processors had the benefit of a predictable supply of raw material in terms of quantities and quality. This was a major factor reflected in the long term confidence of this sector of the industry in terms of the highest capital investment. Only this sector could guarantee a supply of a uniform product at a controlled size and quality, as demanded by the multiple retailers.

8.3 Outlets

Because of erratic supplies most primary processors were restricted in the range of potential outlets for their fish. The majority were supplying to inland markets and to fishmongers. This restriction was mainly due to the uncertainty of the quantity and range of species available to processors on the market.

8.4 Premises

The standard of premises used for fish processing varied from a few that were so bad that they would be well below normally acceptable standards for a food business of any type, to excellent custom-built units designed for the hygienic handling of fish. However it must be emphasised that the standards of the premises did not necessarily indicate the quality of the fish handled. Thus although none of the better premises were handling poor fish many of the poorer premises were handling fish of excellent quality.

The majority of premises occupied by primary processors were situated adjacent to the fish docks. Generally the premises were old and badly maintained and because areas adjacent to the docks were derelict there was a problem of keeping the surroundings clean and well maintained. However not all docks were like this and in some ports custom-built units were available, although usually at a higher rental than the older, less hygienic, traditional premises.

Because many of the older premises were not designed for the hygienic handling fish these were usually the ones suffering from badly cracked and poorly drained floors. Walls and ceilings were constructed of unsuitable materials and maintaining a hygienic conditions was all but impossible. Where the premises had been uprated with a smooth well-drained floor and hygienic wall and ceiling cladding the differences were remarkable.

Only the large premises were constructed with adequate space for reception, processing and packing and dispatch areas. In the smaller premises boxes of fish could remain unprotected outside before being processed. Inside the factory raw material, processed fish and offal were piled up and moved when conditions became impossible. As a consequence of lack of space facilities provided for staff to change their clothes, for toilets and for break periods were either non-existent or extremely basic.

8.5 Facilities

The equipment required for primary processing of fish is very basic, but in many factories it was not provided or the standard of this equipment was low and less than that expected in a food factory. For example two thirds of primary processors were using wooden boards for filleting, although there did appear to be an increasing use of plastic boards. None of the larger processors or freshwater processors allowed wood to be used as part of processing equipment.

In primary processors there was little attempt to use machines for handling and processing other than for skinning, finning and strapping of boxes. Even the larger factories who had invested in filleting machines could not keep these fully operational due to irregularity of fish supplies. Great reliance was put on muscle power for moving boxes of fish. As a consequence there was little incentive to move fish until absolutely necessary resulting in fish lying around at ambient temperatures.

The effective use of chills was very limited and surprisingly a quarter of the primary processors did not have a chill. In addition over one quarter of the chills seen on the survey were either not working or were not switched on.

Availability of ice was not a problem and could either be purchased from the major ports or many processors, especially outside these ports, had purchased their own machine.

8.6 Quality Control

Only the larger secondary processors and the freshwater processors employed designated QC staff who carried out routine inspections and checks. This was demanded by the multiple retailers who they were supplying. For the primary processors were no formal quality control procedures but they did operate an implicit control of varying effectiveness. Of greatest importance was the selection and purchase of raw material and it was always the owner/manager of a primary processor who carried out this function. This control of raw

material not only affected the quality of the end-product, but also, in consideration of the prices paid, critically determined the commercial viability of the business.

The effectiveness of the implicit control during processing by primary processors was difficult to determine and depended upon the individuals concerned.

The importance of controlling the weight of fish during packing and of ensuring all orders were made up correctly was reflected in the seniority of the staff member responsible for this work. In addition they were responsible for the icing of fish, which was predominantly top icing only.

The formal QC checks carried out by secondary processors and freshwater processors covered inspection of the raw material, processing standards and end-product standards. In addition to check-weighing, sensory, chemical and bacteriological testing were carried out.

8.7 Cleaning and Hygiene

The standards of hygiene achieved were restricted by the construction and design of the premises and by the facilities available.

Secondary processors and freshwater processors employed cleaning staff but cleaning in primary processors was regarded as part of the job for filleters who cleaned down their immediate work areas at least at the end of the day, and sometimes more frequently.

Usually the premises for primary processors were given a thorough cleaning and disinfection at the end of the week but apart from one or two exceptions ceilings and upper parts of walls were rarely cleaned or maintained. The advantage of hygienic cladding materials was apparent as these were easier to clean and therefore more likely to be kept clean.

Facilities for staff in primary processors were frequently basic or non-existent. Protective clothing was not always provided and under these conditions it was difficult for staff to maintain hygienic standards.

8.8 The Future

A major concern frequently expressed by the processors visited was the availability of fish supplies in the future. All technical considerations, although important, were considered of less relevance than the fundamental requirement for suitable raw material.

Many of the traditional, small primary processors were established when fish was cheap and plentiful, the problem then was selling the product, not trying to find supplies. There was a distinct note of pessimism in many areas with older owners deciding to quit the business.

Some primary processors have diversified into more lucrative markets such as export and selling to multiple retailers. In the case of the latter the standards of hygiene demanded have resulted in major improvements to these premises. However it is usually only the larger companies that can finance such improvements. An interesting development in this area has been that larger processors have laid off their wet fish processing staff and now have their fish cut in smaller premises - operating under less hygienic conditions than those demanded by the multiple retailers.

There was a general awareness in the industry that standards must improve if the fish processing industry is to compete with other food industries. Many primary processors wanted to improve their premises but were reluctant to spend large sums of money in view of the longer term uncertainty of supplies. Some had approached financial institutions for assistance but had been turned down. The obtaining of grants, from whatever source, appeared to be erratic. Local development grants were dependent on area of location and created anomalies, especially in the Grampian area. Obtaining EEC grants appeared to be

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