

CODE OF PRACTICE
ON THE DECLARATION OF FISH CONTENT
IN FISH PRODUCTS

**UK Association of Frozen Food Producers; British Frozen Food Federation;
British Retail Consortium; British Hospitality Association;
Sea Fish industry Authority; LACOTS; Association of Public Analysts**

FOREWORD

By Jeff Rooker, MP
Minister of State, the Ministry of Agriculture, Fisheries, and Food

I am delighted with the initiative of all the participants from industry and enforcement in drawing up this Code of Practice on the Declaration of Fish Content in Fish Products. Meaningful and accurate consumer information is vital to give consumers the necessary help in choosing the foods they buy, and quantitative ingredient declaration (QUID) heralds one of the most significant changes to our labelling rules in this respect. Fish and shellfish products play an important part in the UK diet and, with QUID, consumers will be able to see exactly how much fish they are buying.

This Code should help to resolve the many problems which enforcement and industry have faced in the labelling of fish products and in determining fish content. It is particularly reassuring that there is such widespread support for the Code from manufacturing through to retail and catering, together with trading standards and public analysts. Thus the Code should help all concerned to provide essential consumer information, and also may serve as an example for other products where similar problems need to be addressed.



Jeff Rooker

CODE OF PRACTICE ON THE DECLARATION OF FISH CONTENT IN FISH PRODUCTS

This Code has been drawn up by representatives of the UK Association of Frozen Food Producers, the British Frozen Food Federation, the British Retail Consortium, the British Hospitality Association, the Sea Fish Industry Authority, LACOTS and the Association of Public Analysts.

Manufacturers who elect not to follow some or all of this Code of Practice should be aware that they may have to demonstrate to a court of law that it was not reasonable for them to have taken such precautions, and be able to demonstrate the validity of any action that they have taken.

PART 1 - General

Purpose and Scope

1.1 This Code covers the labelling and declaration of fish content with respect to the requirements of the Food Safety Act 1990, the Food Labelling Regulations 1996, particularly with reference to quantitative ingredient declarations, and the Trade Descriptions Act 1968.

1.2 The Code does not describe in detail Good Manufacturing Practice (GMP) for fish processing nor is it meant to be prescriptive about manufacturing practices and processes. Rather, it describes the extent to which GMP can influence what is regarded as fish as an ingredient in fish products, assist in establishing a due diligence defence, and to define enforcement procedures. The guidance on labelling primarily relates to issues which affect the declaration of fish content.

1.3 The industry is concerned to guard its reputation for providing fish and fish products that are wholesome and deplores attempts to mislead or make false claims about their authenticity.

1.4 Industry and enforcement officers will use this Code of Practice whenever there is a need to consider the correct declaration of fish content in fish products.

Definitions

1.5 For the purposes of this Code of Practice the following definitions apply:

Defect Action Point: A point, step or procedure in a process at which control can be applied and loss of soluble protein compounds reduced, or water uptake limited to the technologically unavoidable minimum (see Appendix 2);
(DAP)

Fillet: means (a) intact, mainly boneless flesh cut from along the line of the backbone of fish, with or without the presence of adhering

	skin; or (b) the operation by which the product in (a) is achieved;
<i>Fish:</i>	means the edible portion of any fish including molluscs and crustacea, and their naturally associated bones or shells, but excludes surimi and similar fish-derived proteins;
<i>Fish content:</i>	means the amount of fish ingredient used in a product;
<i>Fish ingredient:</i>	means fish prepared in accordance with GMP and used in a product;
<i>Fish/fish product:</i>	means any food of which fish is an ingredient other than those listed in Appendix 1;
<i>FPS</i>	means a 'further processing step' in a process over and above that required for the preparation of fish for market;
<i>GMP (Good manufacturing practice):</i>	means conditions and operating practices which do not debase the product unnecessarily in relation to composition, quality, form or texture;
<i>Minced fish:</i>	means comminuted fish tissue;
<i>Nitrogen factor:</i>	means the nitrogen content applied to the fish ingredient and used to calculate the fish content of a product;
<i>Technically unavoidable minimum:</i>	(in relation to added water) means the minimum amount of process water uptake when fish is processed in accordance with GMP and good hygienic practice.

Principles

- 1.6 The following principles have been agreed:
- (i) The substance and structure of fish, in conjunction with the wet nature of its processing, are such that changes can take place from catching to use in fish products which alter its chemical composition.
 - (ii) The handling, storage and processing of all fish, including crustacea and molluscs, are to be conducted in accordance with good hygienic handling of fish and GMP.
 - (iii) Fish treated in accordance with GMP can be regarded as fish when used as an ingredient as defined in the Food Labelling Regulations 1996.
 - (iv) The basis of a fish content declaration is the expression of the percentage of fish in a product calculated from the in-going ingredients during preparation of the food.
 - (v) For enforcement purposes the best available procedure for verification of a final product declaration is the use of chemical analysis, followed by in-factory investigation if there is reasonable doubt that the declaration is correct.

- (vi) For the purposes of determining the fish content of a fish product, the nitrogen factor used shall be indicative of the nitrogen content of that particular fish as an ingredient at the point of incorporation into a recipe, provided the fish has been processed under Good Manufacturing Practice (GMP) and in accordance with the second paragraph of these Principles. The interim nitrogen factors given in Table 3 shall be deemed appropriate for the given fish ingredient. The interim nitrogen factors provided have been derived by reducing the nitrogen factor for fish straight from the sea by an element which accords with the effects of GMP and gives rise to the nitrogen factor commonly found in raw fish purchased by consumers.
- (vii) The chemical analysis of the fish content of a fish product shall be based on the BS 4401 chemical methods¹ as appropriate, followed by the Stubbs and More calculation. However, any other method of determining the fish content, provided it is acceptable to all parties, may be used. For coated fish products it will be necessary to analyse the whole product thus taking into account the possible transfer of soluble nitrogen from the core into the coating.
- (viii) The nitrogen factors in the code will be reviewed periodically and revised in the light of experience, prevailing conditions, emerging technology, improvements in GMP or other factors. Any modification of the nitrogen factors in the code will be subject to the agreement of all parties.
- (ix) The labelling requirements in the code will be reviewed periodically and revised in the light of experience and with the agreement of all parties.

Legislation

1.7 There are statutory compositional requirements on the minimum fish content and a fish content declaration only for spreadable fish products (Meat Products and Spreadable Fish Product Regulations 1984), although these are currently under review. A fish content declaration would only be necessary for a fish product labelled with special emphasis under the Food Labelling Regulations 1996. However, QUID rules, when implemented, will require a percentage fish content declaration on most fish products, based on the amount used in the preparation of the product.

Added Water:

1.8 The Food Labelling Regulations 1996 require that when water has been added to a food and is present in amounts greater than 5% in the finished product, then it must be declared in the ingredients list. QUID rules will not require the declaration of added water content.

¹ British Standards Institution, BS4401: Analytical methods for meat and meat products. Determination of ash: Part 1, 1980. Determination of nitrogen: Part 2, 1980. Determination of moisture: Part 3, 1970. Determination of total fat: Part 4, 1970.

Drained Weights and Weight Net of Glaze:

1.9 Under the Food Labelling Directive 79/112/EEC, products with a covering medium of water, brine or vinegar must declare a drained net weight. These products, and other similar products where a drained weight is declared voluntarily will be exempt from QUID provisions. The DTI are in the process of implementing this provision under Weights and Measures Regulations.

1.10 This requirement also applies to frozen foods protected by an external layer of ice glaze, where the product weight net of glaze should be declared. Any water that is incorporated into a product beneath its protective ice glaze will invoke a fish content declaration whenever the water exceeds the technically unavoidable minimum in accordance with GMP. The declaration should be based on the fish content of the frozen core without the ice glaze.

Enforcement

1.11 Originating Authorities, and Port Health Authorities in the case of imported products, have prime responsibility under LACOTS' Home Authority Principle for ensuring that food produced or imported in their area complies with legal requirements. These authorities will carry out regular planned inspections (according to the requirements of Food Safety Act 1990 Code of Practice No. 8, revised July 1996) of fish product manufacturers, packers and importers and, in the course of those inspections, will take samples and examine records to ensure compliance with this code. Manufacturers will provide every assistance to officers engaged on routine inspections and make available all relevant documentation, etc.

1.12 Enforcement officers in other authorities may also sample fish and fish products being offered for sale. Where the results of chemical analysis and calculation raise doubts on the veracity of the fish content declaration in-factory inspection should follow (see Part 2 - Good Manufacturing Practice). Enforcement officers should refer to the Home Authority in the first instance to obtain any relevant information particularly with respect to GMP inspections. They should then consider whether it is necessary to investigate the matter further, keeping in mind the agreements and requirements contained within this Code of Practice.

1.13 Enforcement officers should ascertain whether there are any mitigating circumstances as to why the applied nitrogen factor used in calculating the fish content may not be appropriate and undertake suitable investigation. Since the natural nitrogen content of fish can vary, elements such as the species of fish, feeding ground, season and processing conditions should be considered in such a judgement. If a manufacturer wishes to rely on a non-standard nitrogen factor its appropriateness would have to be demonstrated.

PART 2 - Good Manufacturing Practice

General

2.1 Fish processing comprises a whole range of operations, each dependent on the type of fish and the nature of the intended finished product. Thus it is not possible

within the limits of this Code of Practice to outline in detail all the potential steps that could contribute to compositional changes for all types of product, especially since many processing steps are particular to an individual factory or processing line. Thus this Code is restricted to describing acceptable water usage to ensure that its uptake does not exceed the technically unavoidable minimum in relation to GMP.

2.2 Part 2 of the Code, therefore, attempts to highlight some of the principal stages in fish processing operations where it is regarded that the greatest losses of nitrogen or ingress of water can or are likely to occur. This is summarised in Appendix 2. The generic flowcharts within Appendix 2 should be regarded only as a guide to a particular operation and, in cases of disputed fish content or application of most appropriate nitrogen factor, the actual full processing operation should be examined and assessed in the light of GMP. However, it should be noted that if a processor wishes to demonstrate GMP then the principles within the various flowcharts, as appropriate, should be followed, paying particular attention to the noted Defect Action Points (DAPs).

2.3 The DAPs are regarded as the key points in a process where the control of water ingress or nitrogen loss are most critical. It is vital in order to demonstrate GMP that a processor is able to show adequate control of the process at these points.

2.4 During the preparation of the raw materials used in fish products (i.e. fillets, fish blocks and shellfish) the principal processing variables which have an effect on the nitrogen or water contents are:

- icing,
- washing, and
- freezing.

2.5 In general, the further along the processing chain, as the fish is subjected to more and more washings and has had skin and bones removed, the more vulnerable it is to changes in soluble nitrogen and water contents.

Icing

2.6 Fish and shellfish deteriorate irreversibly in their eating qualities as time passes after their capture and death and thus temperature control is paramount in minimising the rate of that deterioration. Hygiene legislation requires chilling as soon as possible to a temperature approaching that of melting ice or freezing to -18°C or lower. Temperature control must be maintained during landing, transport and storage ashore, with re-icing carried out as necessary. Ice and water used must be suitably clean and can be made from fresh or salt water.

2.7 Chilling of most fish and shellfish is best achieved by the direct application of ice, which results in rapid cooling to the desired temperature. The flow of ice melt water around the fish speeds cooling whilst helping cleanse the fish and preventing it from drying out. In conventional iced storage, the contaminated ice melt water should drain freely from the fish. Refrigeration is best used in support of ice to reduce the rate

of loss of ice. Cooling is even more rapid if the fish is immersed in a mixture of ice and water.

2.8 For fresh products, icing (supported by refrigeration) remains the best means of chilling in most situations of storage, distribution and retail display. However, for prepared products with large areas of cut surface, it is recommended that impervious sheets are placed in storage and distribution containers above and below the products to minimise direct contact with the ice. For retail display it is recommended that these products are laid on a bed of ice with a sprinkling of ice above to chill the upper surface and prevent it from drying out. In all these situations, there must be free drainage of melt water from the products.

2.9 Immersed storage in tanks of iced or refrigerated water is recommended for many species and particularly for the small fatty fish which, for practical reasons, are stored whole without gutting. For some other species that are more susceptible to being 'washed out' or to salt uptake, and for fish and shellfish subjected to gutting or other such operations exposing small areas of cut surface, immersed storage is best limited to a few days. Immersed storage is not recommended for fish and shellfish with large areas of cut surface or for scallops which are particularly susceptible to water uptake.

2.10 Some further processed products, such as smoked or cooked products, are not suitable for icing as contact with water causes loss of their desirable properties. For those products there is usually reliance only on refrigeration for temperature control.

Washing

2.11 Fish and shellfish should be washed, as necessary, after capture to remove weed, mud and other unwanted materials harvested with them. Washing of the catch and immersed storage are usually in water taken from the harvesting area.

2.12 Operations such as gutting, bleeding, heading and tailing should be followed by thorough washing of the fish and shellfish to remove gut contents, blood and other contaminants and to cleanse the cut surfaces. Immersion for a period of time in chilled water facilitates bleeding whilst the fish are still fresh from the sea.

2.13 During processing operations, processing areas and equipment should be kept clean by rinsing with cold water. Water sprays are required in many processing machines to lubricate cutting knives and to continuously cool and cleanse those machines. However, the water jets generally should not be pointed at the fish, although in gutting operations this may be advantageous. Bone separator machines are best run only moist as excess water passes readily into the comminuted product.

2.14 After preparation, products such as fillets with large exposed cut surfaces should be only briefly washed. They should not be immersed and left to soak in water unless this is an essential part of the process (e.g. soaking fillets in brine prior to smoking).

Freezing

2.15 Freezing, rather than chilling of the raw material may be by a variety of means and, if not enrobed or closely wrapped, products are commonly glazed to provide protection during storage. Small fatty fish, that are prone to the development of oxidative rancidity, are best frozen in plastic bags topped up with water to provide further protection.

2.16 Frozen raw material may be thawed by a variety of means. Material such as whole or gutted fish, suitable for immersed storage, may be thawed by immersion in or spraying with water.

PART 3 - Due Diligence

3.1 This part of the Code sets out some general guidance for an operator who wishes to establish a due diligence defence. However, it is important to note that compliance with this Code will not, in itself, be sufficient for a due diligence defence and it must be recognised that each case may be different and the outcome may depend on the particular facts. Care should therefore be taken in using these guidelines and any person seeking to make use of the defence should take independent advice.

3.2 Operators are permitted to provide a 'due diligence' defence under Section 21 of the Food Safety Act 1990. An explanation of this defence and guidance on what a court is likely to require of a defendant seeking to use it at proceedings is provided within - Food Safety Act 1990 - Guidelines on the Statutory Defence of Due Diligence - February 1991. This document was prepared following discussions between the Institution of Environmental Health Officers, the Food and Drink Federation, the Local Authorities Co-ordinating body on Food and Trading Standards (LACOTS), the National Consumer Council, the National Farmers Union and the Retail Consortium.

3.3 The following points, however, need to be borne in mind when establishing a due diligence defence:

- failure to take any precaution which could reasonably have been taken could invalidate the defence;
- if a company knows or suspects that a product may not be correctly labelled it cannot rely on the defence;
- a system to ensure that all reasonable precautions have been taken need not be based on the best available equipment. However, if equipment and procedures are not designed and operated wherever possible to minimise the water uptake, the company may have to take greater precautions (perhaps *inter alia* by declaring a lower fish content) than a company whose processes and equipment are more efficient in this respect;
- if a processor elects not to follow some or all of this Code it may be necessary to demonstrate to a court that it was not reasonable for them to do so.

3.4 Primarily, industry monitors and maintains the quality standards of fish products using physical means (production records). This is likely to continue even after the introduction of fish content labelling following the implementation of Quantitative

Ingredient Declarations (QUID). Operators should consider using chemical analysis to monitor the apparent fish content of material periodically in order to further support the physical checks in place. Where particular sources or materials are thought to provide lower nitrogen factors or apparent fish contents than identified in Table 3, or the source of material is not traceable, then operators should use chemical analysis to determine the nitrogen content and apparent fish content. Failure to do so may be detrimental to a due diligence defence.

3.5 Enforcement officers are likely to use, in the first instance, chemical analysis as the basis on which to check the validity of fish content declarations.

3.6 The standardisation of products with a higher nitrogen content than that shown in Table 3, with the addition of undeclared water is not permitted. Given the natural variation in nitrogen content of fish, consistently low nitrogen contents found on chemical analyses over a prolonged period of production could themselves trigger further investigation.

3.7 The level of technically unavoidable water uptake and soluble nitrogen compound losses should be minimised during the primary processes utilised to provide the fish ingredient used in any recipe formulations.

3.8 GMP must be in place, although these may vary significantly from plant to plant and country to country. For instance, some filleting lines may have dry conveying and washing of fillets, whilst others may use flume conveying which would include increased exposure to water.

3.9 The processor needs to demonstrate that GMP is in place by addressing issues such as volume, direction of water sprays and drainage operations. The flow diagrams in Appendix 2 identify further examples of key control points (DAPs) relating to the control of uptake of unavoidable water. Physical checks should be carried out where appropriate, which should include records of specific additions beyond GMP, such as water binding agents.

3.10 Manufacturers should recognise that if they are unable to demonstrate sufficient control and exercise GMP, or do not undertake sufficient internal or external checks on the authenticity of a product, that degree of uncertainty should be reflected in the fish content declaration in the knowledge that the declaration must be correct. Poor process controls will quite rightly result in the downgrading or rejection of product in respect to the labelling that is appropriate.

3.11 The labelling categories in Part 4 of this Code are based on recipe formulations and will relate to typical values. Tolerances for processing should be considered when selecting the category appropriate with regard to product labelling, e.g. if coating give-away is constantly run on the high side then the recipe formulation should be amended to reflect the machine capability.

3.12 Individual sample analysis may be used to monitor compliance with these guidelines. Where chemical analysis is utilised it is recommended that the Stubbs and More method be used for the analysis and that the product is analysed as a whole, although Stubbs and More could be applied to each component part and the results summed. Care should be taken to account for any nitrogen that is present in the product as a result of the presence of ingredients other than fish.

3.13 A fish processor may purchase fish raw materials on the world commodity market or from fish auctions and may well have to assume that they have been handled according to good fishery practice (GFP). There would still, however, be an onus to check authenticity as appropriate that the fish had not been adulterated, e.g. by addition of water, polyphosphates, mince, binders etc., not within the agreed standard of purchase specification.

PART 4 - Labelling

4.1 It is particularly important that consumers are not deceived or misinformed by the information given on a product label, but that the true nature and content of any food are accurately described. There are many common terms and descriptors used by the fish products industry, and this part of the Code lays down guidelines for the usage of such terms with respect to the name of the fish product, and the name used to describe the fish ingredient in products where the fish portion has the appearance of a cut of fish. It is important to recognise that Part 4 does not deal with all labelling issues and is without prejudice to non-fish products.

Raw Materials

Fish blocks

4.2 The core of many fish products is derived from frozen fish blocks. These blocks are made in a plate freezer by layering or randomly packing fillets into a plastic sheet lined mould. Pressure is applied by the shelves of the plate freezer on the container. This has the advantage of removing air pockets, which could lead to an increased rate of deterioration in the product, difficulties in cutting and weight variability, and also improves the heat transfer. If excessive pressure is applied the fillets may lose water and fish proteins, and its structure may be damaged. In order to provide a more consistent product, fish mince and/or a polyphosphate solution may be added to the fillets and the material blended prior to forming the block. Particular care must be taken when sampling this material as individual samples are unlikely to be representative.

Minced fish

4.3 There are four classifications of minced fish used by the industry: (i) 'V-cut' (or 'J-cut') mince, which is used in fish fillet blocks; (ii) mince from whole fillets, either because the fillets are too small or ragged for other presentations or surplus whole fish such as blue whiting which are too difficult to fillet; (iii) other sources of minced fish, e.g. from trimmings and pieces of fish from portioning operations; and (iv) 100%

skeletal mince, the product obtained by the specific removal of residual fish adhering to the fish skeleton after filleting. Mince from sources (ii) and (iii) are regarded as equivalent for the purposes of labelling. If the principles of GMP are applied then minced fish is considered to be fish in terms of fish content declarations in any product where it is deemed acceptable to use it. Incorporation of this type of fish mince into blocks marketed as 'fillet blocks' is not considered acceptable. The incorporation of skeletal mince into products, other than comminuted fish products i.e. fish burgers and fish cakes, is not current practice. In order to be able to demonstrate GMP the recipe used and addition rates of fish mince should be adequately controlled. The addition of any level of minced fish to primary products such as natural fish fillets, lobster etc. is unacceptable without declaration in the name of the product.

V-cut mince

4.4 'V-cutting' fillets to remove pin bones has been a GMP technique adopted in the UK for over 35 years in recognition of the potential bone problems which may arise in fish fingers, predominantly a child-oriented product. Consumers now expect essentially bone-free products in the UK, although this is not the case in the rest of Europe. It is common practice to remove the whole area of flesh containing the pin bones by making a 'V-cut' (or 'J-cut') at the thick end of the fillet. The fine bones are removed from this cut by manual or, more usually, mechanical means, resulting in small pieces of fish flesh. This is referred to as "V-cut mince or minced fish" although the material has not passed through a traditional mincing process. Where the principles of GMP are applied this material is considered to be fish in terms of fish content declarations.

4.5 Using the raw materials described above, five types of fish blocks are commonly used in making fish products: 100% fish fillets; 90% fish fillets with 10% polyphosphate or salt solution addition; 80% fish fillets with 10% V-cut mince and also 10% polyphosphate or salt solution addition; 100% fish portions (made from fish cuts from fillets after prime cuts are removed); and 100% minced fish.

General Principles In Describing Fish Products And Declaring Fish Content

4.6 Fish content declarations should be based on the amount of fish ingredient added during the preparation of the product, assuming the product has been produced under GMP. The name of the product and the ingredient name of the fish component should accurately reflect the contents of the block (see paras 4.13, - 4.15).

4.7 If the product or the fish core has the appearance of a fillet or piece of fillet and the raw materials used are not in the same form, but have been shaped or formed, then the name of the food should accurately reflect the use of these raw materials, e.g. "fish fillet formed from pieces of fillet".

Addition of fish mince

4.8 Minced 'V-cut' equivalent to a maximum of 10% of the fillet weight, after deboning, can be reintroduced to the fillets for block manufacture in the 80:10:10 fish

block without a specific declaration to that effect in the name of the final product (FAC Report, 1987; LACOTS Opinion, 1996).

4.9 The use of minced fish, other than V-cut (or J-cut) as above, in a product at any level of incorporation should be reflected in the name of the product in addition to the ingredients list.

Addition of polyphosphate or salt solution

4.10 The addition of up to 10% polyphosphate or salt solution to fish within the block requires no declaration in the name of the product, although the presence of polyphosphate and water must be declared in the ingredients list subject to the general provisions of the Food Labelling Regulations 1996. The percentage declaration of fish content of the product should relate only to the fish element and should not include, as fish, in the calculation any polyphosphate solution which may have been used.

4.11 The addition of more than 10% polyphosphate solution to fish within the block requires the name of the product to reflect the presence of this addition. Water and polyphosphate are still to be declared within the ingredients list, in accordance with the Food Labelling Regulations.

Addition of Other Ingredients

4.12 It is accepted that the core of a fish product may normally contain fish, water, polyphosphate and/or salt. Any other ingredient addition to the fish core should be indicated in the name of the food. The presence of batter within the coating of a coated product is not required to be indicated in the name of the product. There should be an indication of the type of coating (where applicable) in the name of the product.

Names of Fish Ingredient in Fish Blocks

4.13 The following Table outlines the name of the fish ingredient which can be applied to the most commonly used fish blocks (other fish block formulations may be used and their labelling should be determined as appropriate within these general guidelines):

Table 1 Ingredient descriptions for products derived from commonly used fish blocks

<i>Type of Block</i>	<i>Name of fish ^a ingredient for the purposes of the ingredients list</i>
<i>i</i> 100% fish fillets	Fish or Fish fillet (x %) ^b
<i>ii</i> 90% fish fillets with 10% polyphosphate and/or salt solution addition	Fish or Fish fillet (x %)
<i>iii</i> ^c 80% fish fillets with 10% V-cut mince and also 10% polyphosphate and/or salt solution addition	Fish or Fish fillet, including up to 10% minced fillet (x %)
<i>iv</i> 100% fish portions (made from fish cuts from fillets after prime cuts are removed)	Fish pieces (x %), pieces of fish (x %)
<i>v</i> 100% minced fish	Minced fish (x %)

^a name of species of fish may be used to replace or qualify the term "fish".

^b x is the fish content declaration when required under 'QUID'.

^c if minced fish is added or added in greater proportion than standard block, the level of minced fish should be quantified.

Names of Fish Products Derived from Fish Blocks

4.14 Table 2 gives descriptions for fish from the most commonly used fish blocks that can be used in the name of the fish product:

Table 2

	<i>Type of Block</i>	<i>Name of fish product</i> ^{a,b}
i	100% fish fillets	N ^c Fillet or Steak -(made with 100% fish fillet)
ii	90% fish fillets with 10% polyphosphate or salt solution addition	N Fillet or Steak
iii	80% fish fillets with 10% V-cut mince and also 10% polyphosphate or salt solution addition	Fish N, or Fish fillet N qualified to indicate the presence of up to 10% minced fillet
iv	100% fish portions (made from fish cuts from fillets after prime cuts are removed)	N - made with pieces of more than one fish or, as appropriate, made with pieces of fish
v	100% minced fish	N - made from minced fish

^a name of species of fish may be used to replace term "fish".

^b any enhancement of these descriptions will have to be justified.

^c N is the product description.

Note other special labelling provisions for blocks are:

i) - If in i, ii or iii above the product shape or appearance implies a natural fillet or steak then name must be suitably qualified to reflect the process and the fact that the product has been made from more than one fish or fillet, e.g. "formed or shaped from i, ii or iii"(see Section 4.7)

ii) - In iii, if N includes the term fillet or steak then the name must indicate "formed from iii".

Breaded Scampi

Raw Materials

4.15 The majority of breaded scampi produced today is of the formed variety using pieces of scampi or small wholetails. Whole tail scampi is also produced using either one or several wholetails. 'Scampi' is manufactured from the crustacean tails of the species *Nephrops norvegicus* and 'Pacific scampi' is produced from the species *Metanephrops adamanicus* or *Metanephrops challengerii*. Where the term 'scampi' is used below it refers also to 'Pacific scampi' as appropriate.

4.16 Scampi fished in the North or Irish sea will normally arrive with the heads removed. Removal of the tailmeat from the shell is facilitated by freezing and thawing. Tailmeat usually is removed by hand using water jets, although equipment is now available to crack open the shell and separate the tails. On inspection of the finished product care must be taken not to cause frayed pieces to become detached by the method of inspection where the material is destined for use in whole tail products labelled as such. It is also important to ensure that the sample size is representative of the batch in question when determining the acceptability of product.

4.17 A deveining process is sometimes applied, and some fraying of the meat may occur. Frayed material, which is still attached, may be included in wholetail finished product. Controls must, however, be in place to ensure that pieces that become detached are not incorporated. The presence of this material is not permitted in wholetail or whole scampi.

4.18 The gut of scampi occasionally bursts during processing and this may result in the scampi meat becoming discoloured. Where such discoloured meat is removed, the resulting scampi piece should only be used for the production of wholetail scampi if there are four or more segments of the scampi meat remaining intact.

4.19 Breaded scampi is customarily produced from a core composed of scampi and a polyphosphate solution in a 90:10 ratio scampi. The level of polyphosphates within the solution may vary and is not always in proportion to the level of water retained. QUID requirements will necessitate that the quantity of scampi used in the preparation of the product is given in the ingredients list as a percentage.

Names used in the description of scampi products

Single wholetail

4.20 Only where one wholetail is used can the product be termed "single wholetail scampi".

Wholetail / whole scampi

4.21 These descriptions may encompass products where a maximum of three wholetails are placed beside or on top of each other before coating. In such circumstances the presence of more than one wholetail within the core must be reflected in the name of the product, e.g. "made from more than one scampi", and the names above must not be used in isolation.

Formed pieces of Scampi

4.22 Equipment is currently not available to maintain the integrity of wholetail meat through a shaping process. Where a product is produced from whole scampi and pieces of scampi or from pieces of whole scampi coated together this has to be reflected in the name of the product, e.g. *Formed pieces of scampi*. The name of the scampi ingredient in the ingredients list should be "scampi pieces" or "whole(tail) scampi including scampi pieces".

Minced Scampi

4.23 Minced scampi must not be incorporated at any level in *Single Wholetail*, *Wholetail Scampi*, or *Whole Scampi* or in *Shaped* or *Formed (pieces of) Scampi*. Minced scampi may be used in reformed scampi provided this is indicated in the name of the product: '*Reformed Minced Scampi....*'. The name of the scampi ingredient in the ingredients list should be "minced scampi".

Use of polyphosphate solution

4.24 Where there is less than 10% w/w addition of polyphosphate solution to scampi meat within the core, no indication of this is needed in the name of the product. However the presence of added water and polyphosphates must be identified in the ingredients list as and when required by the Food Labelling Regulations. Where there is more than 10% w/w addition of polyphosphate solution to scampi meat within the core, the name of the product has to reflect the addition of water. Where the core contains more water than scampi this needs to be reflected in the name of the product. Subject to paragraph 4.25, where the name of the product uses the name 'scampi' alone, at least 90% of the product core should be scampi.

Extended Scampi

4.25 Where scampi is extended with ingredients other than polyphosphate, salt and/or water, e.g. prawns, whitefish, cereal or textured vegetable proteins, such ingredients must be declared in the name of the product and this name will also carry a sub-designation of the type '*Reformed Minced Scampi and Prawns in a Crispy Crumb*'.

Fish Cakes

4.26 From 1950 until 1996 products were legally allowed to be called "Fish Cakes" if they complied with the minimum compositional requirements of the Fish Cake Order which has now been revoked. Regulation 7 of the Food Labelling Regulations permits a customary name to be used for food if it is customary in the area where the food is sold. It has been customary for a product meeting the minimum compositional standard to be described as a 'fish cake' and the term therefore continues to be acceptable as a customary name for such a product without further qualification or description.

Catering Establishments

4.27 Product supplied to catering establishments must be labelled with names as recommended above. Descriptions provided by caterers on menus, chalkboards, etc., must accurately describe the product and not mislead the consumer. They must comply with the provisions of the Food Safety Act 1990 and the Trades Descriptions Act 1968, and with the limited provisions of the Food Labelling Regulations 1996 that apply to food sold in catering establishments. Where label declarations within the ingredients list have been recommended for pre-packaged goods these declarations would not be required to be made by caterers.

4.28 Catering establishments may serve fish products after re-heating. This process causes some of the water incorporated during the processing stages to be driven off. Labelling of product within catering establishments should reflect the product as sold. This will result in situations where the labelling on products received by the caterer will not necessarily be reflected in menu descriptions. For example, a scampi product which declares the presence of water may not be required to do so depending on the amount of water which is lost during cooking.

4.29 The presence of any extender within the core, e.g. textured vegetable material etc., however, would need to be labelled on the product packaging as received and on the menu for the final customer. The re-heating will not change the presence of this material.

PART 5 - Nitrogen Factors in Fish

Nitrogen content of fish and shellfish

5.1 The nitrogen in fish is distributed between proteins and the other nitrogen-containing molecules, referred to as non-protein nitrogen (NPN). The hundreds of different proteins in muscle are contained within three principal groups:

- (i) sarcoplasmic proteins that are from the fluid within the muscle cells. They are mainly enzymes and are the only water-soluble proteins;
- (ii) myofibrillar proteins are the contractile proteins; and
- (iii) stromal proteins (largely connective tissue) hold the muscle bundles together and to the skeleton, whilst other proteins in this group are associated with cellular membranes.

5.2 NPN compounds originate mostly from the sarcoplasm and include peptides, amino acids, amines, amine oxides, guanidine compounds, quaternary ammonium compounds, purines and urea. Compared with meat from land animals fish muscles exhibit significant differences in the types of protein present and muscle structure. For example, fish generally contains a greater proportion of water-soluble proteins, less connective tissue protein, more myofibrillar protein and more NPN than meat. The importance of habitat conditions is also reflected in findings that the amounts of free amino acids and other NPN compounds differ considerably in cultured and wild fish of the same species.

5.3 Nitrogen levels vary between different species of fish, but most finfish muscle tissue contains about 18-22% protein, with an average of about 18.5% in fish taken from water. In fatty fish, the fat content of muscle may vary considerably at different times of the year, but the total protein content does not generally undergo large changes with fishing season. In other species there is some evidence of a significant seasonal variation in nitrogen. Maturation of the gonads and/or long periods of feed deprivation can result in tissue depletion with marked decreases in the muscle protein. Protein depletion is normally associated with increased water in the muscle.

5.4 After the death of the fish, rigor mortis and autolysis take place, and changes occur both to the protein and non-protein nitrogen. Connective proteins are broken down much more easily in fish than meat muscle. In the NPN component, trimethylamine oxide is converted to the volatile bases, trimethylamine, dimethylamine and ammonia, as well as formation of nucleotide bases from phospho-nucleotides (ATP, ADP and CP).

5.5 The structure of fish muscle is different in that the smaller amount of connective tissue breaks down more quickly leaving the muscle more vulnerable to take up of water and loss of soluble nitrogen, especially in filleted fish. Not only does the nitrogen content of fish vary with the species, season and harvesting ground but compared with other meats the changes that occur after death and during processing often take place at a faster rate. The very nature of the wet processing and in many instances the fact that large areas of flesh are exposed, e.g. during filleting, means that the losses of soluble protein and NPN can be far higher with fish than with other meats. Changes in the nitrogen content of white fish, based on figures for cod, are of the order of 8% less compared with the nitrogen value of the fish 'straight from the sea' and for scampi this loss is about 20-25% (assuming GMP). However, the change in nitrogen content does not correspond directly to an increase in added water since there is also some loss of natural nitrogen during processing. The contribution that either water uptake or loss of natural nitrogen makes to the change in nitrogen is not easily quantified.

5.6 Therefore, the interim nitrogen factors (listed in Table 3) to be applied in the determination of fish content should be indicative of the nitrogen level of the fish ingredient after it has been prepared by GMP and just prior to any further processing. These interim factors will be used pending the results of further work to be undertaken by a Fish Factors Working Group to be established by the signatories to this Code. The nitrogen factor for each fish species arising from this work will be accepted by all parties to the Code as being the factor to be used in the calculation of fish content.

5.7 It is accepted by industry and enforcement authorities that nitrogen factors will be reviewed periodically and revised in the light of experience, prevailing conditions, emerging technology, improvements in GMP or other factors. Either side may request a review at any time but it is accepted by all parties that a review will take place in any event within 12 months of agreement of the code. Any modification of the nitrogen factors in the code will be subject to the agreement of all parties.

Table 3 Interim Nitrogen factors to be used for fish and shellfish ingredient

Species	Nitrogen %	Ref.	Species	Nitrogen %	Ref.
<u>White fish:</u>			<u>Shellfish:</u>		
Cod	2.66	1,2	Crab	2.4	3
Minced Cod	2.61	4	Lobster	2.7	3
Coley/Saithe	2.69	1,2	Prawn	2.62	3
European Hake	2.64	2	Shrimp	2.73	3
Haddock	2.72	2	Scampi: (from sea)	3.05	5
Ling	2.78	2	washed & peeled	2.33	5
Plaice	2.46	2	Scallops	2.64	6
Alaskan Pollack	2.59	4	Queens	2.55	6
Whiting	2.68	2	<u>Oily fish:</u>		
<u>White fish mean</u>	2.65		Anchovy	2.45	3
			Herring	2.99	3
			Mackerel	3.12	3
			Pilchard	2.83	3
			Sardine	3.07	3

References:

1. Holland, B., Brown, J. and Buss, DH. 1993. Fish and Fish Products. Third supplement to the fifth edition of McCance and Widdowson's *The Composition of Foods*. The Royal Society of Chemistry / Ministry of Agriculture, Fisheries and Food.
2. Food Advisory Committee Report on Coated and Ice-glazed Fish Products. 1987. Ministry of Agriculture, Fisheries and Food, Fd AC/REP/3, HMSO.
3. Pearson, D. 1976. *The Chemical Analysis of Foods* (7th Edition). Churchill Livingstone.
4. Ross Youngs Ltd, - unpublished data.
5. Early, JC, Stroud, GD and Smith, GL. 1983. Variations in the composition and yield of *Nephrops norvegicus*. 1. Nitrogen content. Project Report 1809, Torry Research Station, Aberdeen.
6. MAFF, unpublished data.

PART 6 - Fish Content Declaration

This part of the code is to assist manufacturers in the calculation of fish content from recipes of specific products.

Currently when manufacturers calculate fish content in relation to 'special emphasis' account is taken of water lost as part of the fish product preparation process, e.g. part cooking of breaded products, since it is regarded as a volatile ingredient as defined by Articles 6.5(a) and 7.4 of the Food Labelling Directive 79/112/EEC. Therefore the fish content of the product is calculated using the mixing bowl recipe of the product minus the water lost during preparation.

The fish content then becomes:

$$\% \text{ Fish Content} = \frac{\text{Weight of ingoing fish}}{\text{Weight of final product}} \times 100$$

However, these rules will be superseded by QUID, which will apply from 14 February 2000 and state that *"The quantity indicated, expressed as a percentage, shall correspond to the quantity of the ingredient or ingredients at the time of its/their use"*. The quantity of ingredient declared should generally be calculated at the mixing bowl stage. The declaration relates to the ingredient as identified in the ingredients list. Thus the above method of calculation is subject to agreement with MAFF and hence may change.

It is recommended that where cooked or processed fish is used and declared as an ingredient in a product then its quantitative declaration may be supplemented by a "raw equivalent" fish declaration. The figure placed on the label should be a typical quantity reflecting the producers normal manufacturing variations in accordance with good manufacturing practice.

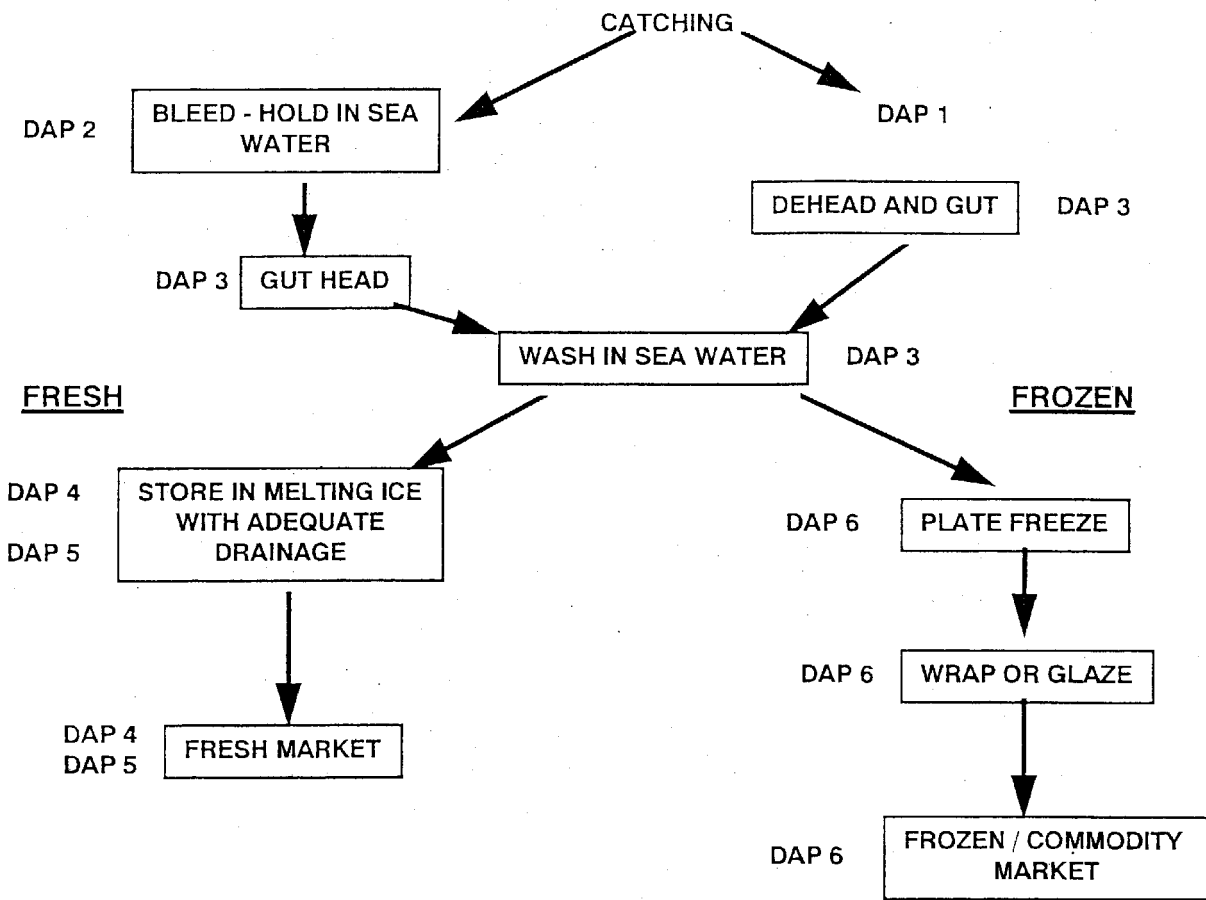
FOODS WHICH ARE NOT FISH PRODUCTS FOR THE PURPOSES OF
THIS CODE OF PRACTICE

1. Pickled or marinated raw fish*.
2. Canned fish in brine or water*.
3. Sandwiches, filled rolls or similar bread products containing fish ready for consumption.
4. Fish soups and broths.
5. Fish stock cubes and similar flavouring agents.
6. Fish oil.

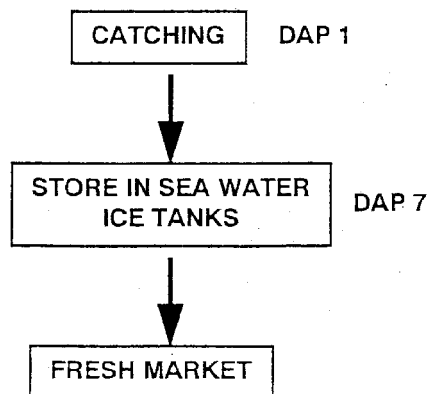
** these products will be covered by provisions regarding drained weight declaration.*

A.
TYPICAL PROCESS FOR FISH CATCHING
AND INITIAL PREPARATION AT SEA
WITH DEFECT ACTION POINTS

A. WHITEFISH



B. SMALL FATTY FISH + SOME WHITEFISH

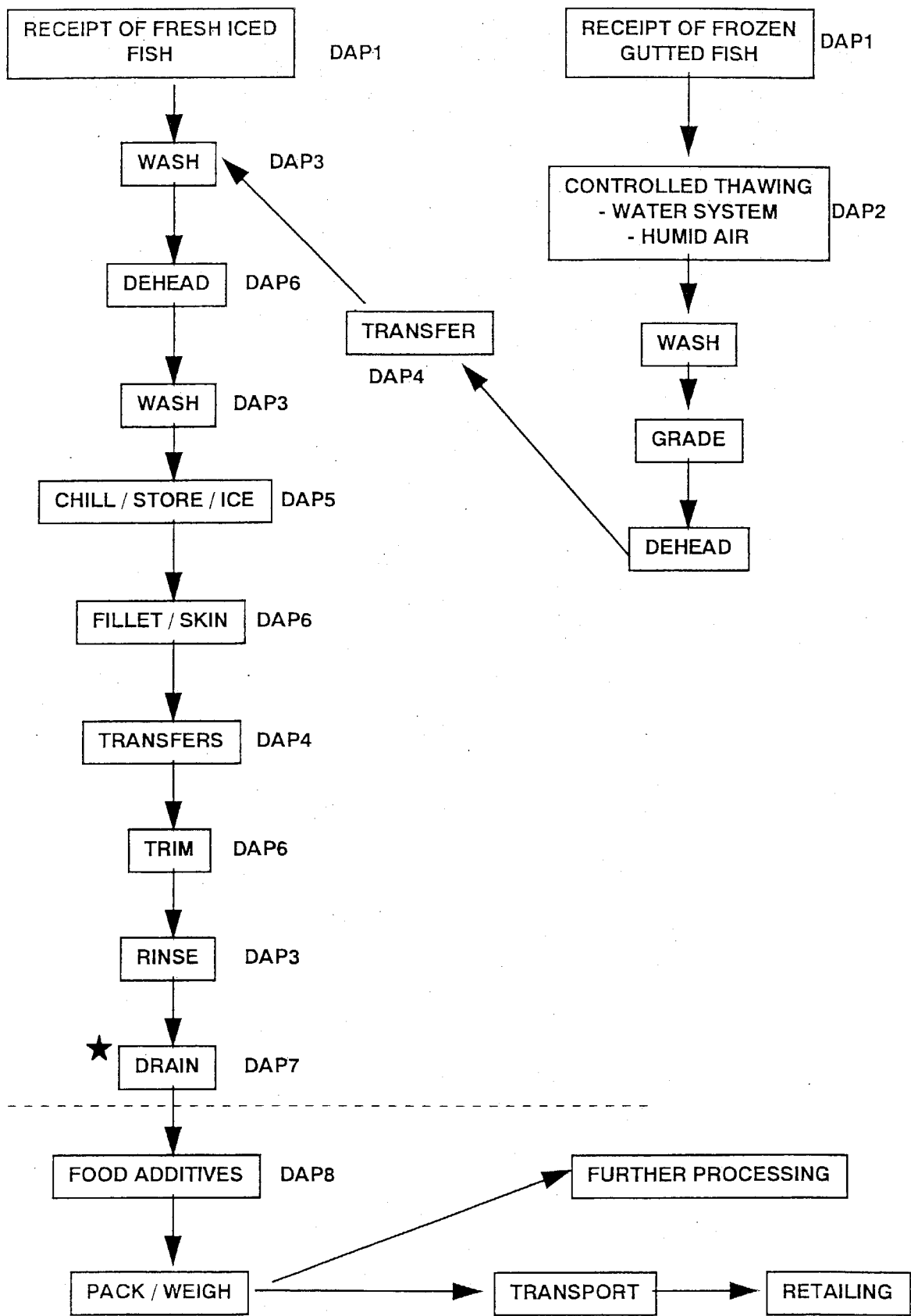


**A. DEFECT ACTION POINTS FOR FISH CATCHING
AND INITIAL PREPARATION AT SEA**

- DAP1 - Time of year, location and condition of fish can affect subsequent water uptake/soluble protein loss and even initial chemical composition of fish species e.g. American Plaice water content varies from 82% in prime condition to 96% after spawning (source Torry).
- DAP2 - Typically 1 - 4 hours in bleed tanks until gutting. Longer would result in leaching (see Section 2.9).
- DAP3 - Washing after deheading and gutting should be adequate to remove blood, guts, slime only.
- DAP4 - Hygienic requirement to store in melting ice, but ensure adequate drainage of melt water.
- DAP5 - Fishing trips can last up to 10 days for fresh fish so that fish can be up to 12 days old by time of transfer to processor. Leaching of soluble proteins can take place throughout this period so that nitrogen content can be anticipated to be less for the first days catch compared to the last days catch in the same fishing grounds.
- DAP6 - Freezing of gutted fish should be as rapid as possible in modern plate freezing systems, followed by storage in stable conditions ideally colder than - 18°C. Poor storage conditions can result in subsequent increased drip or loss of soluble proteins on defrosting.
- DAP7 - Storage of fatty whole fish in refrigerated brine e.g. mackerel, is the preferred system for subsequent processing, but would result in water uptake and protein leaching in cut/gutted fish (see Section 2.9).

The above are subject to good fishery practice and can be little influenced by a purchasing processor other than the decision on whether to buy.

B.
TYPICAL FLOW DIAGRAM FOR FISH PROCESSING
WITH DEFECT ACTION POINTS

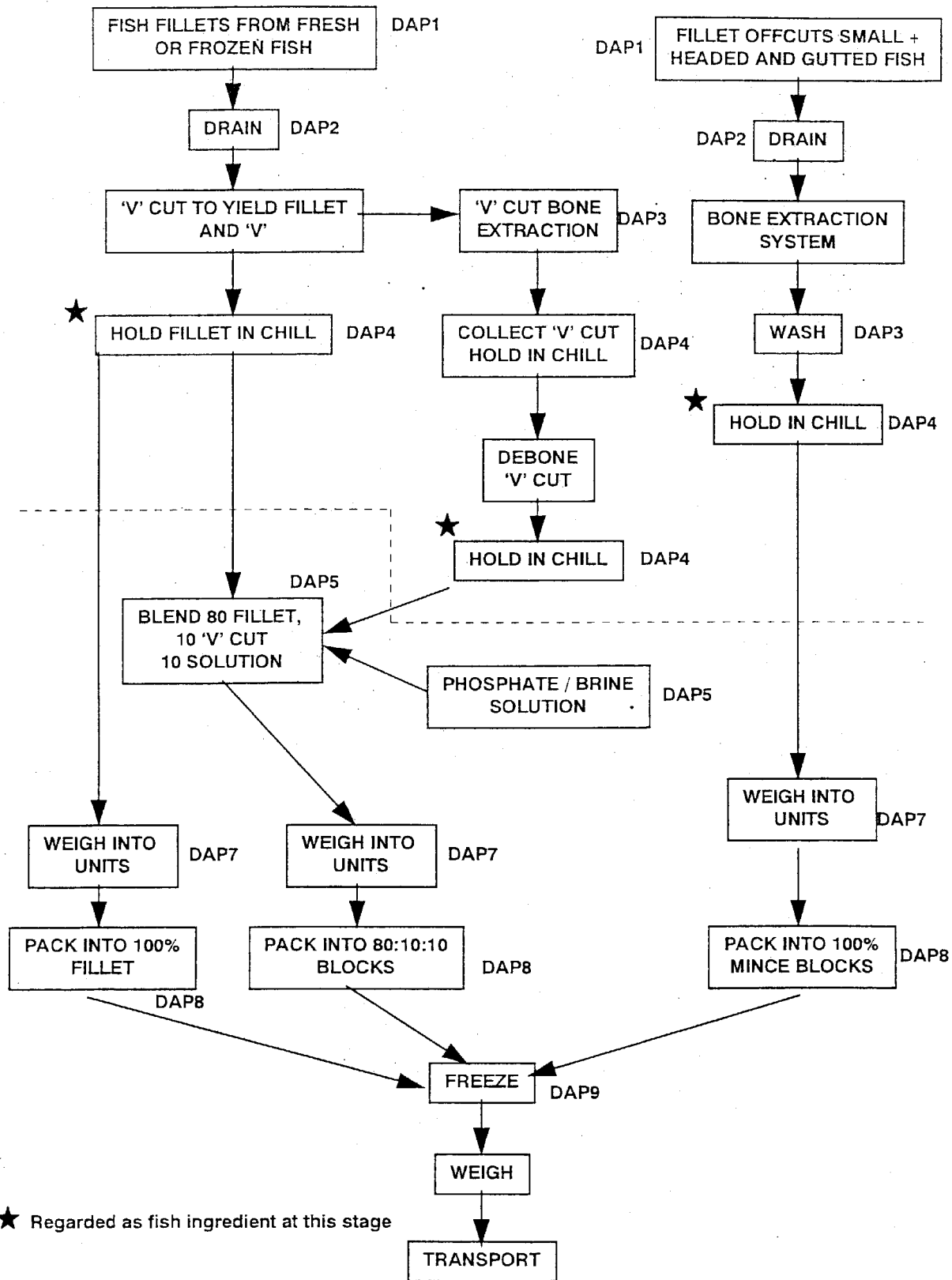


★ Regarded as fish ingredient at this stage

B. DEFECT ACTION POINTS FOR FISH PROCESSING

- DAP1 - Intake of fish raw material. Traceability and fish age from capture and condition could be important in estimating fish composition in event of eventual challenge.
Establishment of GFP and storage conditions of frozen fish is also recommended.
- DAP2 - Controlled thawing of frozen fish could impact subsequent flesh quality and drip. Where controlled humid atmosphere defrosting, system should be controlled to GMP temperatures and where water defrosting, fish should be removed as soon as correct temperature is reached and stored in ice until required.
- DAP3 - All wash procedures should be adequate to achieve purpose, followed by adequate drainage at the final stages of the process where product may be passed onto further processor.
- DAP4 - Some process lines are integrated and involve product transfer by water fluming rather than by dry transfer. These processes should comply with GMP.
- DAP5 - Intermediate storage of work-in-progress fish/fillet materials may take place. Storage in chill without ice would be the desirable procedure.
- DAP6 - Deheading, filleting and skinning are often by mechanical means. Such equipment requires continuous water jets for lubrication and washing. Equally, where the process is by hand filleting, the fish are typically kept in ice water and the fillets may then be flumed to trimming tables. Final trimming usually requires a rinse of the fillet to remove pieces of bone, fin etc.
In all of these processes, the time and or level of exposure to water should be assessed and controlled by, for example, directing water jets onto equipment rather than fish and controlling flow rates.
- DAP7 - Final fish fillet preparation should include a draining period, usually in plastic trays with drainage holes. Provided for short periods of storage only, it may be advantageous to place a waterproof paper sheet between the ice and the fish. Note that fish will continue to drip after process waters have gone, but this will include fish fluids and nitrogen compounds. Level of drip will also be dependent on fish species, condition and previous storage conditions so that the processor should strike a balance between loss of process wash water and loss of fish yield.
- DAP8 (FPS) - Food Additives. If fish is subject to for example a phosphate dip solution or any other treatment, then this is in addition to GMP and will require preparation to specific strength and monitoring to determine pick up over GMP yield.
- DAP9 - Transport/Further use.
Since drip will continue as outlined, received processed fillet fish may well be composed of fish flesh and drip, but provided ice has not been added, then this will have been derived from the fish.

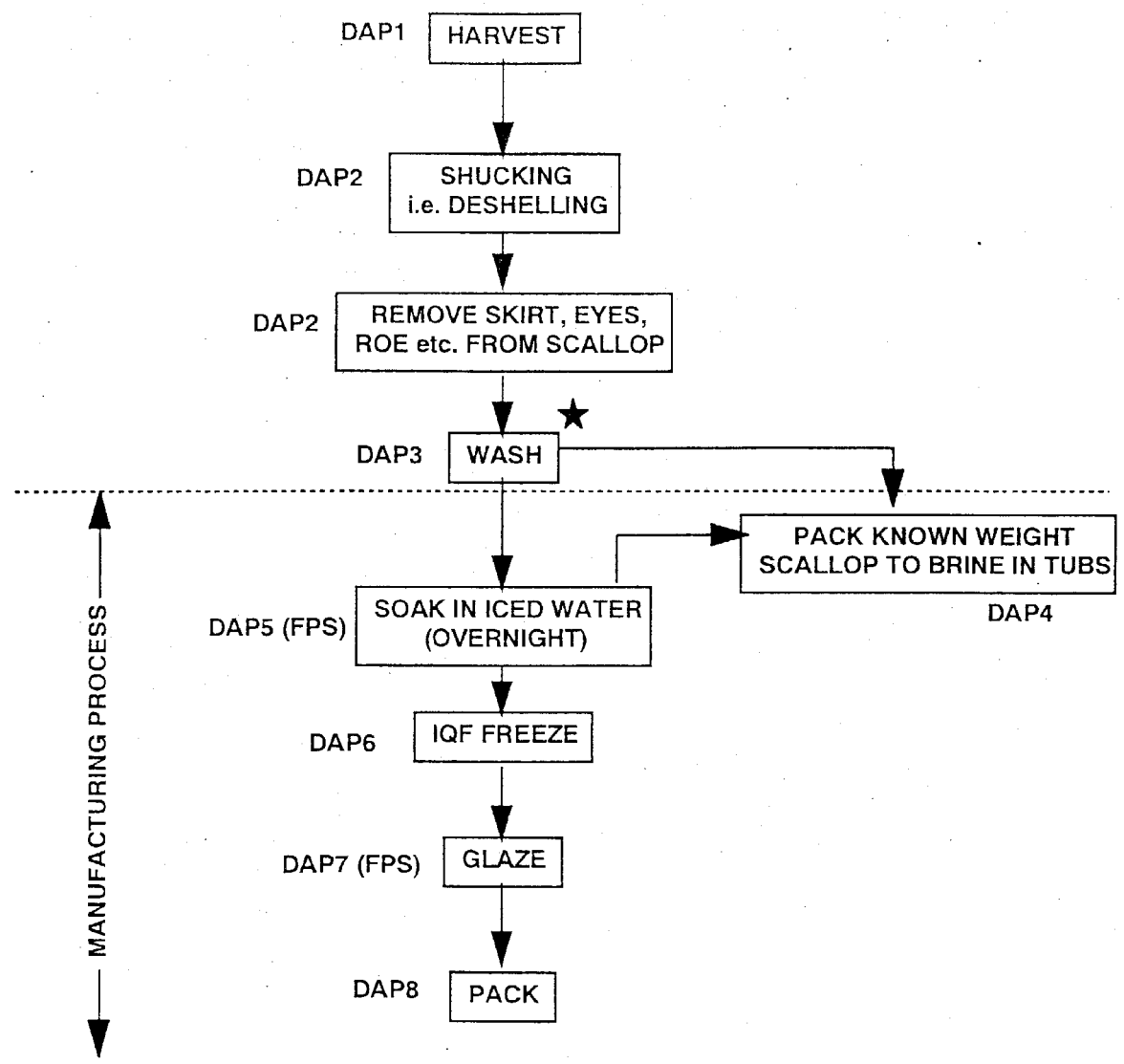
C.
 TYPICAL PROCESS FOR FISH BLOCK MANUFACTURE
 WITH DEFECT ACTION POINTS



C. DEFECT ACTION POINTS FOR FISH BLOCK MANUFACTURE

- DAP1/2 - Fish block production is usually associated with fillet production so that these points would correspond to DAP7 on that flow system, i.e. fillets should be adequately drained.
- DAP3 - Mince after bone extraction can occasionally be washed to improve colour. This process will lead to rapid loss of soluble nitrogen compounds and fish liquors along with uptake of wash water. Such processes cannot be recommended and would almost certainly result in the mince having a lower nitrogen content, which could lead to the eventual fish block having to be labelled 'fish with added water'.
- DAP4 - V cut material for 80:10:10 or other fish materials for bone extraction should be effectively drained prior to use and stored in chill after processing for .
- DAP5 - Brine and or phosphate solution should be prepared and monitored to specified strength.
- DAP6 (FPS) - 80:10:10 blends and similar should be accurately weighed and blended through appropriate equipment to ensure uniformity of the mix and this should be used with minimum delay to prevent drip, or puddling.
- DAP7 - Allowance of extra weight of fish to achieve end-product weight will be required, according to condition of the fish.
- DAP8 (FPS) - After packing fish into fish wraps and frames for block production, they should be plate frozen with minimum of delay to prevent drip and puddling to occur at block surfaces. NOTE: blended blocks must be labelled appropriately.
- DAP9 - Fish drip will be squeezed from the fish during expansion and freezing so that final block weight should be monitored.

TYPICAL FLOW DIAGRAM FOR SCALLOP HARVESTING AND PROCESSING WITH DEFECT ACTION POINTS



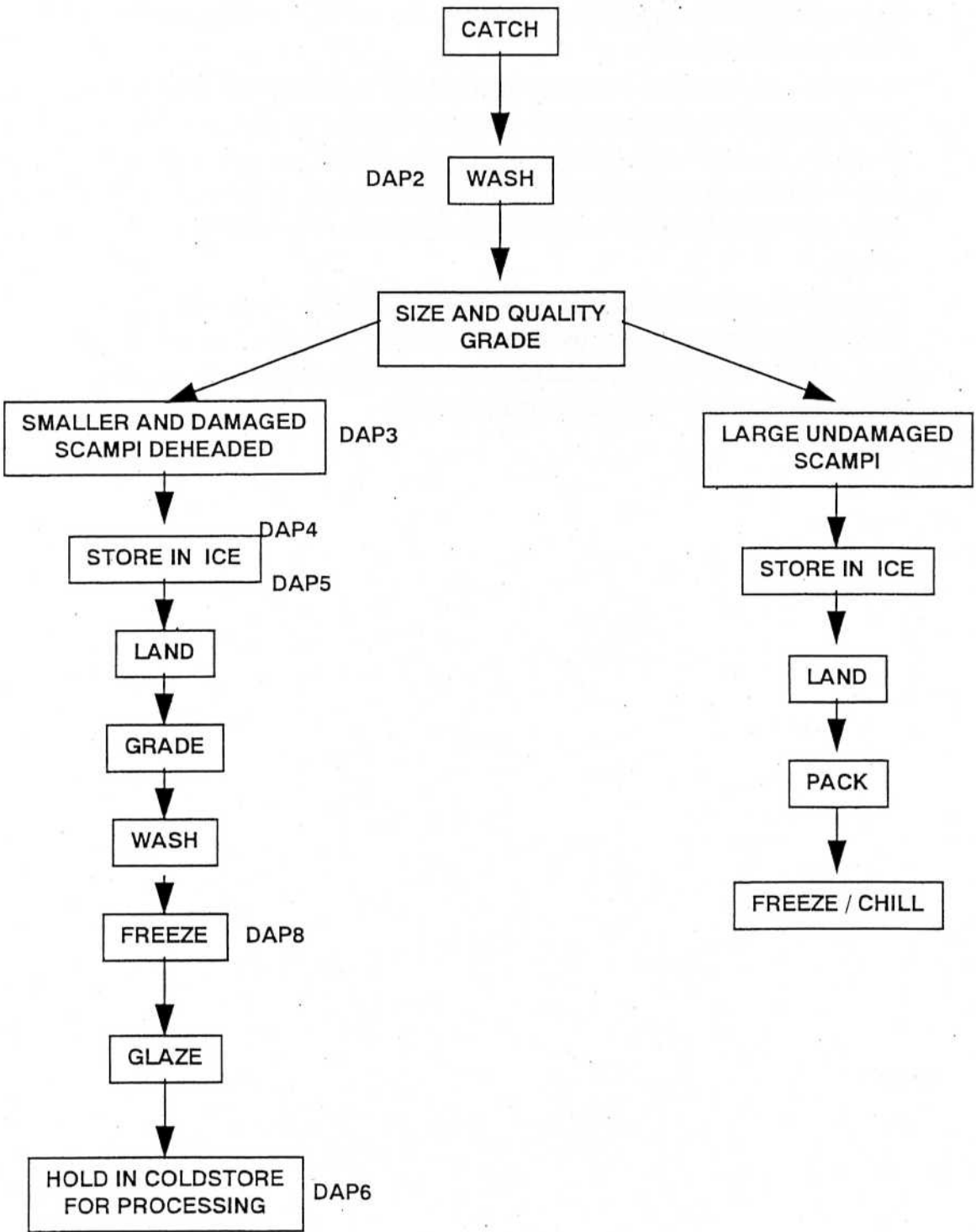
★ Regarded as fish ingredient at this stage

D. DEFECT ACTION POINTS FOR SCALLOP HARVESTING AND PROCESSING

- DAP1 Time of year and condition of scallops can affect subsequent water uptake/soluble protein loss and even chemical composition. Traceability records would be advantageous. Scallops are monitored alive and stored dry in sacks. Scallops may be held in freshwater, and in some countries ice is used.
- DAP2 GMP controls involve deshelling and eviscerating scallops dry for subsequent washing. Deshelling may sometimes involve steam.
- DAP3 Typical scallop washing process would involve spray process for minimal uptake of about 5% followed by draining.
- DAP4 Washed scallops are typically packed dry into tubs, but if packed into brine, then washed weight of scallops should be used.
- DAP5 (FPS) Washed scallops may be soaked for periods of time. Yield increase will be dependent on time and condition of scallop. This is an FPS point where initial and final weights should be monitored to reflect final scallop content declaration.
- DAP6 Rate of freezing could effect final defrosting weight if used for further processing.
- DAP7 (FPS) Glaze content addition should be monitored by Codex procedures.
- DAP8 (FPS) Final packed product declarations should reflect the scallop processing, e.g. if 25% water pick up at DAP5 then the fish content is 80% ($100 \div 125 \times 100$) and if 25% glaze addition then net weight is 80% of packed target weight.

E.

TYPICAL PROCESS FOR SCAMPI, CATCHING AND INITIAL PROCESSING
FOR WHOLE SCAMPI MARKET AND FURTHER PROCESSING
WITH DEFECT ACTION POINTS

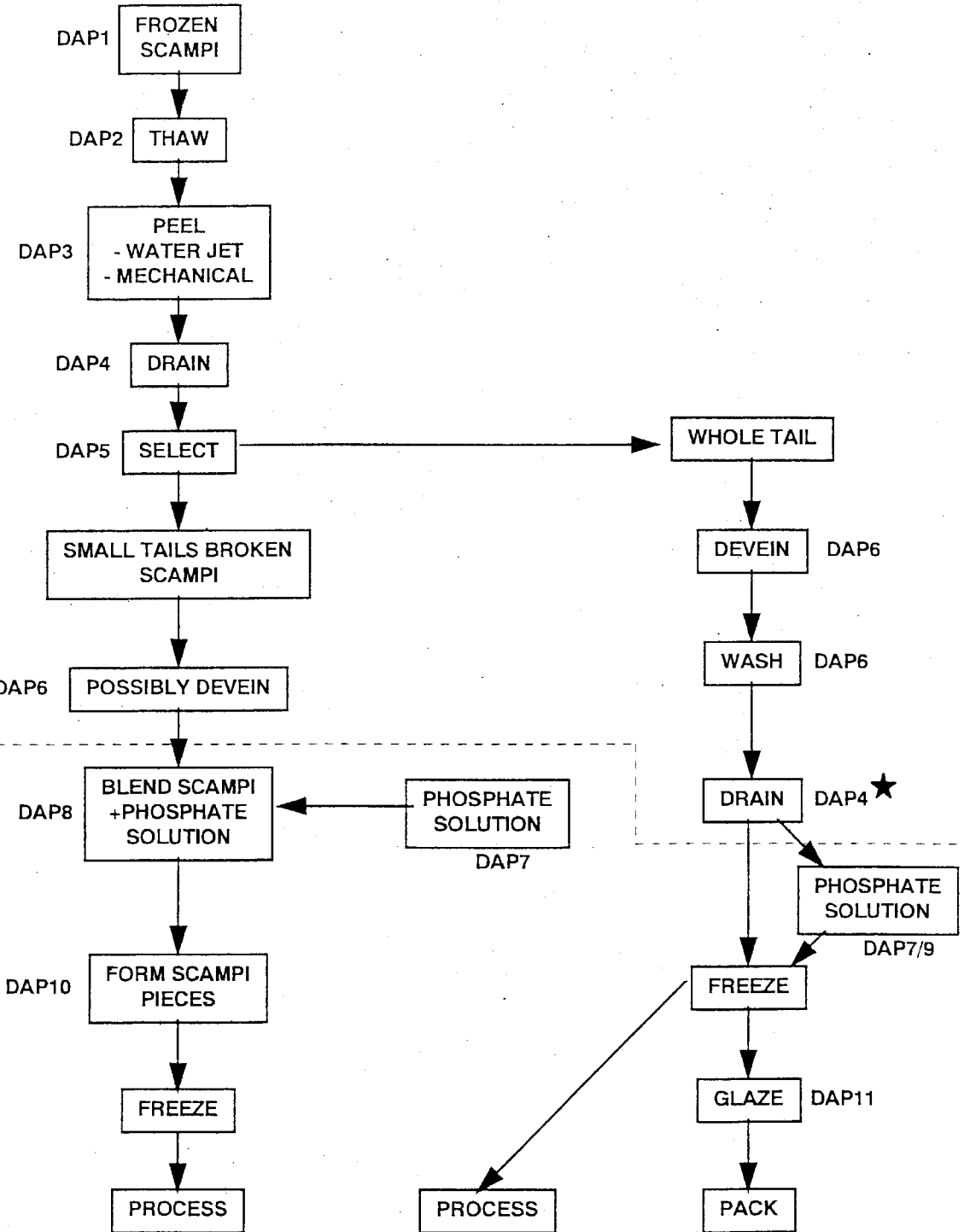


**E. DEFECT ACTION POINTS FOR SCAMPI CATCHING
AND INITIAL PROCESSING**

- DAP1 - Time of year, location and condition of scampi can affect subsequent water uptake/soluble protein loss and even initial chemical composition.
- DAP2 - All scampi for further processing are deheaded at sea so that drip leaching from the damaged surface will occur.
- DAP3 - Hygienic requirement to store in melting ice, but ensure adequate drainage of melt water.
- DAP5 - Fish trips can last up to 6 days so that scampi can be up to 6 days old by time of transfer to processor and 7 days by time of processing. Significant leaching of soluble nitrogen compounds can take place throughout this period so that nitrogen content can be anticipated to be for less for the first days catch compared to the last days catch in the same fishing grounds.
- DAP6 - Freezing of gutted fish should be as rapid as possible in modern plate freezing systems, followed by storage in stable conditions ideally colder than - 18°C. Poor storage conditions can result in subsequent increased drip or loss of soluble proteins on defrosting.

F.

TYPICAL PROCESS FOR PRODUCTION OF SCAMPI CORES FOR FURTHER PROCESSING AND FOR WHOLE TAIL PEELED SCAMPI FOR MARKET WITH DEFECT ACTION POINTS

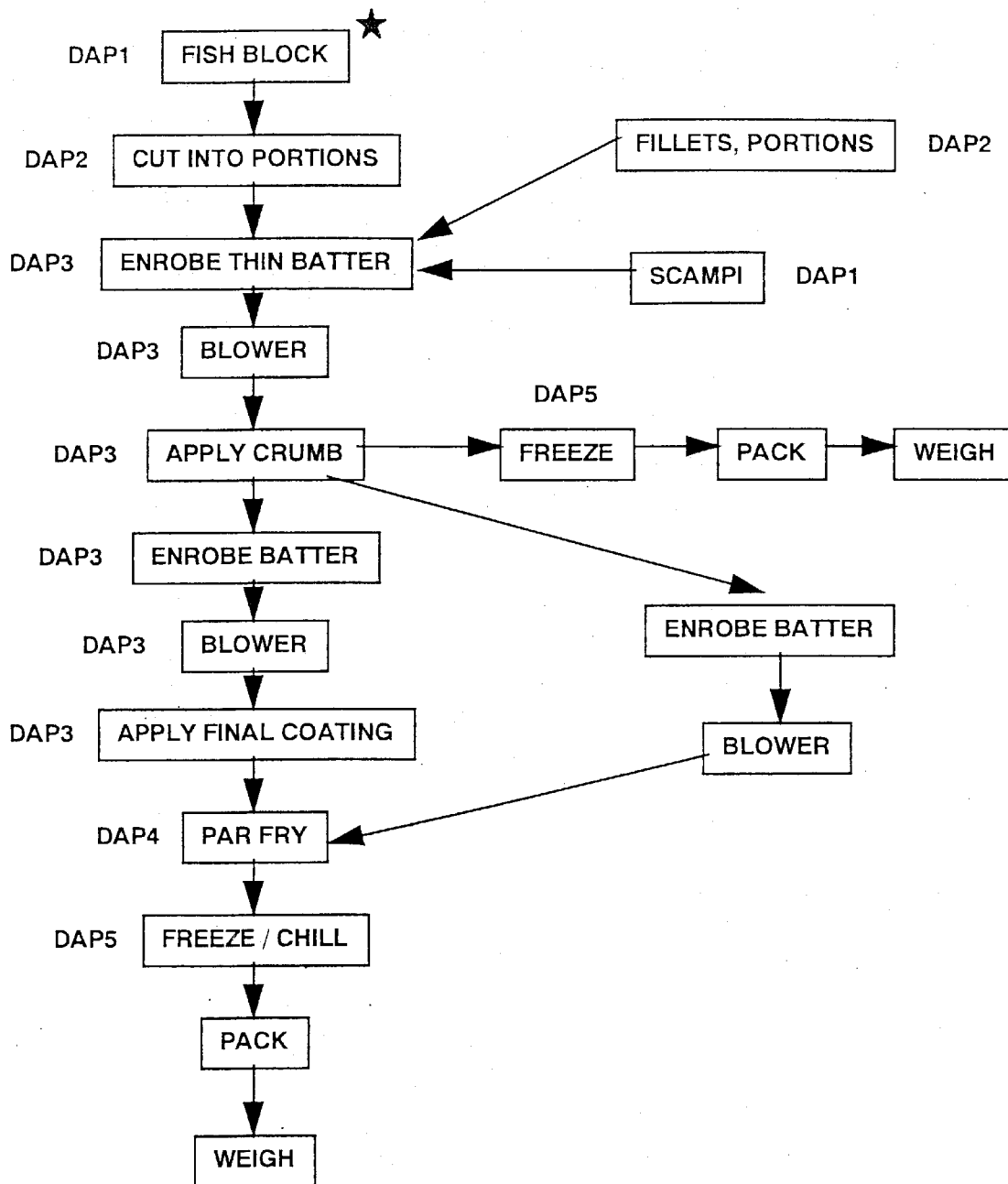


★ Regarded as fish ingredient at this stage

F. DEFECT ACTION POINTS FOR SCAMPI CORES FOR FURTHER PROCESSING AND WHOLETAIL PEELED SCAMPI

- DAP1 - If frozen scampi is purchased for processing then there will be a need for assurance that it has been caught and prepared to GFP and traceability is known to verify possible eventual challenges on nitrogen content.
- DAP2 - Controlled thawing of frozen fish could impact subsequent flesh quality and drip. Where controlled humid atmosphere defrosting, system should be controlled to GMP temperatures and where water defrosting, fish should be removed as soon as correct temperature is reached and stored in ice until required.
- DAP3/4 - Water jet peeling breaks the surface cellular structure of the resulting scampi tails and bathes the scampi in water. Adequate drainage (minimum 30 minutes) should be ensured to remove extraneous water, but since drip of soluble nitrogen compounds and scampi juices will accelerate, there will need to be a GMP compromise between drainage and loss of essential scampi.
- DAP5 - Selection and subsequent processing of scampi should be in controlled conditions to minimise drip.
- DAP6 - Deveining scampi results in a cut along the dorsal part of the scampi tail and in consequence again accelerates drip. It will also be necessary to wash away the vein, but minimum water necessary should be used.
- DAP7 (FPS) - Phosphate solution should be made to the correct strength and any metering system monitored.
- DAP8 (FPS) - Where scampi is blended with small whole tails and/or broken tails to produce a formed product, this is a positive addition of water and an FPS. Records of batch weights will need to be kept and monitored and the level of addition will affect fish content declaration and possibly water content declarations.
- DAP9 (FPS) - As with DAP8, if whole tails are pre-soaked for either subsequent coated or plain product, records will need to be kept of pick up solution. This should preferably be by positive addition, although batch weights of scampi before and after would be acceptable.
- DAP10 - Uniformity of size of scampi pieces could ultimately impact on pick up of eventual coating.
- DAP11 (FPS) - Glazing of whole tail scampi should be controlled via the Codex Method to meet the on-pack labelling standards.
- DAP12 (FPS) Process assumes that coating will be involved. Methods of coating determination are referred to in the flow diagram for coated products.

TYPICAL PROCESS FOR COATED FISH PRODUCT MANUFACTURE WITH DEFECT ACTION POINTS



★ See Appendix 2C in relation to fish ingredient

NOTE: Modern fish coatings are built up from a series of thin coatings and usually involve a final par fry, which is essential for tempura batter coatings.

Some products may however be produced from a 2-stage batter and crumb coating without frying

G. DEFECT ACTION POINTS FOR COATED FISH PRODUCTS
MANUFACTURE

- DAP1 - Fish blocks and formed scampi should have been produced to GMP and comply with the anticipated nitrogen content for the specification and their nature of processing.
- DAP2 - Fish fillets/cuts will vary in volume: surface area ratios according to season. This will affect pick up of coating, but uniformity of batch to meet end product packing and labelling specification should be ensured.
- Portions cut from blocks, the cutting pattern and resulting portion weights/sizes should be checked.
- DAP3 - The enrobing process should be controlled via portion specifications batter temperature and viscosity, air knives and blowers to achieve the specified final product weight.
- DAP4 - Frying conditions should be controlled to achieve the final product weight and oil content.

The most reliable method to monitor pick up of coating and after par frying at DAP3 and 4 is by weighing portions and reweighing after each process. The number of portions for each sample and frequency of sampling will be dependent upon the nature of the fish portions and process capability of the line.

Note that stripping coating from the fish core can lead to erroneous results due to:

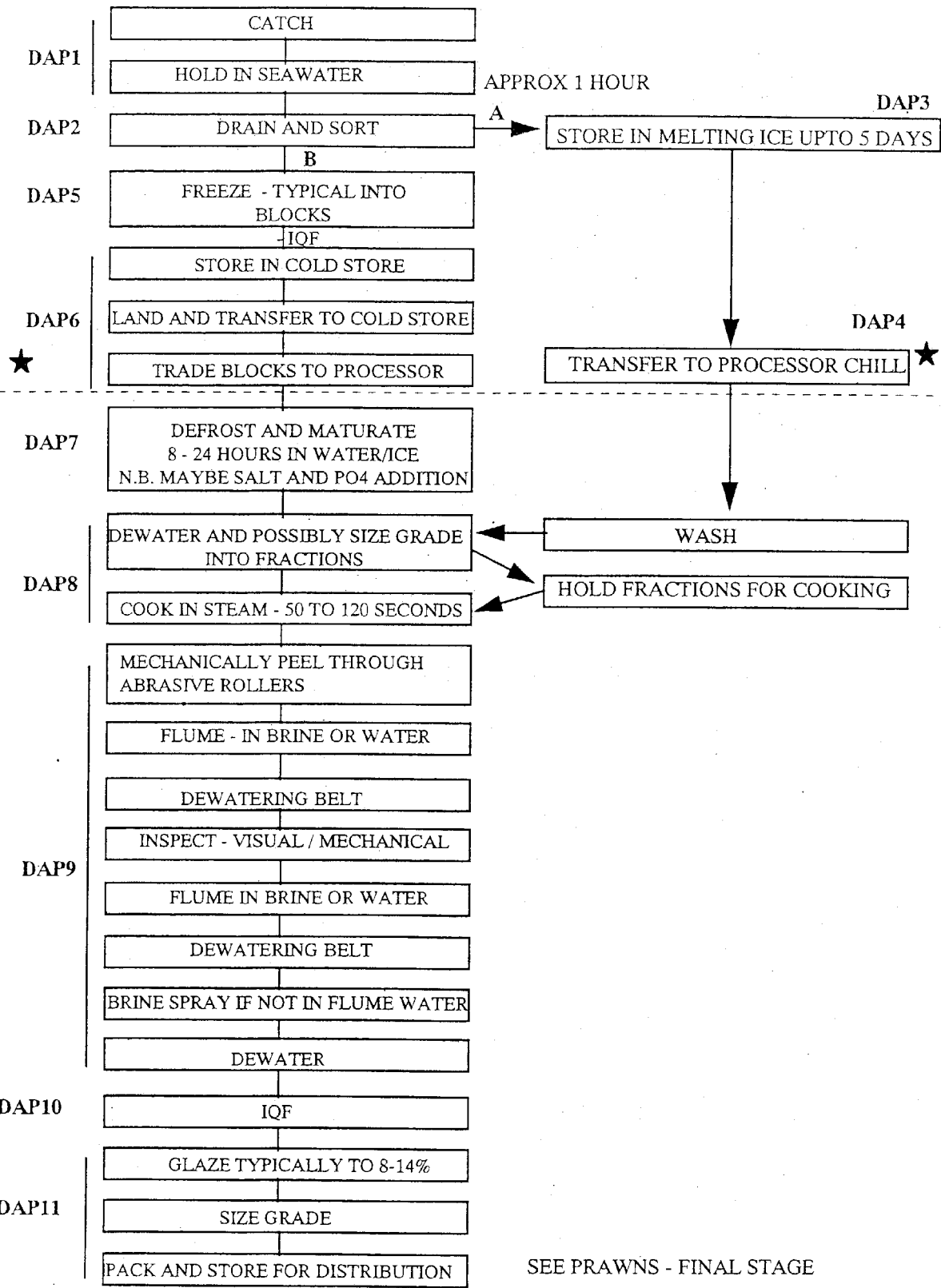
- i) Uneven of soft surfaces of fillet portions and gaping of the flesh segments which will contain batter.
- ii) For par fried products, the added complication of separation of gelled coating from the gelled surface of fish and potential loss of moisture from fish surface.
- iii) Where there may be customer requirements to adopt such procedures, results of comparative strip tests carried out at later dates will always yield significantly higher apparent coating levels due to redistribution of fish juices into dry coatings, even in frozen storage. This is exacerbated in fluctuating storage conditions.

- DAP5 - Freezing and packing operations frequently lead to a loss of loose coating which may be quantifiable and affect final core to coating ratio.

H.

TYPICAL PROCESS FOR COOKED AND PEELED NORTH ATLANTIC PRAWNS WITH DEFECT ACTION POINTS

(Catching and initial processing stages based on gmp and due diligence)



SEE PRAWNS - FINAL STAGE

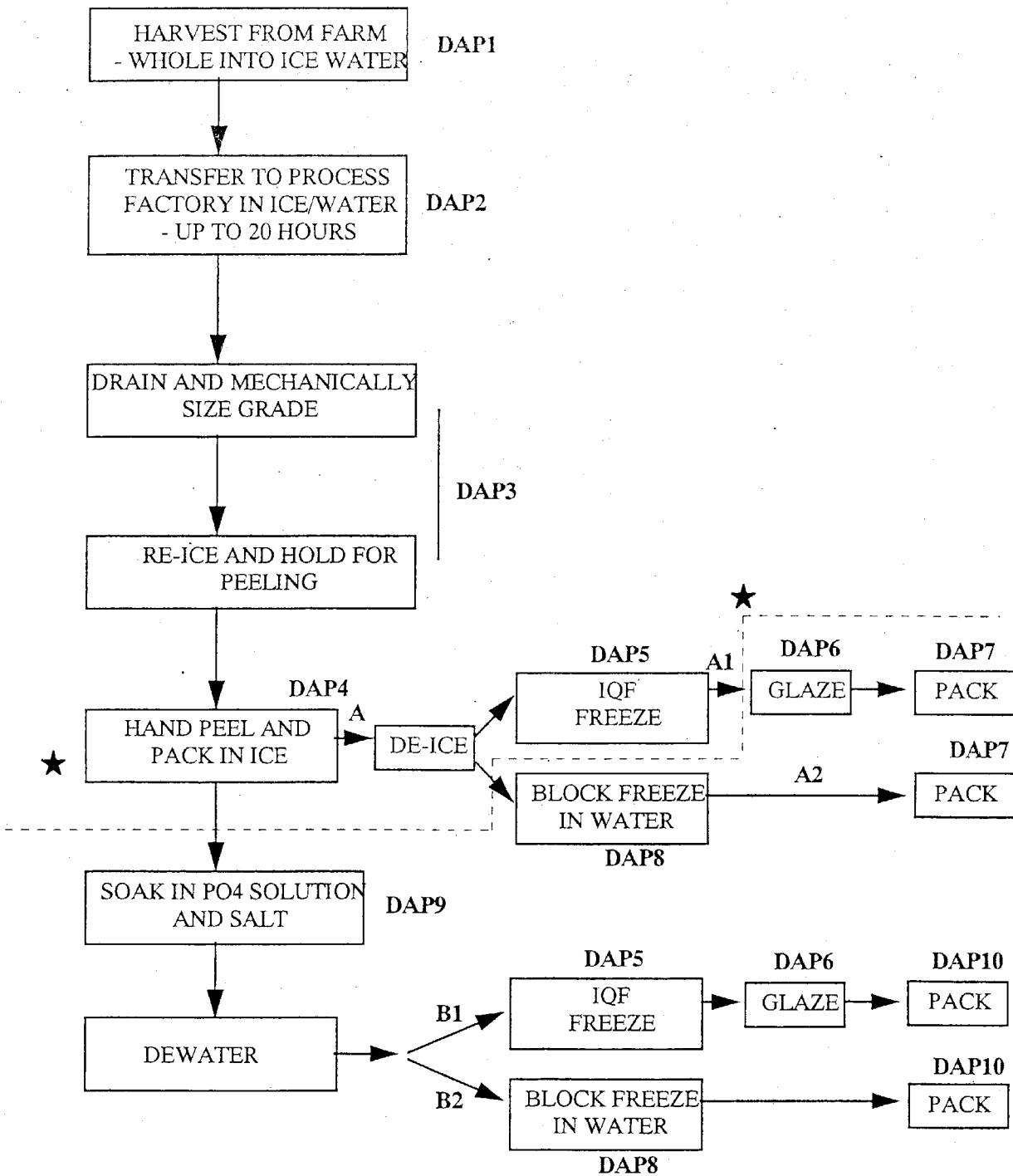
★ Regarded as fish ingredient at this stage

H. Typical Process for Cooked and Peeled North Atlantic Prawns with Defect Action Points

- DAP1 Time of year, location and condition of prawns can affect water uptake/soluble protein loss and eventual composition. For instance prawns during April to September may have clear soft almost paper thin shells after moult.
- DAP2 Sorting may involve size grading of ocean catch into different fractions for separate processing conditions. Coding required.
- DAP3 For fresh landings, prawns can be upto 6 days from time of catching to landing (legal limit Norway) Hygienic requirement to store in melting ice, but ensure adequate drainage and where in refrigerated hold, the temperature is about 4°C to allow ice to melt. Significant leaching of soluble nitrogen compounds can be anticipated throughout this period, especially for recently moulted prawns.
- DAP4 Transfer of fresh prawns into processing plant usually involves de-icing, washing, draining and re-icing to await processing.
- DAP5 A high percentage of prawns are now frozen whole at sea into blocks in polythene wraps in plate freezers. Fast efficient freezing ensures final product quality and texture. IQF freezing is an alternative with storage in sacks.
- DAP6 Frozen storage under stable conditions below -20°C ensures texture and quality and minimises eventual soluble nitrogen compound loss.
- DAP7 Frozen prawns have to undergo a period of maturation to enable ease of peeling after cooking. This is not necessary in fresh prawns since this takes place after 2 days on ice. Maturation usually involves soaking in water / ice for 8 - 24 hours. This will lead to some loss of soluble proteins/water exchange. In some instances processors may include salt and polyphosphate additions to improve peeling.
- DAP8 Prawns may be size graded prior to cooking. Since cooking serves also to ensure safety, cooking of ungraded prawns must be to meet desired temperature on the largest prawns. Cooking graded prawns will improve yields and alter composition.
- DAP9 The whole process of peeling cooked prawns, inspection and brining is a wet operation with water jets to remove shells and usually water or brine fluming through to sorting belts and to sorting equipment. Soluble protein loss should not occur in cooked prawns, but there will be surface wetness and final dewatering prior to freezing has to be effective.
- DAP10 IQF freezing is the typical method through a semi fluidised bed. Pre-drained prawns are essentially to prevent initial welding together through icing and accumulation of unwanted glaze.
- DAP11 IQF prawns are in-line ice glazed for protective reasons. Glaze is determined by Codex method and may be backed-up by an in-line weighing system. If prawns have been pre-graded, results will be more

consistent. If size grading takes place after glazing, this will significantly affect glaze levels of individual fractions i.e. mean 10% could range mean 8% to mean 14% for large and small grades respectively. Glaze measurement, and accurate labelling are essential. Temperature control throughout these processes is essential to maintain uniformity of pick-up of glaze and its subsequent retention to prevent dehydration. Secondary IQF freezing is often included between DAP16/17 to improve performance.

I.
 TYPICAL PROCESS FOR FARMED WARM WATER PRAWNS IN
 COUNTRY OF ORIGIN WITH DEFECT ACTION POINTS



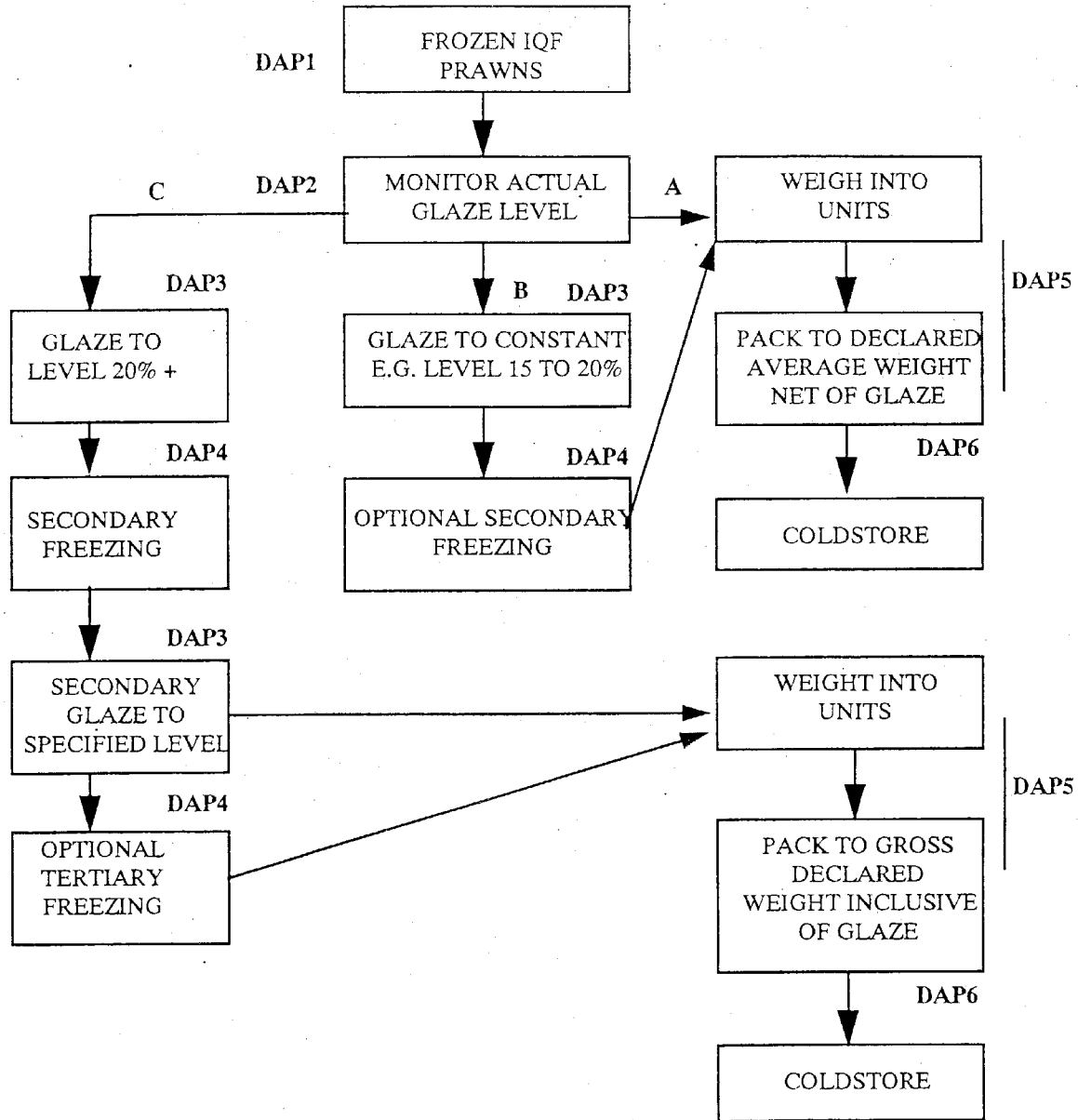
★ Regarded as fish ingredient at this stage

I. DEFECT ACTION POINTS FOR FARMED WARM WATER PRAWNS IN
COUNTRY OF ORIGIN

- DAP1 Harvesting farmed prawns will typically be when they are in peak condition. There are unlikely to be the issues of moult to contend with as in wild prawns.
- DAP2 Farms are often some considerable distance from processing plants and have to be conveyed in ice/water to ensure cold temperatures in tropical conditions.
- DAP3 Farmed prawns are typically de-iced on receipt, mechanically size graded, re-iced in trays and held in chill rooms, usually for up to 24 hours i.e. the process is faster than for cold water prawns.
- DAP4 Deheading, and peeling, where specified is often by hand, although investment in mechanical peelers is now occurring. It is essential to re-ice quickly in warm conditions.
- DAP5 IQF freezing is often on trays in blast freezers for larger farmed prawns. Draining DAP6 is essential if the prawns are required unglazed since a significant amount of water can be left on the prawns in this type of operation.
- DAP6 Glazing may be spray, but is often by water dipping. Temperature control after IQF is essential to ensure uniformity of glaze pick up by this means.
- DAP7 Final packed weight should reflect the net drained weight
- DAP8 Where the prawns are block frozen, they are typically weighed into a 2 kg pack to which 15-20% water is added for protection and the pack is plate frozen.
- DAP9 Warm water prawns are often pre-soaked in brine/phosphate solution prior to freezing and packing. Where this occurs, the process should be controlled to meet specified pick up of salt and solution.
- DAP10 As per DAP7 but the pack labelling should reflect presence of salt, polyphosphates and water in the prawn as well as glaze on the prawn.

J.
PRAWNS - FINAL PACKING STAGE - RETAIL / CATERING
WITH DEFECT ACTION POINTS

Can be at originating producer or otherwise in UK.



J. DEFECT ACTION POINTS FOR PRAWNS FINAL PACKING STAGE

- DAP1 Frozen prawns, whether raw or cooked, peeled or otherwise will follow a similar process.
- It will be necessary to substantiate that they meet the agreed processing specification in terms of any brining, phosphate dipping, cooking etc and that they are glazed to the specified and anticipated level on receipt. Glaze determination by Codex.
- DAP2 During subsequent packing, glaze levels of prawns should be checked to ensure uniformity.
- DAP3 Secondary glazing is typically carried out to improve consistency of protective glaze for 'net weight' declared prawns. Levels may vary, but probably at least 15%, which is inclusive of initial glazing is necessary to correct inconsistencies. Regular checking by Codex method is advisable.
- DAP4 Secondary freezing after glazing will ensure retention of glaze during the packing stage, but chilled environments are effective.
- For gross weights packs, levels of glaze above 15% are typical and may be applied through 2/3 sequences.
- DAP5 Whether the eventual pack is labelled net of glaze or inclusive of glaze, sufficient glaze checks should have been taken to ensure that the final declaration is met and that any average weight requirements are also taken into consideration.
- DAP6 Final packs should be placed in coldstore as quickly as possible to ensure glaze integrity.

Main Committee Meetings

- (i) 21 October 1996
- (ii) 17 March 1997

Working Group Meetings

- (i) 28 November 1996 (Hull including Factory visit)
- (ii) 10 January 1997
- (iii) 18 February 1997
- (iv) 9 May 1997 (WG on labelling)
- (v) 20 June 1997 (WG on N₂ factors)
- (vi) 18 November 1997 (Final WG)

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Miss D Love
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Dr K Hargin
Mrs V McFarlane

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March 1998

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