

codex alimentarius commission



FOOD AND AGRICULTURE
ORGANIZATION
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ALINORM 07/30/18

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION

Thirtieth Session
Rome, Italy, 2 – 7 July 2007

**REPORT OF THE TWENTY-EIGHTH SESSION OF THE
CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS**

Beijing, China
18 – 22 September 2006

Note: This document incorporates Circular Letter CL 2006/45-FFP

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CX 5/35

CL 2006/45-FFP
September 2006

TO: - Codex Contact Points
- Interested International Organizations

FROM: Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, 00100 Rome, Italy

SUBJECT: Distribution of the Report of the 28th Session of the Codex Committee on Fish and Fishery Products (ALINORM 07/30/18)

A. MATTERS FOR ADOPTION BY THE 30th SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Proposed Draft Code at Step 5/ 8 of the Procedure

1. Proposed Draft Code of Practice for Fish and Fishery Products (Quick Frozen Coated Products, Salted Fish and relevant Definitions) (para. 91, Appendix II)

Governments wishing to propose amendments or comments on the above document should do so in writing in conformity with the Guide to the Consideration of Standards at Step 8 (see Procedural Manual of the Codex Alimentarius Commission) to the above address **before 10 March 2007**.

Proposed Draft Standard at Step 5 of the Accelerated Procedure

2. Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (para.12, Appendix III)

Governments wishing to submit comments on the implications which the Proposed Draft Amendment may have for their economic interests should do so in writing in conformity with the Accelerated Procedure for the Elaboration of Codex Standards to the above address **before 10 March 2007**.

Proposed Draft Standard and Code at Step 5 of the Procedure

3. Proposed Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs, Lobsters and Crabs and relevant Definitions) (para. 92, Appendix IV)
4. Proposed Draft Standard for Live and Raw Bivalve Molluscs (para. 111, Appendix V)

Governments wishing to submit comments on the implications which the Proposed Draft Standard and Code may have for their economic interests should do so in writing in conformity with the Procedure for the Elaboration of World-wide Standards at Step 5 to the above address **before 10 March 2007**.

B. REQUEST FOR COMMENTS AND INFORMATION

Draft Standard at Step 6 of the Procedure

5. Draft Standard for Sturgeon Caviar (para. 26, Appendix VII)

Governments wishing to submit comments should do so in writing to the above address **before 30 June 2007.**

Proposed Draft Code at Step 3 of the Procedure

6. Proposed Draft Code of Practice for Fish and Fishery Products (other sections) (para. 92, Appendix VI)

Governments wishing to submit comments should do so in writing to the above address **before 30 June 2007.**

SUMMARY AND CONCLUSIONS

The summary and conclusions of the 28th Session of the Codex Committee on Fish and Fishery Products are as follows:

Matters for adoption by the Commission:

The Committee:

- advanced to Step 5/8 the Proposed Draft Code of Practice for Fish and Fishery Products (Quick Frozen Coated Products, Salted Fish and relevant Definitions) (para. 91, Appendix II);
- advanced to Step 5 of the Accelerated Procedure the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (para.12, Appendix III);
- advanced to Step 5 the Proposed Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs, Lobsters and Crabs and relevant Definitions) (para. 92, Appendix IV);
- advanced to Step 5 the Proposed Draft Standard for Live and Raw Bivalve Molluscs (para. 111, Appendix V);
- agreed to propose new work on the revision of the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products (para. 123); an amendment to the Standard for Quick Frozen Fish Sticks, Fish Portions and Fish Fillets – Breaded or in Batter (Nitrogen Factors) (para. 129); a Proposed Draft Standard for Fish Sauce (para. 127) and a Proposed Draft Standard for Abalone (para. 133).

Other matters of interest to the Commission:

The Committee:

- agreed to return to Step 6 the Draft Standard for Sturgeon Caviar (para. 26, Appendix VII);
- agreed to return to Step 3 the Proposed Draft Code of Practice for Fish and Fishery Products (other sections) (para. 92, Appendix VI);
- agreed to return the Proposed Draft Standard for Smoked Fish for redrafting, circulation at Step 3 and consideration at the next session (para. 121);
- agreed to defer consideration of the Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat and the Proposed Draft Code of Practice for the Processing of Scallop Meat until its next session (paras. 112 and 122);
- agreed to consider further at its next session a proposal for the inclusion of additional species in the Standard for Canned Sardines and Sardine-Type Products (para. 130).

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INTRODUCTION

1) The Codex Committee on Fish and Fishery Products held its 28th Session in Beijing, China from 18 to 22 September 2006, at the kind invitation of the Government of the People's Republic of China. The Session was chaired by Dr Bjørn Røthe Knudsen, Regional Director of Norwegian Food Safety Authority and co-chaired by Professor Li Xiaochuan, Chinese Academy of Fisheries Science. The Session was attended by 140 delegates representing 45 Member States, one Member Organization (EC) and 1 international organization. The complete list of participants is attached to this report as Appendix I.

OPENING OF THE SESSION

2) The Session was opened by Mr Zhang Bao Wen, Vice-Minister of Agriculture for China, who welcomed the delegates and thanked FAO/WHO, the Codex Alimentarius Commission and the Government of Norway for supporting China in hosting this Committee. He emphasized the close relationship between agricultural products and food safety and the role that Codex played in setting food standards in order to guarantee health of consumers and to facilitate trade in food and informed the Committee of China's growing agricultural outputs, especially in fish and fishery products, the importance of the quality and safety of these products and the fact that China had established a National Fish Standards Commission to oversee the development of standards to ensure compliance with Codex and other international standards. In wishing delegates well in their deliberations, Codex was commended for its efforts to protect consumer health and China's commitment to work together with the Commission and its members was emphasized.

3) The Norwegian Ambassador to China, Mr Tor C. Hildan, made some opening remarks on behalf of the Government of Norway and thanked China for the manner in which it had organised this Session. He noted that the holding of this Committee in China was in line with the objectives of Commission to take sessions to more parts of the world. He reiterated the importance of Codex in terms of their recognition by the Agreements of the World Trade Organisation and noted that with the increase export of fishery products by new fishing nations leading to increased risk of these products, the need to ensure their safety and to maintain consumer confidence and access to international markets harmonisation of standards was important. He emphasized that the work of this Committee was important in achieving these objectives.

ADOPTION OF THE AGENDA (Agenda Item 1)¹

4) The Committee accepted the proposals of the Delegations of Vietnam and Thailand to include under agenda item 12 proposals for new work on a Proposed Standard for Fish Sauce and a Discussion Paper on the Inclusion of Interim Nitrogen Factors of Additional Fish Species in Table 2 of the Standard of Quick Frozen Fish Sticks, respectively. With these additions, it adopted the Provisional Agenda as proposed.

5) The Delegation of the European Community presented CRD 1 on the division of competence between the European Community and its Member States according to Rule II. 5 of the Rules of Procedure of the Codex Alimentarius Commission.

MATTERS REFERRED TO THE COMMITTEE BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER CODEX COMMITTEES (Agenda Item 2)²

6) The Committee noted the decisions of the 28th and 29th Sessions of the Commission and other Codex Committees with regard to the adoption of the sections on Aquaculture and Shrimps and Prawns; Cephalopods; Transport; Retail and relevant Definitions of the Code of Practice for Fish and Fishery Products and the Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family; the adoption at Step 5 of the Proposed Draft Standard for Sturgeon Caviar; the request to inform the Executive Committee and the Commission of the time-frame for completion of items approved as new work prior to 2004; the need for more comprehensive consideration by the Codex Committee on Food Additives on the revision of the Guideline Levels for Methylmercury in Fish and the need to take into account all factors related to the consumption of fish, in particular, both risks and benefits; the work of the FAO/WHO on developing methodology for risk assessments taking into account both risk and benefit aspects and the invitation by FAO to members to provide information on work being undertaken in this regard.

¹ CX/FFP 06/28/1; CRD 1 (Division of competence between the European Community and its Member States).

² CX/FFP 06/28/2,

PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR CANNED SARDINES AND SARDINE TYPE PRODUCTS: *Clupea bentincki* (Agenda Item 3)³

7) The Committee recalled the decision of the last session of the Committee to defer this item for discussion at this session.

8) In view of the fact that no new elements were likely to arise on this item and in order to expedite discussion, the Chairperson proposed to establish an intra-session working group⁴ to consider this issue together with the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products (Agenda Item 10) and Amendment to the Labelling Section in the Standard for Canned Sardines and Sardine-Type Products (Agenda Item 11) and to propose possible options to enable progress of this item. The Committee agreed to the establishment of a working group and agreed that the working group under the coordination of the Delegations of Canada and European Community would explore all possible options to allow progression of this item and item 11 together or separately, not excluding the possibility of considering item 10.

9) The Delegation of Canada presented CRD 25 which outlined the recommendations covering all three above mentioned items.

10) The Committee unanimously agreed with the recommendations to amend the Standard for Canned Sardines and Sardine Type Products as follows: sections 2.1.1 by inclusion of *Clupea bentincki* to the list of species and 6.1.1 (ii) Labelling to read ““X sardines” where “X” is the name of a country, a geographic area, the species or the common name of the species, or any combination of these elements in accordance with the law and custom of the country in which the product is sold, and in a manner not to mislead the consumer”. It was also agreed that the Discussion Paper on the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products should be accepted as new work.

11) The Committee expressed its gratitude to the coordinators and members of the working group for the excellent work done in order to allow progress on this very difficult issue.

Status of the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine Type Products

12) The Committee agreed to advance these amendments to Step 5 of the Accelerated Procedure for final adoption by the 30th Session of the Commission (Appendix III).

DRAFT STANDARD FOR STURGEON CAVIAR (Agenda Item 4)⁵

13) The Committee recalled that the Draft Standard had been adopted at Step 5 by the 28th Session of the Commission and circulated at Step 6. The Delegation of the Russian Federation recalled the background of the development of the standard and informed the Committee of the result of the working group that had been held during the session to prepare a revised text taking into account the comments received and identifying issues for further discussion. The Committee discussed the text presented in CRD 23 and made the following amendments and comments, in addition to editorial changes.

TITLE and Section 1. SCOPE

14) Some delegations pointed out that the working group had proposed substantial changes to the Title and the Scope, introducing two new proposals in square brackets, and recalled that the mandate of the working group was to make editorial changes to the document and identify issues in the light of the comments received, but not to introduce substantial amendments to sections that had been previously finalized and

³ CX/FFP 06/28/3; CRD 2 (comments from Canada and Kenya); CRD 10 (comments from Peru), CRD 25 (Recommendations of the working group)

⁴ Canada and EC (coordinators of working group) with assistance of Brazil, Chile, European Community, Ecuador, Finland, France, Germany, Morocco, Peru, South Africa, Spain, Tanzania, United Kingdom, United States, Venezuela)

⁵ ALINORM 05/28/18, Appendix VI, CL 2005/1-FFP, CX/FFP 06/28/4 (comments of Canada, European Community, France, Japan, Iran, Mexico, Peru, Russian Federation, United States), CRD 6 (comments of Thailand), CRD 16 (comments of EC), CRD 21 (comments of China), CRD 23 (revised version prepared by the Working Group)

adopted at Step 5 without square brackets. Other delegations indicated that these proposals had been included as they appeared in the written comments.

15) The Committee had an extensive discussion on the proposal to refer in the title either to “sturgeon [and paddlefish] caviar” or to “caviar from the Acipenseriformes order”. Several delegations expressed the view that the current title should remain sturgeon caviar and the Scope covering only the *Acipenseridae* family should be retained, as other species should not be marketed as caviar, and noted that fish roe of other species could be covered by a separate standard that could be put forward as new work at a later stage. The Delegation of Finland, speaking on behalf of the Member States of the EC present at the session, expressed the view that according to CITES, caviar is processed from all species of the Acipenseriformes order, including paddlefish, and therefore the provisions in the Codex standard should be consistent with those of CITES in order to support the sustainable catch and trade in sturgeon and derived products.

16) As consensus could not be reached on the title and the scope, several delegations supported the proposal of the Chair to retain as an alternative the current text of the title and scope, and the Committee agreed that the current Title and scope and the two alternatives proposed in CRD 23 should be placed in square brackets for further consideration. All sections relating to the proposal to amend the title and scope were also retained in square brackets throughout the text.

17) The Representative of FAO informed the Committee that FAO and CITES were in the process of concluding a memorandum of understanding whereby FAO would provide technical expertise in the relevant commissions of CITES.

Section 2.2 Product Definition

18) The Committee agreed to place in square brackets for further consideration the numerical levels of salt as this was a new proposal, and the Committee noted that the question of the use of analytical results in this respect might also require further discussion.

Section 2.3 Process Definition

19) The Committee agreed that the requirement for a temperature from -2°C to -4°C was too restrictive and amended the range to “0°C to -4°C”. The Delegation of Russia expressed its reservation on this decision. Paragraph 2.3.2 was amended to refer to re-packaging in general, as it may be carried out industrially or in small processing units.

Section 4. Food Additives

20) The Delegation of Japan pointed out that JECFA had not been able to allocate an ADI for boric acid (INS 284) and sodium tetraborate (INS 285) due to lack of long term studies and therefore this additive could not be included in the standard in the absence of a risk assessment. The Committee recalled that only food additives that had been assigned an ADI by JECFA could be allowed at a specific level of use and therefore agreed to ask the Committee on Food Additives to place these two additives on the priority list of additives for evaluation by JECFA.

21) Some delegations pointed out that they did not allow the use of additives at the national level, or that caviar could be produced and kept at low temperatures without additives and therefore proposed that additives should not be allowed for caviar. The Delegation of the European Community pointed out that the additives proposed had a clear technological function and should be retained for further consideration. The Delegation of the Russian Federation confirmed that these two additives allowed a longer shelf life of the product. The Committee agreed to retain the proposed levels of additives in square brackets, pending further discussion and risk assessment by JECFA.

22) The Committee noted the written comments from Iran, that was not present at the session, concerning veterinary drugs in aquaculture. The Committee agreed that this issue was adequately covered by the provisions of the section on Aquaculture in the Code of Practice for Fish and Fishery Products.

Section 6. Hygiene

23) The Committee deleted the reference to a section on caviar products in the Code of Practice for Fish and Fishery Products since no specific proposal had been made so far for such new work. The Committee noted that the revised version of the standard included additional hygiene provisions that had been previously deleted to ensure consistency with the standard text on food hygiene included in the Procedural Manual.

Some delegations proposed to delete these paragraphs (6.3 and 6.4) and pointed out that the additional text proposed on foreign matter was adequately covered by the reference to the General Principles of Food Hygiene, while the reference to other substances appeared to refer to contaminants, which were already addressed in section 5. The Delegation of Finland, speaking on behalf of the Member States of the EC present at the session, expressed the view that these two additional paragraphs were necessary since they referred to items that were not fully covered by the two previous paragraphs. The Committee could not come to a consensus and retained these paragraphs in square brackets for further consideration.

Section 7. Labelling

24) The Delegation of Australia, supported by the Delegation of Canada, expressed the view that declaration of country of origin should not be required for labelling intended for the final consumer. The Committee did not discuss this question in detail and agreed to retain the text in square brackets for further consideration.

Section 8. Sampling, Examination and Analysis

25) The Committee agreed to delete the reference to CODEX STAN 233 (Sampling Plans), that had been reintroduced in the draft, since this text had been revoked by the Commission in 2004. Some delegations questioned the other changes made to this section and the deletion of Annex A on Sensory and Physical Examination, which usually appeared in the standards developed by the Committee. This section was not discussed in detail and it was agreed to consider it further at the next session.

Status of the Draft Standard for Sturgeon Caviar

26) The Committee agreed to return the Proposed Draft Standard, as amended at the present session to Step 6 for further comments and consideration at the next session (see Appendix VII). The Committee indicated that it was expected that this standard would be finalized at its 29th Session in 2008.

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS (Agenda Item 5)⁶

27) The Committee recalled that its last session had advanced to Step 8 several sections that were subsequently adopted by the Commission, and had returned to Step 3 the sections on Bivalve Molluscs, Quick Frozen Coated Fish and Fishery Products, Salted Fish, Smoked Fish, and Lobsters and Crabs.

28) The Committee agreed to consider the sections on Quick Frozen Coated Fish and Fishery Products, Lobsters and Crabs and Salted Fish as a first stage, and to consider those sections that corresponded to a Proposed Draft Standard under development after the relevant standard had been discussed at the present session.

SECTION 10. PROCESSING OF QUICK FROZEN COATED FISH AND FISHERY PRODUCTS

29) The Committee recalled that its last session, while discussing the section on shrimps and prawns, had agreed to transfer all provisions on coated products other than fish to section 10, which already included fish products, in order to incorporate all coated products into a single section. The Committee considered the text section by section and made the following amendments and comments, in addition to editorial changes.

30) The Committee agreed to add an explanation to the flow diagram to clarify that it was for illustrative purposes only, to ensure consistency with similar flow charts.

Section 10.4 Processing Operations – Molluscan Shellfish

31) The Committee agreed that section 10.4.2.3 Refrigerated Storage should refer to section 7.6.5 which covers storage of bivalve shellfish. The title of sections 10.4.7 and 10.4.10 were corrected to ensure consistency with section 10.3 of the current Code, and similar changes were made to the relevant sections of section 10.5.

⁶ ALINORM 05/28/18, Appendix IX, CX/FFP 06/28/5 (comments of European Community, New Zealand), CX/FFP 06/28/5-Add.1 and Add. 2 (comments of United States), CRD 3, 4 and 5 (comments of Canada), CRD 6 (comments of Thailand) CRD 12 (comments of Brazil) CRD 15 (comments of Canada and Norway)

32) In section 10.4.4.2, the Committee agreed to include contamination from dirty deglazing water as a potential hazard, in addition to a potential defect.

Section 10.5 Processing Operations – Coated Shrimp

33) The Committee noted a proposal to insert blast freezing before packaging in the flow chart but retained the current text as it was clarified that in practice coated shrimps may be frozen after packaging.

34) In section 10.5.1.1, the Committee agreed to add a new indent concerning the use of sulphites “in accordance with manufacturer’s instructions and Good Manufacturing Practice”.

35) In section 10.5.4.2 the Delegation of New Zealand proposed to delete some provisions that were not related to food safety. The Committee however recalled that the Code included both quality and safety provisions and retained the current text. The Committee amended the description of potential hazards and the text of the last indent to reflect that, when machines were used to cut shrimps, the presence of metal due to damage to blades was a physical hazard.

36) In section 10.5.5.1 Wet Coating, the Committee agreed to add toxin formation as a potential hazard and defective coating as a potential defect. It was further agreed to add new paragraphs under Technical Guidance to address the quality of batter ingredients; bacterial toxin formation in batter mixes; and the conditions of use of different types of batters. In section 10.5.5.2 a new paragraph was added concerning breadcrumb formulation and particle size.

37) A new sub-section on Frying was added to section 10.5.6 Pre-frying in order to clarify the conditions under which frying was necessary and how it should be controlled.

38) The Committee agreed to advance the Proposed Draft Section 10 to Step 5 with the recommendation that the Commission omit Steps 6 and 7 and adopt it at Step 8 (see Appendix II)

SECTIONS 2.7 AND 11. PROCESSING OF SALTED FISH

39) The Committee recalled that at its last Session it had agreed to return the sections on salted fish to Step 3 for further comments and consideration at this Session. A revised document prepared by Norway in cooperation with Canada and based on comments made at previous sessions was presented in CRD 15 and used as a basis for discussion.

40) The Delegation of Norway introduced the document and explained that a new section on drying had been introduced in order to make the code consistent with the Codex Standard for Salted Fish and Dried Salted Fish and as a consequence proposed to rename section 11 as Processing of Salted Fish and Dried Salted Fish.

41) The Committee agreed to consider the text section by section and made the following amendments and comments in addition to editorial changes.

Section 2.7 Definitions

42) The Committee agreed to delete reference to excess in the definition for dry-salting; to delete the definition for salt cured fish as it did not appear in the text; and to delete the definitions of heavily, medium, lightly and very lightly salted as they were already included in the Standard for Salted Atlantic Herring and Salted Sprat.

Section 11.1 General

43) The Committee agreed to replace “scombrotoxic fish” with “fish that accumulate histamine” in order to clarify that several species other than those of the Scombroid family could accumulate histamine and that this amendment would apply throughout the text.

Section 11.2.4 Nobbing and Section 11.2.5 Gibbing

44) In response to the question raised on the use of the terms “nobbing” and “gibbing”, it was explained that these were terms specific for this process and that they were thus appropriate and were clearly defined.

Section 11.3.2

45) It was agreed to replace “pink” and “dun” with “bacteria” and “mould” since these terms were not widely understood and to apply this amendment throughout the text.

Section 11.3.1 Salt Requirements

46) It was agreed to delete some of the provisions for salt requirements since these were overly prescriptive and to indicate that salt used as an ingredient needed to be of food grade.

Section 11.4.4 Dry-salting

47) It was agreed to delete reference to a specific temperature and to indicate that salted fish should be stored or maintained at a temperature to prevent possible histamine formation in order to allow for different practices.

Section 11.5 Drying

48) It was agreed to delete reference to drying times and temperatures to accommodate different processing practices.

Appendix VI

49) The Committee agreed to add the *Pollachius pollachius* to the list of fish used to produce salted and dried salted fish.

50) The Committee agreed to advance the Proposed Draft Section 2.7 and 11 to Step 5 with the recommendation that the Commission omit Steps 6 and 7 and adopt it at Step 8 (see Appendix II).

SECTION 13. PROCESSING OF LOBSTERS AND CRABS

51) The Committee recalled that its last session had returned the section to Step 3 for further comments and consideration. The Delegation of the United States, referring to its written comments (CX/FFP 06/28/6-Add.2) proposed to divide section 13 into two separate sections for lobsters and for crabs, in order to facilitate the use of the Code and make the sections shorter, and pointed out that two new sections had been added on the processing of cooked fresh and frozen crab. The Committee supported the proposal to develop two separate sections on crabs and lobsters.

52) The Delegation of the United States also pointed out that extensive comments had been made in order to provide more technical guidance at several processing steps. The Committee agreed to introduce most of these amendments, with some additional amendments put forward in other written comments and in the discussion, while noting that several changes would apply to both new sections. The Committee considered the text section by section and made the following amendments to Appendix IX, ALINORM 05/28/18.

53) The second paragraph of section 13 applying to Lobsters was amended in order to ensure consistency with the *Standard for Quick Frozen Lobsters* as regards the species covered, and especially the Norwegian lobster and squat lobster.

54) In section 13.1.2 Hygiene Control Programme, the Delegation of the United States, supported by several delegations, proposed to retain the provisions on chlorinated water without square brackets. The Delegation of the European Community expressed the view that the use of chlorinated water should not be allowed in the Code at this stage and that there was a need for a more comprehensive discussion on the use of chlorinated water in relation to food safety. The Delegation therefore proposed that only potable water should be used for cleaning lobsters and crabs.

55) Some delegations pointed out that this issue had been discussed in previous sessions and that the Committee had concluded that the use of chlorinated water was safe, on the basis of a document prepared by WHO and FAO. In reply to a question concerning the discussion of chlorinated water in the CCFAC, the Secretariat indicated that FAO and WHO were in the process of preparing a joint Expert Consultation on the Uses of Active Chlorine, on the basis of the terms of reference that had been prepared by the Committee on Food Hygiene and the Committee on Food Additives and Contaminants in 2005.

56) The Representative of FAO drew the attention of the Committee to the Draft FAO/WHO *Guide on the Use of Chlorination in Fish Processing* and pointed out that chlorinated water should not be used to hide inadequate manufacturing practices or result in adverse effects to health.

57) The Committee agreed to retain the current text without square brackets and noted that this question would be discussed further when finalizing the section at the next session. In order to clarify the use of chlorinated water, the Committee also agreed with the proposal of the Delegation of South Africa to refer to a “concentration that would prevent chlorine tainting” in the first indent and to refer to the WHO/FAO Guide in the second indent. The Committee agreed to proceed similarly throughout the text when reference was made to chlorinated water. The Delegation of the European Community, referring to its written comments, maintained its reservation on this question and on the reference to chlorinated water in all relevant sections.

58) In the same section, the Committee agreed to add a new paragraph under Technical Guidance concerning the prevention of cross contamination between cooked and raw material.

59) The Delegation of the United States recalled that the Committee had earlier agreed to develop an Annex including all potential hazards for fish and fishery products and proposed to retain in the current section only the hazards which were specific to crabs and lobsters and to revise the information on defects to add in particular discoloration in crabs and lobsters. The Committee agreed with this proposal.

60) As regards parasites, the Committee discussed whether the Code should apply to fresh water species and, although the Scope of the Code itself includes both marine and fresh water species, some delegations pointed out that the species covered by the scope of the present section did not include fresh water crabs and lobsters, and therefore the reference to parasites was deleted.

61) The Committee also included new text on the description of hazards, as proposed by the Delegation of Canada in CRD 4, on *Listeria monocytogenes*; veterinary drugs residues; and biotoxins.

62) In the Flow Chart for frozen raw lobsters (Figure 13.1) a box on “Application of Additives” was inserted to connect the box on “Additives Storage” and the box on “Tailing” to reflect the use of additives at this stage, and a box on “Glazing” was inserted between the “Freezing” and the “Packaging” steps.

63) Some changes in wording were made throughout section 13.3.1 in order to clarify the hazards and technical guidance such as biotoxins, veterinary drugs residues, cross contamination, and the conditions of live lobster holding.

64) In the section on Labelling, the Committee added new technical guidance concerning the use of sulphites, in order to ensure consistency with the section on shrimps and prawns.

65) The Committee agreed to correct the sequence of the “Glazing” and “Packaging” steps in the Flow Chart (Figure 13.2) for cooked lobsters for clarification purposes

66) In section 13.3.2.5 the technical guidance on cross contamination was reworded as a separate indent to highlight its importance and some potential hazards and technical guidance were clarified throughout the section.

67) The Committee agreed that the amendments applying both to lobsters and to crabs would be introduced in the section on crabs. However, the additional provisions for crabs were not discussed in detail at the present session. The Committee recognized that substantial progress had been achieved, and that the provisions on crabs did not raise controversial issues but would require further detailed consideration prior to finalisation at the next session. The Committee therefore agreed to advance the Sections on Lobsters and on Crabs to Step 5 (see Appendix III), with the understanding that members would have the opportunity to provide detailed comments at Step 6. The Delegation of the European Community reserved its position on this decision following earlier discussion on the use of chlorinated water.

SECTION 7 – LIVE AND [RAW] BIVALVE MOLLUSCS

68) The Committee recalled that its 26th Session had not discussed the section due to time constraints and had returned it to Step 3 for comments. The Committee considered this section in the light of the advice provided by the WHO/FAO/IOC Expert Consultation on Biotoxins in Molluscan Bivalves and the recommendations of the Working Group on Biotoxins that had been held between the sessions to consider how to integrate the advice of the Consultation into the Proposed Draft Standard for Live and Raw Bivalve

Molluscs and the Code (see also Agenda Item 6). The Committee expressed its appreciation to the Delegation of Canada and to the Working Group for their excellent work and useful advice.

69) The Committee considered the text in Appendix IX of ALINORM 05/28/18 section by section and made the following amendments and comments.

70) The Committee agreed to delete the square brackets and retain the current title, following its earlier discussion on the title and scope of the Proposed Draft Standard. The Committee discussed whether the Code should be divided into two separate sections for live and for raw bivalves, to reflect the structure of the standard but at this stage agreed to consider the code in its present structure rather than returning it for further redrafting in order to facilitate progress.

Definitions

71) The Committee agreed to make the following changes to the definitions: as regards “distribution centres” it was clarified that molluscs were also dispatched alive from such establishments; “purification” was replaced with “deuration”; and the definition of “Post Harvest Treated Bivalve Molluscs” was deleted as the process was described in detail under section 7.7. The Committee also agreed to replace this term with “processing to reduce or limit target organisms” throughout the text.

Section 7.1 General remarks, Additions to the prerequisite Programme

72) In addition to editorial changes and consequential amendments to the terminology for consistency with the definitions, the Committee clarified the use of indicators of faecal contamination in the 4th paragraph and the conditions for relaying in the 5th paragraph.

Section 7.2 Classification and Monitoring of Growing Areas

73) The list of hazards was amended to reflect current terminology and the classification of biotoxins. The last sentence of section 7.2.1 was deleted in order to avoid confusion concerning the presence of *Vibrio* and viruses as related to indicators of faecal contamination.

74) In section 7.2.2., two first indents, the Committee agreed that monitoring should be carried out “at an appropriate frequency based on the risk of contamination” as the term “frequent monitoring” was unclear.

75) In the last indent of the section, it was clarified that the conformity of bivalves with end product specification “can be determined by direct examination of the mollusc’s flesh or through adequate monitoring of the water”.

76) In section 7.2.2.1, the Committee agreed to clarify the use of *E.coli* and coliforms as indicators, to add a new sentence concerning the presence of viruses, and to retain the last sentence on bacteriophage and viral detection without square brackets.

Section 7.2.2.3 Marine Biotoxin Control

77) In the first paragraph, the Committee agreed to clarify the frequency of monitoring and to add a new sentence on the need to monitor growing areas for environmental signals of toxic event. On the basis of the recommendations of the Working Group and the Expert Consultation, new technical guidance was added on phytoplankton monitoring; the use of indicator shellfish species; and sampling.

78) In section 7.2.2.4 Chemical Contaminants, the Committee agreed with the proposal of the Delegation of New Zealand to insert a new paragraph to clarify the conditions of monitoring for chemical contaminants, especially taking into account the presence of sources of chemical contamination in the area concerned.

Section 7.3 Harvesting and Transportation of Live Bivalve Molluscs

79) The Committee amended the first paragraph to reflect that the section also included processing to reduce or limit target organisms, and added technical guidance in the third indent concerning the need to prevent discharge of human waste from vessels and the presence of animal on harvest vessels.

Section 7.4 Relaying

80) The Committee added some new text on relaying methods at the end of the first paragraph in order to clarify the difference between relaying and purification; technical guidance as regards the separation of

relaying areas from the bivalve in adjacent waters; and the monitoring of relaying sites for sources of contamination

Section 7.5 Depuration

81) The Committee agreed to change the title to “depuration” in view of its earlier decision under Definitions and it was clarified in the first indent that depuration takes place only in tanks.

Section 7.6 Processing of Bivalve Molluscs in a Distribution Centre or an Establishment

82) The Committee agreed with the proposal of the Delegation of the United States to insert a new paragraph and to modify the current text to explain that some countries have “distribution centres” from which bivalve molluscs must be dispatched alive but other countries have establishments from which bivalve molluscs may be dispatched either alive or raw, and that the code of practice should take into account the practices existing in different countries.

83) In section 7.6.1 Reception, the Committee agreed that viable parasites should be listed as defects instead of hazards and clarified the technical guidance as regards distribution centres and other establishments.

84) In section 7.6.2, the title was simplified and new technical guidance was added as regards the use of natural sites for conditioning.

Section 7.6.4 Packing and Labelling

85) The Committee agreed to insert general recommendations on the prevention of contamination at the beginning of the section. The Delegation of the United States proposed to divide the section into two sub-sections applying respectively to live and to raw molluscs and to transfer the text to a new sub-section at the end of section 7. The Committee agreed with the proposal in principle but recognized that at this stage further redrafting might delay progress. It was therefore agreed to proceed with the review of the sections without changing the structure of the code, dividing section 7.6.4 as it was currently presented, and integrating the additional technical guidance proposed in the written comments of the United States, with the understanding that further changes could be made when finalizing Section 7 at the next session. It was agreed to proceed similarly for sections 7.6.5 Storage and 7.6.6 Distribution.

Section 7.7 Post Harvest Treatment

86) Following its earlier decision on definitions, the Committee agreed to refer to “processing to reduce or limit target organisms” in the title and throughout the text, and made some further amendments to the first paragraph, hazards and technical guidance for clarification purposes. It was further agreed to delete the three last paragraphs as these recommendations were covered in other sections. In reply to the question on the meaning of “limit”, it was explained that “limit” meant giving a shock to target microorganisms to stop their growth, and not necessarily to reduce the level of target microorganisms.

87) In section 7.7.1, the entire text of the “Technical Guidance” was deleted as it would be confusing to link heat treatment to “purification”. However, the third indent was retained and transferred to section 7.7 as it provided useful advice on heat treatment processing.

88) The Committee agreed to add a new section 7.8 Shucking, including a new sub-section 7.8.1 Hand and Mechanical Shucking and Washing, followed by the current section 7.7.2, renumbered as 7.8.2, in order to provide more specific guidance on this step of the process, as proposed by the Delegation of the United States.

Other matters

89) The Committee noted that some provisions on freezing in the Process Definition had been deleted from the Proposed Draft Standard and should be considered or further developed for inclusion in the Code at a later stage.

90) The Committee, recognizing that substantial progress had been made at the present session, agreed to advance the Proposed Draft Section 7 to Step 5 (see Appendix IV)

Status of the Proposed Draft Code of Practice for Fish and Fishery Products

91) The Committee agreed to advance Section 2.7 Definitions, Section 10.4 and 10.5 Quick Frozen Coated Fish and Fishery Products, and Section 11 Salted Fish to Step 5/8 for adoption by the 30th Session of the Codex Alimentarius Commission (see Appendix II).

92) The Committee agreed to advance Section 2.9 Definitions, Section 7. Live and Raw Bivalve Molluscs, Section 13. Lobsters and the Section on Crabs to Step 5 (see Appendix IV) and to return to Step 3 Section 12 Smoked Fish, that was not discussed at the present session (see Appendix VI).

PROPOSED DRAFT STANDARD FOR LIVE AND RAW BIVALVE MOLLUSCS (Agenda Item 6)⁷

93) The Committee recalled that at its last session it had agreed to return this Proposed Draft Standard to Step 3 for further comments and redrafting by the Delegation of the United States for consideration at this Session. It further recalled that it had agreed to establish a working group, chaired by Canada that would examine the advice of the WHO/FAO/IOC *ad hoc* Expert Consultation on Biotoxins in Molluscan Bivalves and prepare a discussion paper for consideration by this Committee and to amongst others make recommendations for consideration by the Committee to integrate the advice into the Proposed Draft standard and the relevant sections on the Code on Live and Raw Bivalve Molluscs.

94) The Delegation of Canada introduced the report and explained the principles on which the recommendations were based and that marine biotoxins were classified into groups based on chemical structure and that no recommendations were made for groups of biotoxins that were not currently implicated in human illness. The Representative of FAO recommended that countries consult the report as it contained the most updated work in this area and had excellent recommendations. The Delegation of France indicated that comments in paragraph 30 of the report did not fully reflect the discussions at the meeting and that there was no proof of toxicity of cyclic imines to humans.

95) The recommendations of the report were considered in the relevant sections of the Proposed Draft Standard.

96) The Committee considered the Proposed Draft Standard section by section and in addition to editorial changes and changes to ensure consistency between parts I and II and other fish standards, made the following amendments and comments.

Scope

97) The scope was amended to clarify that the Standard did not apply to scallops when the final product is the adductor muscle only, as agreed at the last session. The Committee did not agree to the proposal of the Delegation of Peru to extend the scope to include additional species since it was clarified that regulatory programmes were structured to cover water quality, which would not apply to those non-filter feeders as proposed.

PART I – LIVE BIVALVE MOLLUSCS

Section I-2.3 Process Definition

98) This section was amended in order to indicate that depuration and relaying were both purification measures.

Section I-3.1 Bivalve Molluscs

99) The Committee agreed to amend this section to clarify that acceptability of molluscs included several other characteristics other than visual characteristics.

Section I-5 Hygiene and Handling

100) The Committee agreed to amend this section to include the standard wording as provided for in the Codex Procedural Manual for commodity standards. The Committee accepted the general approach proposed

⁷ CL 2006/7-FFP, CX/FFP 06/28/6 (comments of Australia, Brazil, Canada, EC, New Zealand, Japan, Peru), CX/FFP 06/28/6 Add.1 (Report of the Working Group Meeting to Assess the Advice from the Joint FAO/WHO/IOC *ad hoc* Expert Consultation on Biotoxins in Bivalve Molluscs), CRD 6 (comments of Thailand), CRD 9 (comments of Kenya), CRD 11 (comments of Norway)

by the Delegation of Australia. The testing regimes for the determination of faecal coliforms and *E.coli* were therefore clarified by accepting the proposal of the Delegation of Australia as presented in their written comments to replace the first regime and to retain the second, but to align its format with that of the first. The reference to enteric pathogenic viruses was deleted since reliable indicator methods for viruses did not exist and specifications for *Vibrio parahaemolyticus* were included.

101) Recommendations of the biotoxin working group were taken into account to revise the clauses relating to identification of marine biotoxin groups and corresponding action levels.

102) The Committee noted several other recommendations from the working group in relation to the undertaking of studies of the toxicity of several toxin groups, including spirolides by members so that the Committee could request WHO/FAO to undertake a risk assessment on these toxins and the request to WHO/FAO to develop a practical manual and training for biotoxin monitoring programs. The Delegation of Japan requested FAO/WHO to reevaluate Azaspiracids and Brevetoxins because there was a large difference between the guidance level for Azaspiracids recommended by the Expert Consultation and the limit in the Proposed Draft Standard, and there was no Brevetoxin limit recommended by the Expert Consultation. Several delegations supported the development of a training manual and emphasized the need for training not only of laboratory personnel, but also for personnel involved with monitoring. The Representative of FAO noted the recommendations and indicated that the development of the training manual would depend on availability of resources.

Section I-6.1 The Name of the Food

103) The Committee agreed to remove the square brackets and to retain the text to indicate that the label of the food should be the common or usual name of the species of bivalve molluscs.

Section I-6.4 Labelling of Containers

104) The section was renamed to read “Labelling of non-retail containers” and the proposal of the Delegation of EC as amended by the Delegation of Canada to include information on clear identification, traceability/product tracing and durability was agreed to. The Delegation of the European Community emphasized that in their interpretation clear identification of the product included the use of scientific names.

Section I-7.1 Sampling

105) The Committee agreed to add a new subsection to take into account the recommendation of the working group to include the principles identified in the Expert Consultation regarding the portion of shellfish to be analyzed and agreed not to specify the type of data needed to support the conversion factor.

Section I-7.5 Determination of Biotoxins

106) The Committee agreed to insert a table of appropriate methods with an introductory paragraph to clarify that several chemical and instrumental methods as well as functional assays were in use although they were not fully validated. The Committee agreed to refer to the AOAC Method 2005.06 rather than to the “Lawrence method”. It was further agreed, after the proposal of the Delegation of Norway, to insert a footnote to clarify that false positives may occur in mouse bioassays for lipophilic biotoxins due to the presence of certain substances including certain non-hazardous biotoxin groups and that internationally validated methods should be used to confirm the types of biotoxins present when false positives were suspected.

107) The Committee noted the concern of the Delegation of Thailand with regard to the availability of reference material and the capability of developing countries to apply the some of the methods proposed that require costly equipment.

Section I-7.4 Methods of Analysis of *Escherichia coli* and faecal coliforms in shellfish meats

108) The Committee agreed to the proposal of the Delegation of the European Community to replace the methods for *E.coli* with the more updated ISO/TS 16649-3 Standard – Enumeration of beta glucuronidase-positive *Escherichia coli* in live bivalve molluscs.

PART II – RAW BIVALVE MOLLUSCS

II-2.2 Process Definition

109) The Committee agreed to delete the detail with regard to the freezing process and to consider this further in the related Code of Practice.

Section II-4 Food Additives

110) After clarification by the Secretariat that no provisions for antioxidants at GMP levels were provided for in the General Standard for Food Additives, the Committee agreed to delete reference to GMP. It was noted that some antioxidants and other additives such as colours were allowed at numerical levels in the GSFA in the food categories concerned. As no proposals were made at the present session, the Committee agreed to put the section in square brackets and ask for further comments on the additives for use in bivalve molluscs.

Status of the Proposed Draft Standard for Live and Raw Bivalve Molluscs

111) The Committee agreed to advance the Proposed Draft Standard to Step 5 for adoption by the 30th Session of the Commission (see Appendix V). The sections on hygiene, methods of analysis and labelling would be sent to the relevant committees for endorsement. The Committee indicated that this Standard would be finalized at its 29th Session in 2008.

PROPOSED DRAFT STANDARD FOR QUICK FROZEN SCALLOP ADDUCTOR MUSCLE MEAT (Agenda Item 7)⁸

112) The Committee could not discuss this item due to time constraints and agreed that its consideration would be deferred to its next session.

PROPOSED DRAFT STANDARD FOR SMOKED FISH (Agenda Item 8)⁹

113) The Committee recalled that the proposed draft standard had been returned to Step 3 for circulation for comments and consideration at this Session. The Delegation of Denmark introduced the proposed draft standard and indicated that the extension of the scope to include the introduction of liquid smoked products and the definition of liquid smoking still had to be addressed.

114) The Committee agreed to consider the proposed draft standard section by section and made the following comments.

115) The Delegation of South Africa in recognizing that the application of liquid smoke was valid and that hazards inherent in the process are similar to those present in traditionally smoked products, but that there was a noticeable difference in flavour, proposed to amend the title of the standard to read “Standard for ready-to-eat smoked and smoke-flavoured fish” to avoid misleading the consumer. The amendment of the title was supported by several delegations.

116) The Delegation of New Zealand supported by several delegations, referring to its written comments, further elaborated on the rationale for the inclusion of liquid smoked products in this proposed draft standard and indicated that its exclusion may necessitate the development of another standard for liquid smoked fish very similar in nature to this standard which would further unnecessarily increase the workload of the Committee.

117) The Delegation of the European Community supported by several other delegations was opposed to the extension of the scope to include products flavoured with liquid smoke as these products differed significantly from traditionally smoked products and would be confusing for consumers. It was proposed that such products be covered by a separate standard.

118) The Delegation of Canada drew the attention of the Committee to the experience of the Committee with the development of a standard for raw and live molluscs and proposed that a similar approach be taken

⁸ CX/FFP 06/28/7 (European Community, United States), CRD 16 (comments of the EC)

⁹ ALINORM 05/28/18 Appendix V, CL 2005/14-FFP, CX/FFP 06/28/8 (comments from European Community, New Zealand, United States) CRD 7 (comments from Canada, Kenya and South Africa), CRD 16 (comments from the European Community), CRD 20 (comments from Ghana)

where the current standard could be dealt with in two parts to address both traditionally smoked and smoke-flavoured products. This proposal was supported by several delegations

119) The Delegations of Kenya and Ghana also drew the attention of the Committee to a range of other products that were first dried and then smoked or were not necessarily ready-to-eat, that would also need consideration.

120) Several delegations supported a proposal to establish an electronic working group to explore the various points raised for the inclusion or exclusion of liquid smoked products and their consequences and to consider other types of products that may have been excluded from the discussion and to recommend to the next Session of the Committee whether one or two separate standards would need to be elaborated. Other delegations were of the view that the electronic working group should elaborate a text for ready-to-eat smoked fish or to work within the current scope, but to consider all comments made for inclusion of smoke-flavoured products.

Status of the Proposed Draft Standard for Smoked Fish

121) In view of the lack of consensus on the scope, it was agreed to suspend further discussion on this item and to establish an electronic working group led by the Delegation of the Netherlands that would revise the current proposed draft standard taking into account all comments submitted and discussion at this Session of the Committee for circulation at Step 3 for comments and further consideration by the next session of the Committee. In addition it would collect and collate data on all other types of products and make recommendations for consideration by the Committee on whether other products should be included in the current proposed draft standard or whether there was a need for the development of a new standard to cover products other than those already covered in the standard.

PROPOSED DRAFT CODE OF PRACTICE FOR THE PROCESSING OF SCALLOP MEAT (Agenda Item 9)¹⁰

122) The Committee could not discuss this item due to time constraints and agreed that its consideration would be deferred to its next session.

DISCUSSION PAPER ON THE PROCEDURE FOR THE INCLUSION OF ADDITIONAL SPECIES IN STANDARDS FOR FISH AND FISHERY PRODUCTS (Agenda Item 10)¹¹

123) As discussed under item 3, it was agreed to propose this item as new work and to submit the project document (Appendix 2 of CX/FFP 06/28/10) for consideration by the Commission. Pending approval by the Commission, the Delegation of France kindly offered to lead the development of this work based on Appendix 1 of CX/FFP 06/28/10 with assistance of several other delegations and to prepare the revision to the inclusion procedure for circulation for comments at Step 3 and further discussion by the next session of the Committee.

DISCUSSION PAPER ON AN AMENDMENT TO THE LABELLING SECTION IN THE STANDARD FOR CANNED SARDINES AND SARDINE-TYPE PRODUCTS (Agenda Item 11)¹²

124) The Committee agreed not to consider further amendments to the section on labelling as proposed in the discussion paper prepared by Morocco, taking into account the agreement reached under Agenda Item 3.

¹⁰ CX/FFP 06/28/9, CX/FFP 06/28/9-Add.1 (comments of United States), CRD 8 (comments of Japan, Kenya)

¹¹ CX/FFP 06/28/10, CRD 25 (Recommendations of the working group)

¹² CX/FFP 06/28/11, CRD 11 (comments of Brazil)

OTHER BUSINESS, FUTURE WORK AND DATE AND PLACE OF THE NEXT SESSION (Agenda Item 12)¹³

125) Four proposals for new work were submitted to the Committee for its consideration

PROPOSED STANDARD FOR FISH SAUCE

126) The Delegation of Vietnam drew the attention of the Committee to the fact that fish sauces, traditionally a product of Asian countries was now consumed and traded internationally. These products were however traded under several different names and were governed by a number of different national standards that were affecting international trade and that there was a need to elaborate an international standard for fish sauces to provide guidance relating to food safety and quality. The Delegation of Thailand reiterated the need for the standard and noted that in future a relevant code of practice for these products should also be considered.

127) The Committee agreed to this proposal and agreed to submit the project document as prepared by the Delegations of Vietnam and Thailand to the 30th Session of the Commission for adoption as new work. Pending the decision of the Commission, the Delegations of Vietnam and Thailand, with the assistance of China, Germany and Indonesia, would elaborate a proposed draft standard for circulation at Step 3 for comments and consideration by the next Session of the Committee.

INCLUSION OF INTERIM NITROGEN FACTORS OF ADDITIONAL FISH SPECIES

128) The Delegation of Thailand reminded the Committee of its previous conclusion that fish content should be declared on the label for the benefit of consumers and that the Delegation of Thailand had previously expressed its view that the list of fish species in Table 2 of the Amendment to the Labelling Section of the Standard of Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets – Breaded or in Batter needed to be revised since only nitrogen factors of white fish from temperate waters were specified. Several tropical fish are also used to manufacture these products and Thailand was in the process of determining interim nitrogen factors of several of these species. The inclusion of these nitrogen factors would provide information to consumers and ensure fair trade practices.

129) The Committee agreed to submit the project document as presented in CRD 26 to the 30th Session of the Commission for adoption as new work. The Delegation of Thailand with assistance of other interested countries would be tasked with preparing a proposed draft standard for circulation at Step 3 for comments and consideration by the next Session of the Committee.

PROPOSAL FOR THE INCLUSION OF THE SPECIES *Opisthonema libertate*, *Opisthonema bulleri*, *Opisthonema medirastre* and *Opisthonema berlangai* IN THE STANDARD FOR CANNED SARDINES AND SARDINE-TYPE PRODUCTS

130) The Delegation of Ecuador introduced the proposal for new work as outlined in CRD 19 and indicated the importance of the species mentioned to the economy of Ecuador. The Committee agreed that more information data was necessary to assess this proposal and invited the Delegation of Ecuador to resubmit a new project document outlining all the elements as prescribed in the Procedural Manual and the procedure for the inclusion of species for consideration by the next Session of the Committee.

STANDARD FOR FRESH/LIVE AND FROZEN ABALONE (*Haliotis* spp)

131) The Delegation of South Africa informed the Committee of the significance of this product in international trade and that currently criteria for bivalve molluscs were being applied to abalone, since gastropods were being considered under legislation for bivalve molluscs in many countries. Since these criteria were not applicable a separate standard for these products was warranted. This proposal was supported by several delegations.

¹³ CRD 19 (Proposal for the inclusion of the species *Ophistonema libertate*, *Ophistonema bulleri*, *Ophistonema medirastre* and *Ophistonema berlangai* in the Codex Standard for Canned Sardines and Sardine-Type Products, prepared by Ecuador), CRD 22 (Proposal for New Work on the Standard for Fresh/Live and Frozen Abalone (*Haliotis* spp), prepared by South Africa with support from Australia, Mexico, Chile and USA), CRD 24 (Proposal for new work on the Standard for Fish Sauce, prepared by Vietnam and Thailand), CRD 26 (Proposal for the inclusion of interim nitrogen factors of additional fish species in the Table 2 of the amendment to the labeling section of the Standard of Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets – Breaded or in Batter, prepared by Thailand)

132) The Delegation of New Zealand supported by several other delegations was of the opinion that the scope of the proposed new work was too narrow and should include other gastropods. The Chairperson pointed out that the extension of the scope would require a new project document which would delay the process and proposed that in view of the importance of this particular product in international trade, that the proposal be accepted with its current scope and at a later stage consideration could be given to the inclusion of other gastropods. The proposal by the Delegation of Canada to expand the scope to other gastropods, but to place emphasis on abalone in view of the difficulty in expanding the scope once established was not agreed to.

133) The Committee after considering the relevance of the product agreed to forward the project document to the 30th Session of the Commission for adoption as new work and requested the Delegation of South Africa, pending the decision of the Commission, to elaborate a proposed draft standard for circulation at Step 3 for comments and consideration by the next Session of the Committee, with the assistance of interested countries.

DATE AND PLACE OF NEXT SESSION

134) The Committee noted that the next Session was tentatively scheduled to be held in Norway in late March or early April 2008 subject to confirmation by the host Government and the Codex Secretariat. The Committee was also informed of the intention to extend the next Session by one working day in order to allow progress on the extensive agenda of this Committee.

135) The Committee noted the offer of the Delegation of Morocco to host the 30th Session of this Committee in Morocco.

SUMMARY STATUS OF WORK

Subject Matter	Step	Action by	Document Reference in ALINORM 07/30/18
Proposed Draft Code of Practice for Fish and Fishery Products (Quick Frozen Coated Products, Salted Fish)	5/8	Governments 30 th CAC	para. 91 Appendix II
Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products	5A	Governments 30 th CAC	para.. 12 Appendix III
Proposed Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs, Lobsters and Crabs)	5	Governments 30 th CAC	para. 92 Appendix IV
Proposed Draft Standard for Live and Raw Bivalve Molluscs	5	Governments 30 th CAC	para. 111 Appendix V
Draft Standard for Sturgeon Caviar	6	Governments 29 th CCFFP	para. 26 Appendix VII
Proposed Draft Standard for Smoked Fish	2/3	Governments 29 th CCFFP	para. 121
Proposed Draft Code of Practice for Fish and Fishery Products (other sections)	3	Governments 29 th CCFFP	para. 92 Appendix VI
Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat	4	29 th CCFFP	para. 112
Proposed Draft Code of Practice on the Processing of Scallop Meat	4	29 th CCFFP	para. 122
Revision of the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products	1/2/3	30 th CAC Governments 29 th CCFFP	para. 123
Proposed Draft Standard for Fish Sauce			para. 129
Amendment to the Standard for Quick Frozen Fish Sticks (Nitrogen Factors)			para. 127
Proposed Draft Standard for Fresh/Live and Frozen Abalone			para. 133

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PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

(At Step 5/8 of the Procedure)

SECTION 2. DEFINITIONS FOR THE PURPOSE OF THIS CODE

2.7 SALTED AND DRIED SALTED FISH

Barrel	a cylindrical container made from wood or plastic or other suitable food contact material with a lid for water-tight closure
Black membrane	Parietal peritoneum, the pigmented lining of the abdominal cavity
Brine	solution of salt in water;
Brine Injection	is the process for injecting brine directly into the fish flesh;
Brining	means the process of placing fish in brine for a period of sufficient length for the fish tissue to absorb a specific quantity of salt;
Dry-Salting	is the process of mixing fish with suitable food grade salt and stacking the fish in such a manner that the resulting brine drains away;
Dun	a discoloration and a development of the mould <i>Sporendonema epizoum</i> which affect the fish surface and make it look like peppered. The fish flesh is unaffected;
Fatty Fish	is fish in which the main reserves of fat are in the body tissue and the fat content is more than 2%
Gibbing	the process of removing the gills, long gut and stomach from fatty fish, such as herring, by inserting a knife or using hands at the gills; the milt or roe and some of the pyloric caeca are left in the fish;
Lean Fish (White Fish)	is fish in which the main reserves of fat are in the liver and less than 2 % fat in the body tissue
Maturing	the process from salting until the fish is salt-matured
Nobbing	removing the head and gut from fatty fish, such as herring, in one operation by partially severing the head and pulling the head away together with attached gut, the roe or milt is left in;
Pickle	brine which may contain vinegar and spices;
Pickling	is the process whereby primary fatty fish is mixed with suitable salt which may contain vinegar and spices and stored in watertight containers under the resultant pickle which forms by solution of salt in the water extracted from the fish tissue. Pickle may be added to the container. Pickled products will always remain in a brine solution.
Pink	a discoloration caused by red halophilic bacteria which damages the fish flesh
Salt	is a crystalline product consisting predominantly of sodium chloride. It is obtained from the sea, from underground rock salt deposits or from vacuum processed and refined brine;
Salt-Matured Fish	means salted fish that has an appearance, consistency and flavour characteristic of the final product;
Salted Fish /Salted Fillet	fish /fillets which have been treated by either brining, brine injection, dry-salting, pickling or wet-salting or a combination of these;
Saturated	the water phase of the fish muscle is saturated with salt (26,4 g salt/100g water phase);

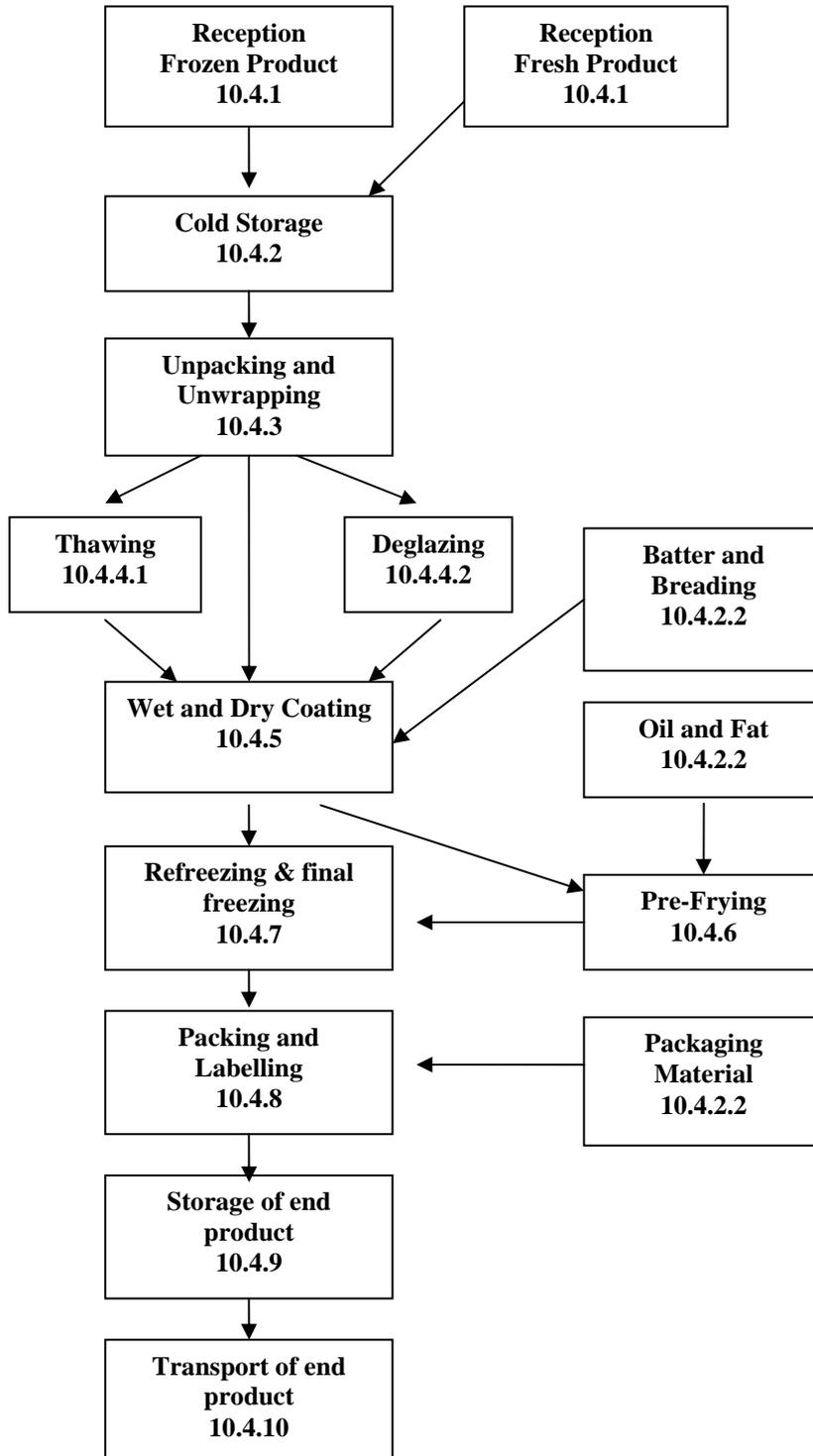
Split Fish	fish that have been cut open from throat or nape to the tail, with gills, guts, roe or milt removed. Head and whole or part of backbone may be left in or removed;
Stacking (restacking)	laying fish in piles with salt spread evenly on the surface
Wet -Salting	is the process whereby primary lean fish is mixed with suitable food grade salt and stored in watertight containers under the resultant brine which forms by solution of salt in the water extracted from the fish tissue. Brine may be added to the container. The fish can be removed from the container and stacked so that the brine drains away.

SECTION 10 - PROCESSING OF QUICK-FROZEN COATED FISH AND FISHERY PRODUCTS

(To be added to the adopted Section 10. Processing of Quick Frozen Coated Fish Products)

*This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process
References correspond to the relevant sections of the Code*

Figure 10.2
Example of a flow chart of a coated molluscan shellfish processing line



10.4 PROCESSING OPERATIONS – MOLLUSCAN SHELLFISH

Coated molluscan shellfish should be manufactured from safe and wholesome molluscs that were subject to regulation and controls of a shellfish authority having jurisdiction of the harvesting, processing and handling that ensures that they are safe to consume. Shellfish can be cooked or raw prior to the coating process and should not contain significant defects such as sand, cuts, parasites or discoloration that may affect the consumer acceptability of the finished product. The methods depicted in this subsection are typical processing techniques applied to a wide variety of molluscan shellfish that are commonly used.

Refer to figure 10.2 for an example of a flow chart for coated molluscan shellfish processing.

10.4.1 Reception

All incoming raw materials should be subject to an examination for food safety hazards and defects based on appropriate Codex Alimentarius sampling plans.

10.4.1.1 Molluscan Shellfish

Potential Hazards: chemical contamination, biotoxins, microbiological contamination;

Potential Defects: decomposition, oxidation, freezer burn, parasites, torn or damaged molluscs, packaging material, shells or pieces of shell;

Technical Guidance:

- Molluscan shellfish should be obtained from sources that are approved by a Shellfish Authority to ensure that marine biotoxins are properly controlled and that the product was handled and processed in accordance to hygienic standards and proper process control to control food safety hazards.
- Temperatures of all incoming lots should be recorded. Frozen product should be -18° C or lower. Fresh product should not exceed 4° C.;
- Packaging material of frozen products should be examined for dirt, tearing and evidence of thawing;
- Cleanliness and suitability of the transport vehicle to carry fresh and frozen molluscan shellfish products should be examined for each incoming shipment;
- Use of temperature recording devices with the shipment is recommended;
- Representative samples should be taken to assess the level of possible hazards and defects;

Refer also to Section 7 Molluscan Shellfish

10.4.1.2 Other Ingredients

See Section 10.3.1.2

10.4.1.3 Packaging Materials

See Section 10.3.1.3

10.4.2 Storage of Raw Material, Other Ingredients and Packaging Materials

10.4.2.1 Molluscan Shellfish (Frozen Storage)

See Section 10.3.2.1

10.4.2.2 Other Ingredients and Packaging Materials

See Section 10.3.2.3

10.4.2.3 Molluscan Shellfish (Refrigerated Storage)

Potential Hazards: microbiological growth, physical and chemical contamination;

Potential Defects: decomposition;

Technical Guidance:

- raw fresh molluscan shellfish should be stored between 0° C and 4° C.;
- raw fresh molluscan shellfish should be properly protected from contamination.

See Section 7.6.5

10.4.3 Unpacking and Unwrapping

See Section 10.3.4

10.4.4 Production of Coated Molluscan Shellfish

10.4.4.1 Thawing Frozen Product

Potential Hazards: microbiological growth;

Potential Defects: decomposition, product damage

Technical Guidance:

- molluscan shellfish that is frozen should be subjected to controlled conditions during the thawing process (below 4° C) that prevent the growth of pathogenic and spoilage bacteria.
- sufficient controls should be instituted to ensure that the thawing product is not subject to conditions that are not hygienic or sanitary;
- care should be taken to ensure that the raw thawed product is not subjected to conditions that cause tearing and breakage of the product;

10.4.4.2 Deglazing

Potential Hazards: contamination from dirty deglazing water

Potential Defects: thawing of product, contamination from dirty deglazing water;

Technical Guidance:

- controls should be instituted to ensure that immersion to remove ice glaze is not too long to cause the individual molluscan shellfish to thaw;
- thaw immersion water should be replaced at sufficient intervals to ensure that the product is not subject to dirt and other contaminants;

10.4.4.3 Separation of Individual Molluscan Shellfish

See Section 10.3.6

10.4.5 Coating

See Section 10.3.7

10.4.5.1 Wet Coating

See Section 10.3.7.1

10.4.5.2 Dry Coating

See Section 10.3.7.2

10.4.6 Pre-Frying

See Section 10.3.8

10.4.7 Re-Freezing – Final Freezing

See Section 10.3.9

10.4.8 Packing and Labelling

See Section 10.3.10

10.4.9 Storage of End Product

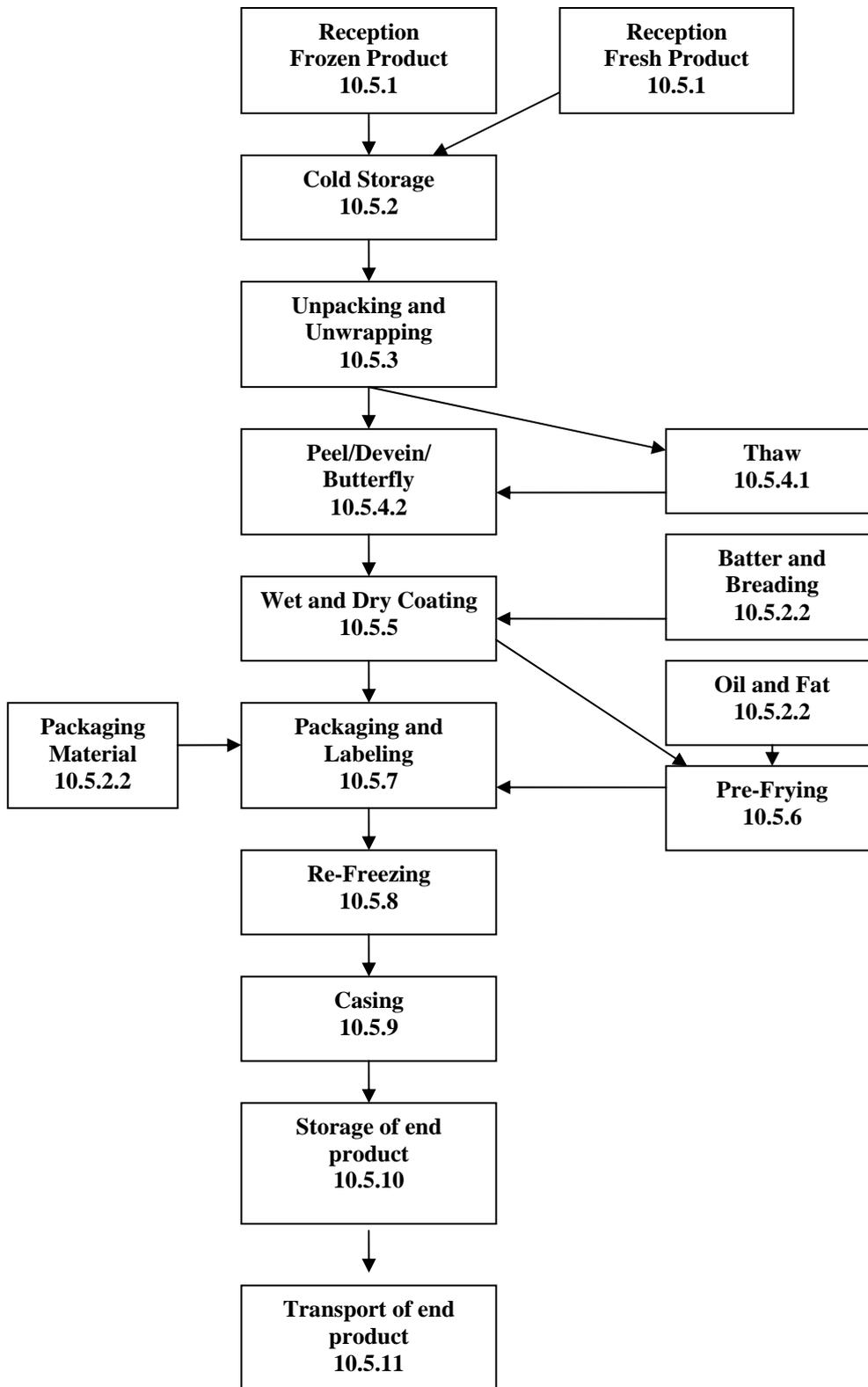
See Section 10.3.11

10.4.10 Transport of End Product

See Section 10.3.12

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.
References correspond to the relevant sections of the Code

Figure 10.3
Example of a flow chart of a coated shrimp processing line



10.5 PROCESSING OPERATIONS – COATED SHRIMP

Coated or breaded shrimp should be manufactured from good quality shrimp that have been subjected to sanitary conditions and processed under conditions that properly control food safety hazards. Coated shrimp usually are removed from their shells with the exception of the tail (telson) and with the alimentary canal or “vein” removed. They are commonly either split (butterfly style) or are round then subjected to the wet and dry coating mixtures and further processed. Production methodology of coated shrimp varies widely. The methods depicted below are commonly applied to tropical and sub-tropical shrimp breading.

Refer to Figure 10.3 for an example of a flow chart for coated shrimp processing.

10.5.1 Reception

See Section 14 Processing of Shrimp and Prawns.

All incoming raw materials should be subject to an examination for food safety hazards and defects based on appropriate Codex Alimentarius sampling plans.

10.5.1.1 Shrimp

Potential Hazards: sulfites

Potential Defects: black spot, soft flesh, inadequate head, viscera and leg removal, decomposition

Technical Guidance:

- The presence of sulfites applied to the shrimp for the purpose of preventing black spot enzyme autolysis should be controlled to ensure that the product can be labeled as containing sulfites;
- Sulphites should be used in accordance with manufacturer’s instructions and Good Manufacturing Practice;
- Raw shrimp with extensive black spot damage should be eliminated as an undesirable quality factor;
- Raw shrimp may exhibit soft flesh characteristics that result from bacterial infection that render it unsuitable for further processing. Incoming lots should be checked for this quality factor;
- Raw shrimp should not exhibit large amounts of viscera, head or leg material;
- Raw shrimp should be checked for signs of temperature abuse and decomposition that would be unsuitable in the finished product;
- Temperatures of all incoming lots should be recorded. Frozen product should be -18° C or lower. Fresh product should not exceed 4° C.;
- Packaging material of frozen products should be examined for dirt, tearing and evidence of thawing;
- Cleanliness and suitability of the transport vehicle to carry fresh and frozen shrimp products should be examined for each incoming shipment;
- Use of temperature recording devices with the shipment is recommended;
- Representative samples should be taken to assess the level of possible hazards and defects;

See Section 14.2.1

10.5.1.2 Other Ingredients

See Section 10.3.1.2

10.5.1.3 Packaging Material

See Section 10.3.1.3

10.5.2 Storage of Raw Material, Other Ingredients and Packaging Materials

10.5.2.1 Shrimp (Frozen Storage)

See Sections 10.3.2.1 and 14.2.2

10.5.2.2 Other Ingredients and Packaging Material

See Section 10.3.2.3

10.5.2.3 Shrimp (Refrigerated Storage)

Potential Hazards: *microbiological growth, physical and chemical contamination;*

Potential Defects: *decomposition;*

Technical Guidance:

- raw fresh shrimp should be stored between 0° C and 4° C;
- fresh shrimp should be properly protected from contamination;

See Section 10.3.2.2

10.5.3 Unpacking and Unwrapping

See Section 10.3.4

10.5.4 Production of Coated Shrimp

10.5.4.1 Thawing Frozen Product

Potential Hazards: *microbiological growth;*

Potential Defects: *decomposition, product damage, physical contamination*

Technical Guidance:

- Shrimp that is frozen should be subjected to controlled conditions during the thawing process (below 4° C.) that prevent the growth of pathogenic and spoilage bacteria;
- Sufficient controls should be instituted to ensure that the thawing product is not subject to conditions that are not hygienic or sanitary;
- Care should be taken to ensure that the raw thawed product is not subjected to conditions that cause tearing and breakage of the product;

10.5.4.2 Peeling, Deveining, Butterflying

Potential Hazards: *microbiological contamination, chemical contamination, metal inclusion*

Potential Defects: *presence of shell, presence of vein, poor cut, damaged flesh*

Technical Guidance:

- Since peeling of larger shrimp usually used for coating is performed by hand care should be taken to ensure that pathogenic bacteria are not transmitted from worker's hands. Careful compliance to Section 3.5 of the Codex Code of Practice on Fish and Fishery Products should be carried out;
- Thawed shrimp should be adequately protected from contamination and processed quickly so that the raw flesh does not deteriorate;
- Sufficient amounts of water should be applied to peeled shrimp to ensure that all shell remnants and veins are washed away and removed from the shrimp;

- If veins are removed by hand with a knife the product should be regularly checked to ensure that the cuts are made to product specifications;
- If the shrimp is butterfly cut by hand the product should be regularly checked to ensure that the cuts are made to product specifications;
- If the shrimp is butterfly cut by machine the cutting blades should be regularly inspected so that the cut does not result in damaged shrimp or metal inclusion;

10.5.5 Coating

See Section 10.3.7

10.5.5.1 Wet Coating

Potential Hazards: *microbiological growth and toxin production in rehydrated batter, toxin formation*

Potential Defects: *improper batter viscosity, foreign material, defective coating*

Technical Guidance:

- batter ingredient powders should be checked against buying specification and ideally sieved before use to remove any packaging and extraneous materials;
- liquid batter preparations should be properly refrigerated or discarded at regular intervals to prevent microbiological growth and toxin formation;
- batter viscosity should be monitored to ensure the proper pick-up of dry coating material. Batter that is too thin or thick may result in a coating and flesh ratio that does not meet specifications and regulatory requirements;
- note that bacterial toxin formation is a possibility in batter mixes so that usage times and temperatures should be set and cleaning schedules of equipment defined and maintained
- bags of dry batter mix should be stripped of their outer layer before being emptied into batter tanks to prevent dust and other contaminants from entering the rehydrated batter mix and into the final product.
- tempura style batters may be used in which case additional crumb coatings will probably not be applied. However, frying temperatures and times will be critical to ensure correct texture
- where batter is for adherence of a crumb coating, formulation and viscosity will be different to tempura styles

See Section 10.3.7.1

10.5.5.2 Dry Coating

Potential Hazards: *unlikely*

Potential Defects: *defective coating, improper flesh/coating ratio, foreign material*

Technical Guidance:

- breadcrumb formulation and grist, or particle size will need to be checked against buying specification and stored according to supplier instructions to avoid staling;
- individual shrimp should be well separated during the coating process to ensure complete coating of the product;
- the total coating and flesh percentages should be regularly monitored using recognized methods to ensure that the specified flesh and coating ratio is attained;

- air blowers that eliminate excess coating from the shrimp should be adjusted and regularly monitored to ensure that the proper coating level is maintained;
- individual shrimp that exhibit incomplete or defective coating should be removed;
- bags of dry coating mix should be stripped of their outer layer before being emptied into batter tanks to prevent dust and other contaminants from entering the rehydrated batter mix and into the final product;

See Section 10.3.7.2

10.5.6 Pre-Frying

See Section 10.3.8

10.5.6.1 Frying

- whilst frying is necessary for tempura batter coatings, it may not always be used for crumb coating operations, although it may aid adhesion;
- fryers should be operated by trained staff. Oil should be turned over on a regular basis to avoid oxidative rancidity;
- oil temperatures should be controlled to avoid burning crumb or fire risk

10.5.7 Packaging and Labeling

See Section 10.3.10

10.5.8 Re-Freezing – Final Freezing

Potential Hazards: unlikely

Potential Defects: poor product texture, excessive moisture migration from flesh to coating

Technical Guidance:

- blast freezing should be carried out quickly with the appropriate temperature and air flow parameters routinely monitored especially when the internal product temperature is between 0° C and -4° C in order to minimize crystallization of the flesh and the moisture migration that will occur from the flesh to the coating;

10.5.9 Casing

Potential Hazards: microbiological growth

Potential Defects: product thawing, moisture migration from flesh to coating

Technical Guidance:

- casing of the frozen containers should be carried out quickly to prevent thawing and quality problems such as texture changes of the shrimp flesh and moisture migration from the flesh to the coating;

10.5.10 Frozen Storage of End Product

See Section 10.3.11

10.5.11 Transport of End Product

See Section 10.3.12

SECTION 11 PROCESSING OF SALTED AND DRIED SALTED FISH

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

Salted fish and fish products and dried salted fish and fish products (i.e. klippfish) should be sound and wholesome, well prepared and packaged so that they will be protected from contamination and remain attractive and safe to eat. In order to maintain the quality of fish it is important to adopt quick, careful and efficient handling procedures.

11.1 GENERAL

Refer also to Section 8.1 for general handling prior to processing and figure 11.1 for an example flow chart of a salted and dried salted fish processing line.

- depending on the species for salting, fish should be completely bled as soon as practical;
- where appropriate, fresh fish intended for processing salted fish should be checked for visible parasites;
- frozen fish should not be salted before it is thoroughly thawed and inspected for suitability;
- freezing, heating or adequate combination of salt content and storage time can be used as treatment procedures for killing living parasites;
- the salt penetration will depend upon fat content, temperature, amount of salt, salt composition, brine concentration, etc.;
- when fish that accumulate histamine are being salted, exposure to temperatures that would support toxin formation by bacteria should be limited at each step in the process
- to minimise time delays, the design of processing lines, where applicable, should be continuous and sequential to permit the uniform flow without stoppages or slow-downs and removal of waste

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.

References correspond to relevant Sections of the Code

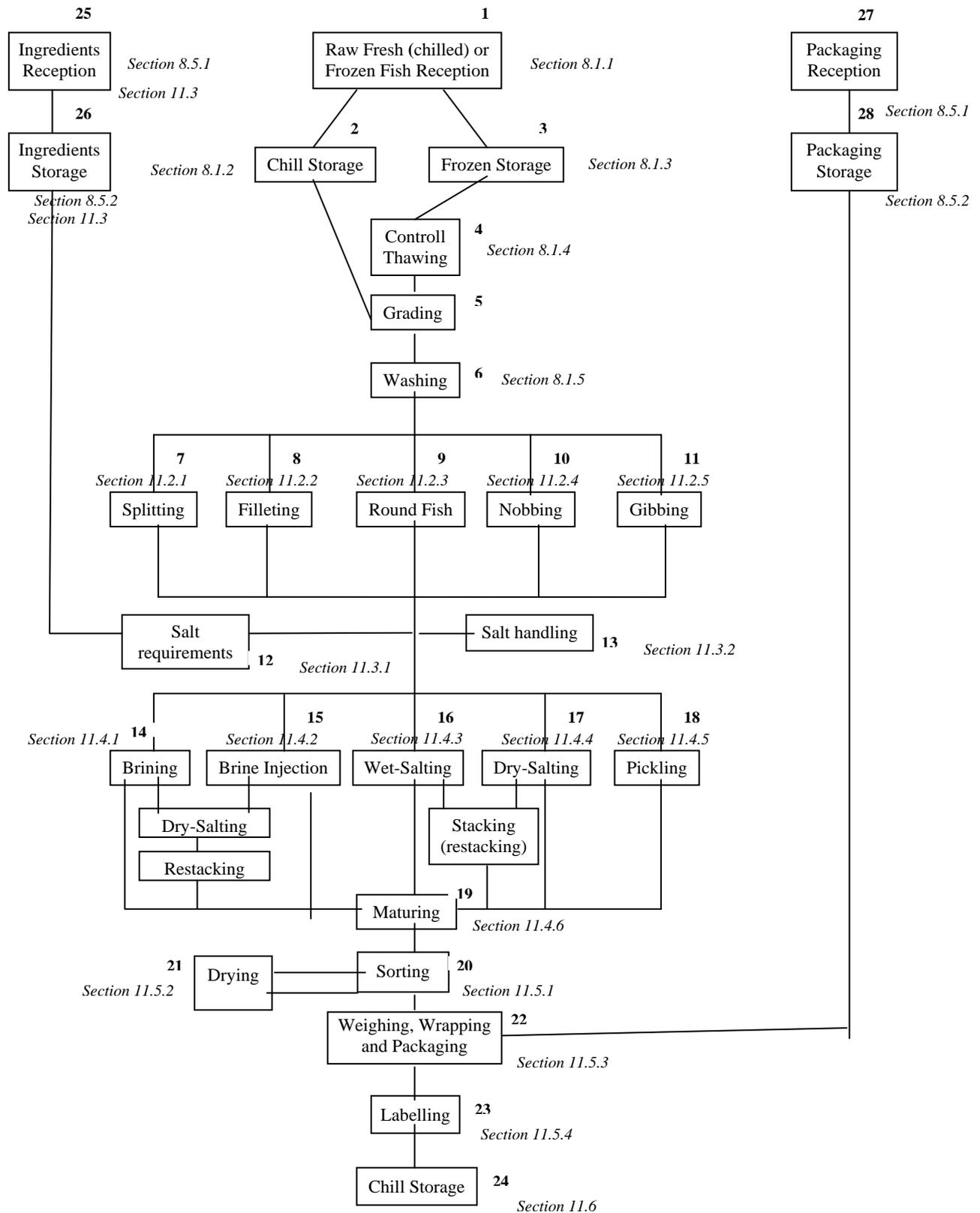


Figure 11.1 Example of flow chart of a salted and dried salted fish processing line.

11.2 PREPARING FOR SALTING

11.2.1 Splitting, Washing and Rinsing (Processing Steps 7)

Potential Hazards: *unlikely*

Potential Defects: *improper splitting*

Technical Guidance:

- fish should be split by a cut made parallel to the backbone straight down from the throat or nape to the tail and in such a way as to prevent uneven and ragged edges or a loss in recovery. If the backbone is to be removed, the fish should be split so deeply that the remains of the backbone (the tail-bone) lie free. It is important to cut the bone rather than to break it from the flesh;
- splitting of fish should be carried out expertly so that blood in nape and blood clots are removed;
- immediately after splitting, fish should be washed in plenty of running potable water or clean sea water, to remove all blood from the fish;
- all impurities, blood and livers should be removed;
- visible parasites should be removed;
- if the black membrane has to be removed, then it should be done after the splitting step

11.2.2 Filleting, Skinning and Trimming (Processing Steps 8)

Refer to Section 8.1.6.

11.2.3 Round Fish (Processing Steps 9)

Refer to Section 8.1.1 – 8.1.5.

11.2.4 Nobbing (Processing Steps 10)

Potential Hazards: *unlikely*

Potential Defects: *Remaining gut content and intestines other than roe or milt, decomposition*

Technical Guidance:

refer to section 11.2.1, 2nd bullet;

- after nobbing fish should be checked for remaining intestines;
- after nobbing fish should be thoroughly washed to remove blood, remaining intestines and scales if appropriate;
- the nobbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

11.2.5 Gibbing (Processing Steps 11)

Potential Hazards: *unlikely*

Potential Defects: *Remaining gut content, decomposition*

Technical Guidance:

refer to section 11.2.1, 2nd bullet;

- after gibbing fish should be checked for correct gibbing;

- fish with incorrect gibbing should be sorted out and used for other purposes;
- after gibbing fish should be thoroughly washed to remove blood, remaining undesirable intestines, heart, etc. and scales if appropriate;
- the gibbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

11.3 SALT HANDLING AND SALT REQUIREMENTS

11.3.1 Salt Requirements (Processing Steps 12)

Potential Hazards: chemical and physical contamination

Potential Defects: incorrect composition

Technical Guidance:

- the quality of salt used in salting of fish should possess an appropriate composition for the product;
- the composition of salt differs according to the origin. Mine salt and solar salt of marine origin contain several other salts like calcium sulphate, magnesium sulphate and chloride as impurities. Vacuum processed and refined salt is almost pure sodium chloride;
- a relatively pure salt is needed for the dry-salting of fatty fish but for some products the presence of small quantities of calcium salts will give the product a somewhat superior appearance. Too much calcium may reduce the rate of salt penetration to an extent that spoilage may occur;
- magnesium salts if present at too high a concentration will give rise to unpleasant bitter flavours and may cause spoilage during the salting operation;
- salt produced from marine sources may contain halophilic bacteria and mould which continue to live in the salt and dry salted fish and could contribute to spoilage;
- salt used in salt fish should be inspected to ensure that it is clean, not used before, free from foreign matter and foreign crystals, show no visible sign of contamination with dirt, oil, bilge or other extraneous materials;
- the size of the salt granules used should be carefully considered. The use of very fine salt granules could result in the formation of clusters which is not favourable for ensuring the uniform distribution of salt on the fish. The use of very coarse salt granule could result in damage to the fish flesh during salting and may reduce the rate of maturation;
- small crystals of salt should be used for dry-salting of fatty fish and large crystals for lean fish;
- Salt used as an ingredient needs to be of food grade.

11.3.2 Handling (Processing Steps 13)

Potential Hazards: chemical and physical contamination

Potential Defects: Bacteria and mould

Technical Guidance:

- salt for salting of fish should be transported and stored dry and hygienically covered in salt bins, storerooms, containers or in plastic sacks;
- in order to minimise the presence and growth of bacteria and moulds in salted fish, such as pink and dun, the re-use of salt should be avoided;

11.4 SALTING AND MATURING

Salted fish should be salt-matured, sound and wholesome. The salting process, including the temperature, should be sufficiently controlled to prevent the development of *Clostridium botulinum*, or the fish should be eviscerated prior to brining.

Salting of fish either by brining, brine injection, wet-salting, dry-salting or pickling should be carried out with full understanding of their effects on the quality of the final product and should be done under strict hygienic condition and temperature control.

Two particular conditions that can adversely affect the quality of salted fish are the occurrence of bacteria and mould. Both defects can be combated by maintaining a temperature lower than 8°C. Salt produced from marine sources may contain halophilic bacteria, which continue to live in the salt and salted fish. In order to minimise such microbial contamination of salted fish, previously used and/or contaminated salt should be removed from the plant.

Another adverse condition that can affect the quality of salted fish is brown (yellow) discolouration often due to rancidity caused by metal catalysts in the salt. The quality of the salt is important, low temperature should be maintained during the process and light and oxygen should be avoided.

11.4.1 Brining (Processing Steps 14)

Potential Hazards: *viable parasites, scombrottoxins, botulinum toxin*

Potential Defects: *decomposition*

Technical Guidance:

- only fresh stabilised brine should be used for the salting operations; water quality is important, potable water should be used for preparation of brine;
- the ratio of brine to fish and the concentration of the brine should be adjusted to desired product; time and temperature (<4°C) control is important if the brine concentration is lower than saturated;
- concentration of brine should be checked at regular intervals, incorrect concentration should be adjusted prior to use;
- to assure proper salt penetration, fish should be of similar size

11.4.2 Brine Injection (Processing Steps 15)

Potential Hazards: *viable parasites, scombrottoxins, injection needle fragment, botulinum toxin*

Potential Defects: *decomposition*

Technical Guidance:

- apparatuses used for brine injection should be cleaned and disinfected at regular intervals;
- needles of apparatuses should be inspected daily for broken tips, for blocking and deflections of needles;
- brine injection devices should be operated by trained personnel only;
- conduct metal detection here or later in the process
- the reflux of injected brine into the reservoir should be avoided

11.4.3 Wet-Salting (Processing Steps 16)

Potential Hazards: *viable parasites, scombrottoxins, botulinum toxin*

Potential Defects: *decomposition*

Technical Guidance:

- fish for wet-salting should be salted and carefully arranged in the curing container such that voids channels between the fish are minimised;

- amount of salt, time and temperature should be controlled to obtain the desired product;
- when salting the fish, the salt concentration of the brine should be checked periodically with a salinometer according to specifications;
- after salting, the fish can be stacked. This should not be done before the proper salt/water balance is obtained. In case of stacking, adequate amounts of salt should be added and evenly distributed over the whole surface of the fish;
- salted fish should be stored or maintained for a sufficient period under controlled temperatures, to ensure proper curing and to prevent deterioration of the product

11.4.4 Dry-Salting (Processing Steps 17)

Potential Hazards: *viable parasites, scombrottoxins, botulinum toxin*

Potential Defects: *decomposition*

Technical Guidance:

- fish for dry salting should be carefully arranged such that voids or channels between fish are minimised and that drainage is adequate;
- fish piles should never be placed directly on the floor or in direct contact with the wall;
- amount of salt, time and temperature should be carefully controlled to obtain the desired product. Sufficient amount of salt is important for the quality of the product;
- fish should be restacked periodically with the top of the pile going to the bottom of the new pile, and with the addition of fresh salt to ensure that sufficient salt will be present to complete the cure;
- if the fish is restacked on pallets, the pallet should be clean;
- fish should not be exposed to freezing temperatures during the salting process;
- salted fish that accumulate histamine should be stored at a temperature to prevent possible scombrotxin/histamine formation;

11.4.5 Pickling (Processing Steps 18)

Potential Hazards: *viable parasites, scombrottoxins, botulinum toxin*

Potential Defects: *decomposition,*

Technical Guidance:

- the amount of salt must be adjusted to the quality of the fatty (primary) fish (fat content). Salt, sugar and spices should be weighed/measured and be evenly distributed;
- during the pickling operation all fish should be well immersed in the resulting pickle;
- fish should be allowed to settle in containers and then salt or pickle added before the container is closed;
- cured fatty fish should be kept in brine or pickle;
- fatty fish should always be covered with pickle during curing;
- pickling is primary used for fatty fish. Under certain conditions dry salting of small fatty fish, such as anchovy and small herring, may be used;

11.4.6 Maturing (Processing Steps 19)

Potential Hazards: *viable parasites, scombrottoxins, botulinum toxin*

Potential Defects: *decomposition, rancidity and discolouring of the flesh or surface bacteria and mould*

Technical Guidance:

- maturing time depends on the fish (species, size and quality), temperature and the amount of salt absorbed by the fish tissues;
- the first part of curing period for fish that accumulate histamine should be done at temperatures between 0°C and 5°C to prevent development of histamine;
- fatty fish such as herring may be kept in a temperature range of 5°C to 10°C under the maturing period. The length of this period will vary from weeks and up to several months depending of the specific products. If the containers are to be held at lower temperatures, the maturing period will increase;
- when salting fish that accumulate histamine, regular checks should be made of histamine content of the end product;

11.5 SORTING, DRYING, WEIGHING, PACKAGING, WRAPPING AND LABELLING

Refer also to Sections 8.2.3 (labelling) and 8.4.4 (Wrapping and packaging)

11.5.1 Sorting (Processing Steps 20)

Potential Hazards: Unlikely

Potential Defects: Incorrect sorting (quality, weight, size, species, etc.) bacteria and mould

Technical Guidance:

- salted fish should be sorted into species, sizes and trade quality categories for the relevant market;
- loose salt should be removed from the fish before sorting and new salt should be added before packaging;

11.5.2 Drying (Processing Steps 21)

Potential Hazards: unlikely

Potential Defects: Decomposition, bacteria and mould

Technical Guidance:

- the time and temperature used for drying will depend upon fish species, size and the handling and stacking of the fish.
- to assure proper drying, the fish should be of similar size
- use of too high temperature can cause hard texture of the other layer of the muscle and should be avoided. This could stop the drying process.

11.5.3 Weighing, Wrapping and Packaging (Processing Steps 22)

Potential Hazards: unlikely

Potential Defects: unlikely

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- barrels in which fatty fish are ready to be marketed should be clean, whole and hygienic.
- the packaging operation should be conducted to minimise the risk of contamination and decomposition;
- products should meet appropriate standards for labelling and weights;

11.5.4 Labelling (Processing Steps 23)

Refer to Section 8.2.3 and 8.5.

11.6 CHILL STORAGE (Processing Step 24)

Potential Hazards: unlikely

Potential Defects: unlikely

Technical Guidance:

- salt matured fish should be stored in chill storage;
- the temperature in the chill storage should be between 1°C to 4°C;
- temperature and storage time should be monitored and recorded at regular intervals;
- the products should be handled carefully and not be over-stacked;

11.7 PACKAGING, LABELS & INGREDIENTS (Processing Steps 25, 26, 27 & 28)

Refer to Section 8.5.

APPENDIX VI OPTIONAL FINAL PRODUCT REQUIREMENTS- SALTED FISH

These products specifications describe the optional defects for salted fish. The descriptions of optional defects will assist buyers and sellers in describing those defect provisions. These descriptions are optional and are in addition to the essential requirements prescribed in the appropriate Codex Products Standards.

1. PRODUCT DESIGNATION OF SALTED FISH OF FAMILY GADIDAE

Reference is given to Standard for Salted Fish and Dried Salted Fish of the Gadidae Family of Fishes (Codex Stan. 167-1989, Rev. 2-2005).

Products from the following species, all belonging to the Gadidae family that have been bled, gutted, beheaded and split so that approximately two thirds of the backbone is removed, washed and fully saturated with salt. Salted Fish used for production of Dried Salted Fish shall have reached 95 % salt saturation prior to drying.

English name	Latin name
Cod	<i>Gadus morhua</i>
Pacific cod	<i>Gadus macrocephalus</i>
Polar cod	<i>Boreogadus saida</i>
Greenland cod	<i>Gadus ogac</i>
Saithe	<i>Pollachius virens</i>
Ling	<i>Molva molva</i>
Blue ling	<i>Molva dypterygia</i>
Tusk	<i>Brosme brosme</i>
Haddock	<i>Gadus aeglefinus</i> / <i>Melanogrammus aeglefinus</i>
Forkbeard	<i>Phycis blennoides</i>
Pollack	<i>Pollachius pollachius</i>

**PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR CANNED SARDINES AND
SARDINE-TYPE PRODUCTS**

(At Step 5 of the Accelerated Procedure)

2. Description**2.1 Product Definition**

2.1.1 Canned sardines or sardine type products are prepared from fresh or frozen fish of the following species:

*Clupea bentincki*¹

6.1 Name of Food

6.1.1 (ii) “X sardines” where “X” is the name of a country, a geographic area, the species or the common name of the species, or any combination of these elements in accordance with the law and custom of the country in which the product is sold, and in a manner not to mislead the consumer”

¹ To be added to the current list

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS**(At Step 5 of the Procedure)****SECTION 2. DEFINITIONS FOR THE PURPOSE OF THIS CODE****2.3 LIVE AND RAW BIVALVE MOLLUSCS**

Accepted / Acceptable / Approved	means accepted by the official agency having jurisdiction;
Conditioning	means placing live bivalve molluscs in tanks, floats or natural sites to remove sand, mud or slime and improve product acceptability;
Distribution Centre	means any approved on-shore or off-shore installation or establishment for the reception, conditioning, washing, cleaning, grading and packaging of live bivalve molluscs fit for human consumption from which the bivalve molluscs are dispatched alive;
Growing Areas	means all brackish and marine areas approved for the production or harvesting of bivalve molluscs either by natural growth or by aquaculture destined for human consumption. The growing areas may be approved as production or harvesting areas for bivalve molluscs for direct consumption, or they may be approved as production or harvesting areas for bivalve molluscs for either depuration or relaying
Heat Shocking	means the process of subjecting bivalve molluscs in the shell to any form of heat treatment, such as steam, hot water, or dry heat for a short period of time, to facilitate rapid removal of meat from the shell for the purpose of shucking.
Depuration	means the reduction of microorganisms to a level acceptable for direct consumption by the process of holding live bivalve molluscs for a period of time under approved, controlled conditions in natural or artificial sea water suitable for the process, which may be treated or untreated.,
Relaying	means the removal of bivalve molluscs from microbiologically contaminated growing area to an acceptable growing or holding area under the supervision of the agency having jurisdiction and holding them there for the time necessary for the reduction of contamination to an acceptable level for human consumption.

2.9 LOBSTERS AND CRABS

Autolysis	is the breakdown or deterioration of crustacean meat or viscera by means of indigenous enzymes; NOTE: NOT USED IN TEXT
Batch systems	are those processing methods where crabs are processed as bulk units;
Black spot	is the appearance of dark pigments at the joints and injured parts of lobster segments, caused by oxidative enzyme reaction;
Butchering	is the process of removing crab back shell, viscera and gills. In some fisheries it may also include the removal of walking legs and claws. Butchering may take place either before or after cooking;
Butt end of the tail	is that part of the tail muscle of lobsters which extends into the cephalothorax;
Carpus	is the second leg segment from the shoulder of the crab; NOTE: NOT USED IN TEXT
Cephalothorax	is the body region of lobsters which is formed anatomically by the fusion of head and

	thorax;
Claw	means the pincer appendage at the end of the crab or lobster arm;
Cocktail claw	is a crab claw product where the shell is partially removed to expose the meat portion of the claw; NOTE: NOT USED IN TEXT
Cooking	means boiling of crustaceans in potable water, clean sea water or brine or heating in steam for a period of time sufficient for the thermal centre to reach a temperature adequate to coagulate the protein;
Crab	means the commercially important species of the Decapoda order in the Brachyura and Anomura sections;
Dactyl tip	Is the lowest segment on a crab leg. NOTE: NOT USED IN TEXT
Deterioration	means those natural processes of quality reduction that occur after harvesting and that are quite independent of man's deliberate intervention;
De-vein	Is to remove the intestine/vein from the lobster tail;
Droptail	Is a condition observed in cooked lobsters which have died or deteriorated before processing. The tail does not curl under the lobster and there is a gap between the tail and cephalothorax; NOTE: NOT USED IN TEXT
Enzymatic activity	Is the catalytic action of enzymes on biochemical reactions;
Insensible	Is the state of unresponsiveness as a result of thermal, electrical, or physical process imposed on lobsters and crabs prior to cooking;
Intestine/Vein	is used in this code to mean the posterior portion of the lobster alimentary tract;
Leg tips	are the third leg segments counting from the crab shell;
Lobster	Means commercially important species in the order Decapoda, and families Nephropidae, Palinuridae or Scyllaridae or other important economic taxonomic families;
Loose neck	has the same meaning in some areas as "Droptail"; NOTE: NOT USED IN TEXT
Merus	is the first leg segment from the shoulder of the crab; NOTE: NOT USED IN TEXT
Pasteurisation	Means subjecting crustacean meat to heat at times and temperatures, which destroy a high proportion of micro-organisms without noticeable changes in appearance, texture and flavour of the product;
Picking	refers to the process of removing meat from the crabs shell by machine or by hand;
Pounding	refers to the holding of live crabs or lobsters in water tanks or floating crates for extended periods of time;
Propodus	is the third leg segment from the shoulder of the crab; NOTE: NOT USED IN TEXT
Sections	are the cleaned, eviscerated and degilled crab parts usually consisting of one half of the crab body and the attached walking legs and claw;
Shaking	refers to the industrial practice of manual meat extraction used for king, snow and Dungeness crabs. The cooked sections are processed by hitting or shaking the meat out of the shell;
Shell	the hard outer covering of lobsters and crabs;
Shoulder	is the section containing meat in the body of the crab;
Shucking	is the process of removing the meat from the shell and appendages of the lobsters;
Tail	in crustacean is the abdomen or posterior part of the body;
Tailing	is the process of separating the tail from the cephalothorax;

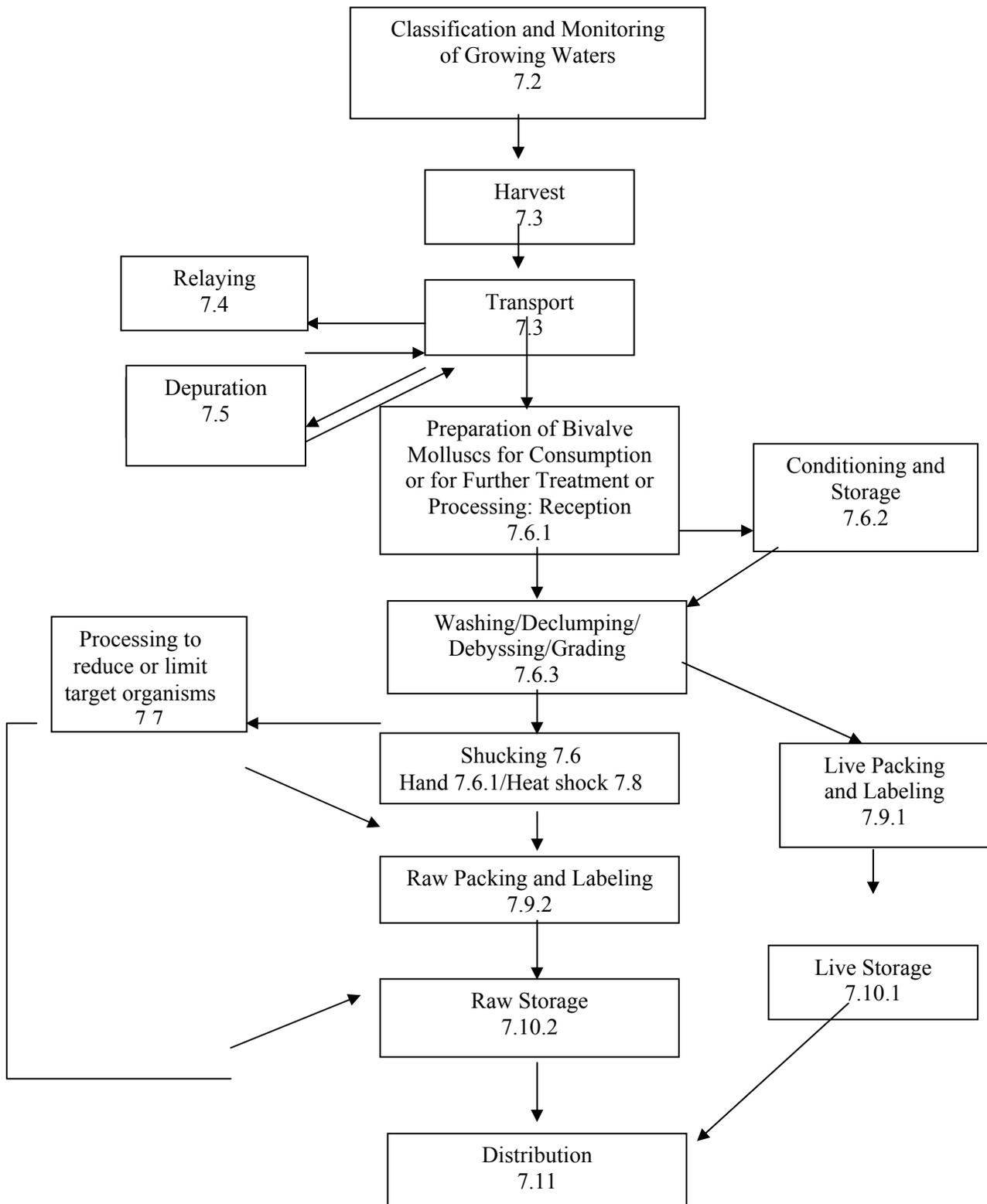
Trimming	is the process of removing any signs of blood, membrane or remnants of the gut which may be attached to the shell or meat of lobsters.
Viscera	refers to the contents of the gut of crabs;
Waste	means those crab or lobster parts which remain after the meat removal operation is completed.

SECTION – 7 – LIVE AND RAW BIVALVE MOLLUSCS

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

This flow chart is for illustrative purpose only. For implementation of HACCP principles, a complete and comprehensive flow chart has to be drawn up for each product.

References correspond to relevant Sections of the Code..



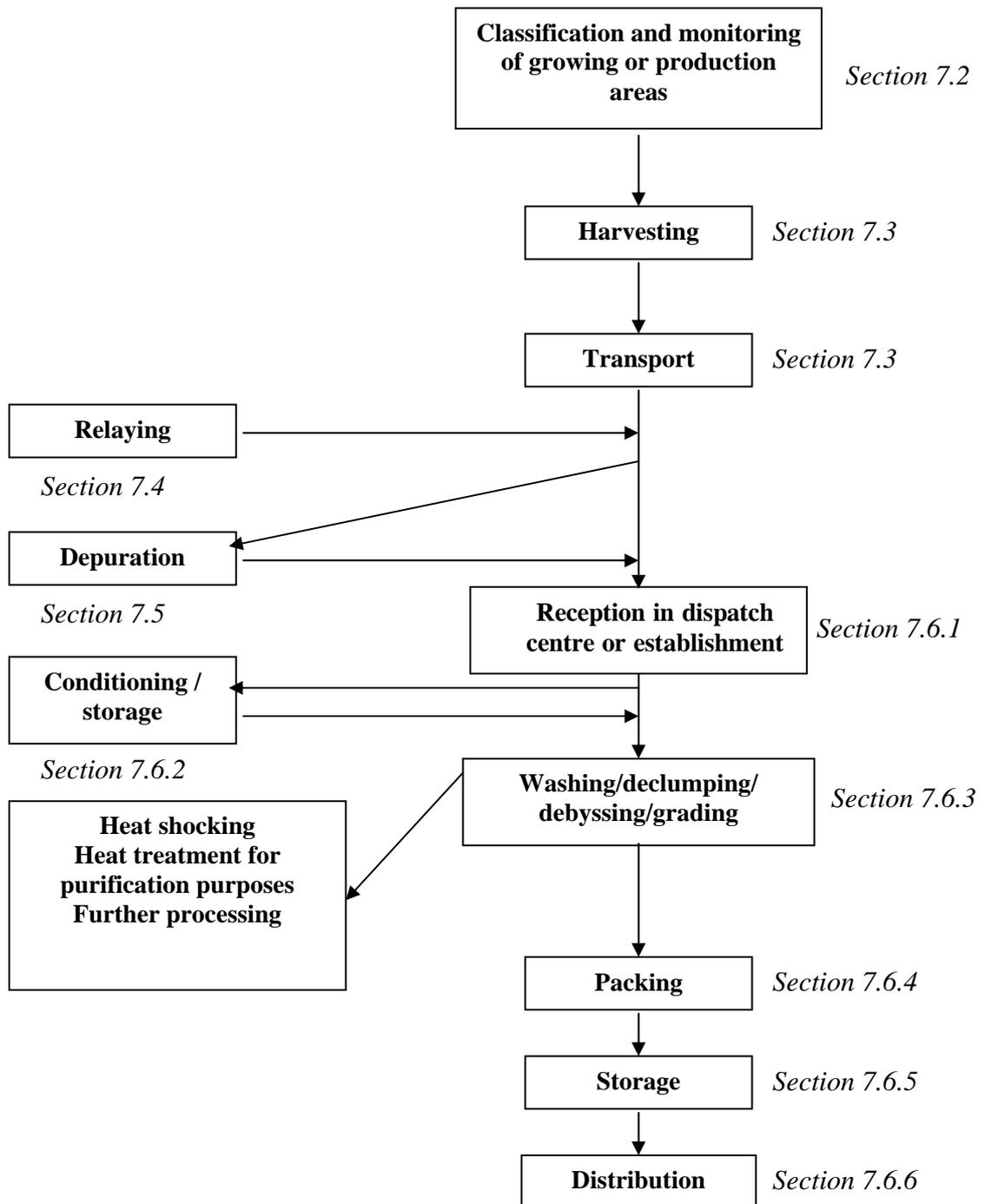


Figure 7.1 Example of a simplified flow diagram for the production of live and raw bivalve molluscs

7.1 GENERAL REMARKS, ADDITION TO THE PRE-REQUISITE PROGRAMME

Bivalve molluscs species like oysters, mussels, manilla and hard shell clams can survive for extended periods out of water and can be traded for human consumption as live animals. Other species like cockles can be traded live if carefully handled, but are normally processed. Species not adapted to dry conditions soon die out of water and are best handled as chilled products or processed.

When spawning (following “gonad ripening”) occurs, it becomes undesirable and in many instances impracticable to trade them as live animals. Stress can induce spawning.

The main hazard known for the production of bivalve molluscs is microbiological contamination of waters in which they grow, especially when the bivalve molluscs are intended to be eaten raw. Since molluscs are filter feeders they concentrate contaminants to a much higher concentration than the surrounding sea water. The contamination with bacteria and viruses in the growing area is therefore critical for the end product specification and determines the process requirements for further processing. Gastro-enteritis and other serious diseases such as hepatitis can occur as result from agricultural run-off and/or sewage contamination like enteric bacterial and/or viral pathogens (Norovirus, viruses causing hepatitis) or from natural occurring bacterial pathogens (*Vibrio* spp.). Another hazard is formed by biotoxins. Biotoxins produced by some algae can cause various forms of serious poisoning like diarrhetic shellfish poisoning (DSP), paralytic shellfish poisoning (PSP), neurotoxic shellfish poisoning (NSP), amnesic shellfish poisoning (ASP) or Azaspiracid (AZP). Chemical substances, such as heavy metals, pesticides, organochlorides, petro-chemical substances may also form a hazard in certain areas.

To control the hazards, identification and monitoring of growing areas is very important for bivalve molluscs safety. The identification, classification and monitoring of these waters is a responsibility for competent authorities in cooperation with fishermen and primary producers. *E. coli*/faecal coliforms or total coliforms may be used as an indicator for the possibility of faecal contamination. If biotoxins are found in the bivalve molluscs flesh in hazardous amounts the growing area must be closed for harvesting bivalve molluscs until toxicological investigation has made clear that the bivalve molluscs meat is free from hazardous amount of biotoxins. Harmful chemical substances should not be present in such amounts that the calculated dietary intake exceeds the permissible daily intake.

Bivalve molluscs from waters subject to microbiological contamination, as determined by the authority having jurisdiction, can be made safe by relaying in a suitable area or a depuration process to reduce the level of bacteria and the level of viruses if the process is continued long enough, or by processing to reduce or limit target organisms. Depuration is a short-term process commonly used to reduce low levels of bacterial contamination, but long term relaying is required if there is a greater risk of contamination.

Especially when the bivalve molluscs need to undergo relaying or depuration to be eaten raw, stress and excessive shocks of the bivalve molluscs must be avoided. This is important because these bivalve molluscs should be able to function again during depuration, relaying or conditioning.

7.2 CLASSIFICATION AND MONITORING OF GROWING AREAS

Potential Hazards: *Microbiological contamination, biotoxins, chemical contamination*

Potential Defects: *unlikely*

Technical Guidance:

There are 5 different types of important hazards coming from the bivalve molluscs growing environment:

- enteric bacterial pathogens;
- enteric viral pathogens (e.g. Norovirus, viruses causing hepatitis);
- naturally occurring bacterial pathogens (e.g. *Vibrio* spp.);
- biotoxins (e.g. okadaic acid group (DSP), saxitoxin group (PSP), brevetoxin group (NSP), domoic acid group (ASP), azaspiracid group (AZP));
- chemical contaminants.

7.2.1 Classification of growing areas

Surveys of the growing area, shoreline and land catchment should be conducted to determine sources of both domestic and industrial pollution which may affect the quality of the growing area water and bivalve molluscs. Sources may include municipal sewage outputs, industrial outputs, mine wastes, geophysical contaminants, domestic animal holding pens, nuclear power plants, refineries or other sources. The need to reschedule hygiene surveys will be determined by population shifts and changes in agricultural and industrial activities in the coastal area. Resurveys should be conducted at an acceptable frequency and known pollution sources should be re-evaluated on a regular basis to determine any changes to their impact on the growing area.

When pollution sources have been identified and evaluated, sampling stations for water and/or bivalve molluscs and/or sediments should be established and studies conducted to determine the effects of the pollutants on water and bivalve molluscs quality. The data should be evaluated by the official agency having jurisdiction and growing areas should be classified according to official standards and criteria.

When interpreting growing area data, the official agency having jurisdiction should take into account variations which may affect the level of pollution during the most unfavourable hydrographic and climatic conditions as influenced by rainfall, tides, winds, methods of sewage treatment, population variations and other local factors, since bivalve molluscs respond rapidly to an increase in the number of bacteria or viruses in their environment by accumulating these agents. The agency should also consider that bivalve molluscs have the ability to accumulate toxic chemicals in their tissue in concentrations greater than the levels found in the surrounding water. FAO, WHO, or other international or national food standards may be used as a guide to acceptable levels.

The official agency having jurisdiction should immediately announce decisions concerning the classification of growing areas to the affected producers and depuration and distribution centres.

When the limits of any biological or chemical hazard set in the end product specification are exceeded, appropriate measures must be taken under the responsibility of the official agency having jurisdiction.

Classified growing areas should be clearly defined by the official agency having jurisdiction as either:

- suitable for harvesting for direct human consumption, relaying in acceptable water or depuration in an approved depuration centre or approved processing to reduce or limit target organisms e.g. heat treatment, radiation, hydrostatic pressure, IQF; or
- non-suitable for growing or harvesting bivalve molluscs.

7.2.2 Monitoring of growing areas

Growing areas should be routinely monitored for changes in water quality and/or bivalve molluscs quality, and sub-standard areas patrolled to prevent harvesting for purposes other than that established by the official agency.

Biotoxins in bivalve molluscs can be caused by plankton containing toxins. For early warning purposes it is recommended to have a programme present to monitor growing areas for the species of plankton that can produce toxins and to recognize other environmental signals that a toxic event may be developing.

Harmful chemical substances within bivalve molluscs should not be present in amounts so that the calculated dietary intake exceeds the permissible daily intake. A monitoring system should be present for harmful chemical substances.

When routine monitoring programmes or resurveys show that the growing area no longer meets the classification criteria, the area should be reclassified or closed for harvesting immediately by the official agency having jurisdiction.

In determining the public health suitability of bivalve molluscs classified growing areas the official agency having jurisdiction may take the following actions:

- Classification/reclassification of growing areas by sanitary survey, monitoring of *E.coli*/faecal coliforms or total coliforms at an appropriate frequency based on the risk of contamination, and other sanitary control measures as applicable.
- Classification/reclassification of growing areas by monitoring of pathogens at an appropriate frequency based on the risk of contamination in bivalve mollusc meat (see 7.2.2.2).
- Closure/Reopening of growing waters by the monitoring of biotoxins in bivalve molluscs alone or in combination with the monitoring of phytoplankton in seawater at an appropriate frequency based on the risk of contamination (see 7.2.2.3).
- Control of chemical contaminants.

Under the responsibility of the official agency having jurisdiction the growing areas providing bivalve molluscs for direct human consumption meet the following requirements at time of harvest:

- The area is not subject to contamination that may present an actual or potential hazard to human health;
- The bivalve molluscs harvested meet the end product specification. This can be determined by examination of mollusc's flesh or through adequate monitoring of the water

Growing areas providing bivalve molluscs for indirect human consumption should be defined in relation to the further procedure of the lot.

7.2.2.1 *E. Coli*/faecal coliforms/total coliforms

All growing areas should be monitored for the presence of *E. coli*/faecal coliforms or total coliforms at an appropriate frequency based on the risk of contamination.

Tests for suitable indicator bacteria such as faecal coliforms or *Escherichia coli* or total coliforms should be used to determine the degree of faecal contamination. The effectiveness of indicator bacteria used should be kept under constant review for their reliability as measures for the degree of faecal contamination. If faecal contamination exceeds a certain threshold-levels relaying or depuration for a time approved by the official agency having jurisdiction may be allowed.

E. coli/faecal coliforms or total coliforms may be used as an indicator for the presence of faecal contamination. Because these indicators do not correlate well with the presence of viruses, other controls such as shoreline surveys should always be employed.

Bacteriophage and viral detection could also be used as indicators when validated analytical methods become available in the future.

7.2.2.2 Pathogen Monitoring

Shellfish sanitation programs rely upon the use of indicator organisms for the presence of contamination rather than upon attempts to monitor for specific pathogens. However, where there has been a shellfish borne outbreak caused by an identified pathogen such as *Salmonella*, monitoring the shellfish meats may be appropriate as part of the process of reopening the affected harvest area. The species, and typically the actual strain, should be known to ensure that monitoring is addressing the source of the pathogen. Predetermined acceptance/rejection levels for the pathogen should have been established in order to use such monitoring results for decision making. Other conditions including the sanitary survey requirements should also have been satisfied as a condition of reopening this area.

7.2.2.3 Marine biotoxin control

Phytoplankton monitoring is a valuable complementary tool that can be used, in combination with the required monitoring of marine biotoxins in shellfish tissue, to optimize program management and resources. Growing areas should also be monitored for environmental signals that a toxin event maybe occurring, e.g, dead or dying birds, mammals, or fish. The risk of blooms of toxic algae may show seasonal variability and areas may also be affected by toxic algae previously unknown in the surrounding sea or coastal waters. These risks should be recognised when drawing up monitoring schedules.

It is important to note that in using indicator shellfish species, the absence of toxicity in indicated species is assumed to imply the absence of toxicity in other species in the growing area. This implication must be verified for each shellfish species and for each group of toxins before defining a particular shellfish species as an indicator for that growing area.

The official agency having jurisdiction should close immediately and effectively patrol affected areas when acceptable levels are exceeded in edible portions of bivalve molluscs meats. These areas should not be opened before toxicological investigation has made clear that the bivalve molluscs meat is free from hazardous amounts of biotoxins.

The official agency having jurisdiction should immediately announce these decisions to the affected producers and depuration and distribution centres.

In establishing sampling programme over space and time, consideration should be given to assuring adequate location and number of sampling sites. Sampling frequency must be sufficient to address spatial-temporal changes in micro-algae, toxins in shellfish and to cover the risks of rapid rises in shellfish toxicity.

Spatial Representational Sampling

The selection of sampling stations for both benthic and suspended culture should be based on sites which have historically presented toxicity in the early stages of a toxic event. It is recognised that sampling, generally, cannot be carried out in a statistically valid way without excessive cost. In order to protect public health, the selection of sampling stations should give appropriate coverage of the extent of a toxic event or the likely “worst case scenario” in a growing area. This should be based on expert judgment using the following factors:

- Hydrography, known upwellings, fronts, current patterns and tidal effects.
- Access to sampling stations in all weather conditions during harvesting.
- Desirability of toxin and micro-algal sampling at the same sampling station.
- In addition to primary (routine) stations, the need for secondary (complementary) and offshore stations.
- Existence of *in-situ* growth (for example, toxic micro-algae from cyst beds).
- The advection of offshore toxic micro-algal blooms into growing areas.

Routine sampling for micro-algae will generally mean taking an integrated sample from the water column. When a toxic event is in progress or developing, targeted, depth-specific sampling should be considered.

Sampling for shellfish grown in suspension, should at least involve an integrated sample composed of shellfish taken from the top, middle and bottom of the lines.

Temporal Representational Sampling

Minimum weekly sampling frequencies are adopted by most monitoring programmes in areas where toxicity is prevalent and where harvesting is taking place or about to take place. Decisions on the frequency of

sampling should be based on risk evaluation. Inputs into the decision may include factors such as seasonality (toxicity and / or harvesting), accessibility, historical baseline information, including toxin and micro-algal data, and the effects of environmental factors such as wind, tide and currents.

Sampling frequency and the factors that may lead to it being changed should be described in a “Marine Biotoxin Action Plan” for the growing area.

Shellfish Sample Size

There is no internationally agreed sample size for different shellfish species. There may be high variability of toxicity among individual shellfish. The number of shellfish sampled should be sufficient to address this variability. For this reason, the number of shellfish in the sample, rather than the mass of the shellfish flesh should be the determining factor for the sample size. Additionally, the size of the sample should be sufficient to allow the test or tests for which the sample is being taken to be carried out, and the shellfish sampled should be of the size marketed.

7.2.2.4 Chemical contaminants

Growing areas should be monitored for chemical contaminants on a sufficiently frequent basis to provide confidence that any identified sources of chemical contamination are not contaminating the shellfish. Shellfish growing areas where there are no known point sources of likely chemical contamination should only require occasional checks for heavy metal accumulation every few years. However, where there are known point sources of specific contamination shellfish may need to be checked more frequently on a routine basis. There should also be the capacity to sample shellfish reactively if a defined event occurs – for example a spillage of anti-fouling paint.

7.3 HARVESTING AND TRANSPORTATION OF LIVE BIVALVE MOLLUSCS

Refer also to Sections 3.1, 3.3, 3.4 and 3.5

This section applies to the transportation of bivalve molluscs for the purpose of direct human consumption, relaying, depuration, processing to reduce or limit target organisms, or further processing.

Appropriate handling procedures depend on different species, growing area and season.

Potential Hazards: *Microbiological contamination, biotoxins, chemical contamination*

Potential Defects: *Physical damage*

Technical Guidance:

- Dredges and other harvesting equipment, decks, holds and containers, which are contaminated from use in a polluted area, should be cleaned and if applicable disinfected (sanitised) before being used for bivalve molluscs from an unpolluted area.
- Holds in which bivalve molluscs are held or containers should be so constructed that the bivalve molluscs are held above the floor level and drained so that the bivalve molluscs is not in contact with wash-down or bilge water, or shell fluid. Where necessary a bilge pumping system must be provided.
- Suitable precautions should be taken to protect bivalve molluscs from being contaminated by polluted water, droppings from sea birds, footwear which may have been in contact with faecal matter or by other polluted material. No overboard discharge of waste, including human faecal material, should occur from harvest vessels around shellfish growing areas. No animals should be allowed on harvest vessels.
- Wash-down pumps should draw water only from non-contaminated seawater.
- Bivalve molluscs should be harvested from and stored in a growing area or relaying area acceptable to the official agency having jurisdiction.
- On removal from water or during handling and transportation, bivalve molluscs should not be subjected to extremes of heat or cold or sudden variations in temperature. Temperature control is critical in handling live bivalve molluscs. Special equipment, such as insulated containers

and refrigeration equipment should be used if prevailing temperatures and the time involved so require. Bivalve molluscs should not be exposed to full sun or surfaces heated by the sun or come into direct contact with ice and other freezing surfaces, nor should it be held in closed containers with solid carbon dioxide. In most cases storage above 10°C (50°F) or below 2°C (35°F) should be avoided.

- Bivalve molluscs should be freed from excessive mud and weed soon after being harvested by washing it with clean seawater or potable water under suitable pressure. Wash water should not be allowed to flow over bivalve molluscs already cleaned. The water should not be re-circulated.
- The interval between harvesting and immersion in water for relaying, storage, conditioning or depuration should be kept as short as possible. This also applies to the interval between final harvesting and handling in a distribution centre.
- If bivalve molluscs are to be re-immersed after harvest they should be re-immersed in clean seawater.
- Appropriate documentation should be maintained for harvesting and transportation activities.

7.4 RELAYING

The requirements for classification and monitoring of growing areas also apply to Relaying areas.

Relaying is intended to reduce the level of biological contaminants that may be present in bivalve molluscs which have been harvested from contaminated areas to such levels that the bivalve molluscs will be acceptable for human consumption without further processing. Bivalve molluscs harvested for relaying should only be harvested from areas that are so designated/classified by the official agency having jurisdiction. Relaying methods vary worldwide. Bivalve molluscs may be placed in floats, rafts or directly on the bottom.

Potential Hazards: *Microbiological contamination, biotoxins, chemical contamination*

Potential Defects: *unlikely.*

Technical Guidance:

- Relaying operations should be strictly supervised by the official agency having jurisdiction to prevent contaminated bivalve molluscs from being diverted directly to the consumer market or from cross contamination of other bivalve molluscs. Boundaries of relaying areas should be clearly identified by buoys, poles or other fixed means. These areas should be adequately separated from the bivalve molluscs in adjacent waters to prevent cross contamination and commingling.
- Holding time and minimum temperature in the accepted area prior to harvest will be determined by the official agency having jurisdiction according to the degree of contamination before relaying, the temperature of the water, the bivalve molluscs species involved and local geographic or hydrographic conditions.
- Relaying sites could become biotoxic from a bloom, or could become an unexpected source of environmental pathogens such as *Vibrio* bacteria, and should therefore be monitored as appropriate while they are being used for relaying.
- Bivalve molluscs should be laid out at a density which will permit them to open and undergo natural depuration.
- Appropriate documentation should be maintained for relaying operations.

7.5 DEPURATION

Refer also to Sections: 3.2, 3.3, 3.4 and 3.5

Depuration is intended to reduce the number of pathogenic micro-organisms that may be present in bivalve molluscs which have been harvested from moderately polluted areas to such levels that the bivalve molluscs will be acceptable for human consumption without further processing. Depuration alone is not suitable for cleansing bivalve molluscs from more heavily contaminated areas or areas subject to contamination by

hydro-carbons, heavy metals, pesticides, viruses or biotoxins. Bivalve molluscs harvested for depuration should only be harvested from areas that are so designated/classified by the official agency having jurisdiction.

The required conditions vary according to the species of molluscs and the design of the depuration system.

For natural functioning and therefore depuration to occur it is essential that the molluscs have not been over-stressed or damaged during harvesting or handling prior to depuration and are not in a seasonally weak or spawning condition.

Depuration centres should maintain the same hygiene standards as sections 3.2, 3.3, 3.4, 3.5.

Potential Hazards: *Microbiological contamination*

Potential Defects: *physical damage*

Technical Guidance:

Depuration centres and tanks must be approved by the official agency having jurisdiction.

- Bivalve molluscs subjected to the depuration process should not contain metallic ions, pesticides, industrial wastes or marine biotoxins in such quantities that it presents a health hazard to the consumer.
- Use only shellstock designated as acceptable by the official agency having jurisdiction.
- The process and the equipment, e.g. tanks, used for depuration should be acceptable to the official agency having jurisdiction.
- Dead or damaged bivalve molluscs should be removed before the depuration process, when practicable. Surfaces of shells should be free from mud and soft commensal organisms. If necessary the bivalve molluscs should be washed with clean sea water or potable water before the depuration process.
- The length of the period of depuration should be adapted to the water temperature and physical water quality parameters (clean sea water, salinity, dissolved oxygen and pH levels suitable to permit the bivalve molluscs to function normally), the degree of contamination before depuration and the bivalve molluscs species. Microbiological investigation of process water and of bivalve molluscs meat should be used to assess depuration parameters. It should be taken into account that viruses and *Vibrio* spp. are more persistent during depuration than the indicator bacteria mostly used for microbiological monitoring (*E. coli* and faecal coliforms).
- Water used in depuration tanks should be changed continuously or at suitable intervals or if recirculated be treated properly. The flow of water per hour should be sufficient to the amount of bivalve molluscs treated and should depend on the degree of contamination of the bivalve molluscs.
- Bivalve molluscs undergoing depuration should remain immersed in clean sea water until it satisfies the sanitary requirements of the official agency having jurisdiction.
- Bivalve molluscs should be laid out at a density which will permit them to open and undergo natural depuration.
- During the process of depuration, the water temperature should not be allowed to fall below the minimum at which bivalve molluscs remain physiologically active; high water temperatures which adversely affect the pumping rate and the depuration process should be avoided; tanks should be protected from the direct rays of the sun when necessary.
- Equipment in contact with water, i.e. tanks, pumps, pipes or piping, and other equipment should be constructed of non-porous, non-toxic materials. Copper, zinc, lead and their alloys should preferably not be used in tanks, pumps or piping systems used in depuration processing.
- To avoid recontamination of bivalve molluscs undergoing depuration, unpurified bivalve molluscs should not be placed in the same tank as bivalve molluscs which are already undergoing depuration.

- On removal from the depuration system, bivalve molluscs should be washed with running potable water or clean sea water, and handled in the same manner as living bivalve molluscs taken directly from a non-polluted area. Dead, with broken shells or otherwise unwholesome bivalve molluscs should be removed.
- Before removing the bivalve molluscs from the tanks drain the water from the system to avoid resuspension and reingestion. The tanks should be cleaned after each use and disinfected at suitable intervals.
- After depuration the bivalve molluscs should meet the end product specification.
- Appropriate documentation should be maintained for depuration.

7.6 PROCESSING OF BIVALVE MOLLUSCS IN A DISTRIBUTION CENTRE OR AN ESTABLISHMENT

Some countries require that bivalve molluscs that are to be frozen and/or shucked, and/or processed to reduce or limit target organisms must first pass through a “distribution centre” from which they exit alive. Other countries allow freezing, shucking, and processing to reduce or limit target organisms to occur in establishments that perform the functions of a “distribution centre.” Both practices are legitimate and the products from each one should be equally permitted in international trade. Where “distribution centre” activities and processing activities occur under the same roof, care must be taken to ensure adequate separation of activities to prevent cross-contamination or commingling live with raw products.

Distribution centres that prepare live bivalve molluscs suitable for direct consumption and establishments that prepare live and raw bivalve molluscs suitable for direct consumption should maintain the same hygiene standards as sections 3.2, 3.3, 3.4, 3.5.

7.6.1 Reception

Potential Hazards: Microbiological, chemical and physical contamination

Potential Defects: Viable parasites, physical damage, foreign matter, dead or dying of bivalve molluscs

Technical Guidance:

- Stress and excessive shocks to bivalve molluscs that will be dispatched live from a distribution centre or other establishment must be avoided.
- Distribution centres and other establishments that prepare live bivalve molluscs should only accept bivalve molluscs which meet the end product specification and which originate directly from approved growing areas or after relaying in an approved relaying area or after depuration in an approved depuration centre or tank.

7.6.2 Conditioning and storage of bivalve molluscs

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: Microbiological contamination, chemical contamination, biotoxins

Potential Defects: Physical damage, foreign matter, dead or dying of bivalve molluscs

Technical Guidance:

Conditioning means storage of bivalve molluscs in sea water tanks, basins, floats, rafts or natural sites with the intention to remove mud, sand and slime.

- The process of storing bivalve molluscs in sea water tanks, basins, floats, natural sites or rafts can be used if it is acceptable to the official agency having jurisdiction.
- Only clean sea water should be used in the tanks, floats, natural sites or rafts and should be of an adequate salinity and adequate physical water quality parameters to permit the bivalve molluscs to function normally. Optimum salinity will vary with bivalve molluscs species and with the harvesting area. Water condition has to be satisfactory adequate for the process. Where natural sites are used for conditioning these should be classified by the official agency having jurisdiction.

- Before conditioning or storage bivalve molluscs should be washed to remove mud and soft commensal organisms and dead or damaged bivalve molluscs should be removed when practicable.
- During storage bivalve molluscs should be laid out at a density and under such conditions that will permit them to open and function normally.
- The oxygen content in the seawater should be maintained at an adequate level at all times.
- The temperature of the water in storage tanks should not be allowed to rise to such levels as to cause weakness of the bivalve molluscs. If ambient temperatures are excessively high, tanks should be placed in a well-ventilated building or away from the direct rays of the sun. The length of the period of conditioning should be adapted to the water temperature.
- Bivalve molluscs should be stored in clean sea water only for such time as they remain sound and active.
- Tanks should be drained, cleaned and disinfected at suitable intervals.
- Recirculating wet storage systems must contain approved water treatment systems.

7.6.3 Washing, declumping, debyssing and grading

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: Microbiological contamination, chemical and physical contamination

Potential Defects: Mechanical damage

Technical Guidance:

- All steps in the process, including packaging, should be performed without unnecessary delay and under conditions which will prevent the possibility of contamination, deterioration and the growth of pathogenic and spoilage micro-organisms.
- Damage to shells and stress will shorten the shelf life of bivalve molluscs and increase the risk of contamination and deterioration. So bivalve molluscs have to be handled carefully:
 - The number of handlings with bivalve molluscs should be minimised;
 - Excessive shocks should be avoided.
- The different process steps should be supervised by technically competent personnel.
- The outsides of the shells should be washed free of mud, and all soft adhering organisms should be removed. Hard adhering organisms should also be removed when possible, care being taken not to chip lips of shells by vigorous washing. Washing should be carried out using pressurised clean (sea) water.
- Bivalve molluscs having formed clumps should be declumped and debyssed as appropriate. The equipment used should be designed and adjusted to minimise the risk of damage to the shells.

7.6.4 Packing and Labelling

Refer also to Sections: 3.2, 3.3, 3.4 and 3.5

All steps in the process of packaging should be performed without unnecessary delay and under conditions that will prevent the possibility of contamination, deterioration and the growth of pathogenic and spoilage micro-organisms.

The packaging material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product harmful or other objectionable substances or odours and tastes. The packaging material should be sound and should provide appropriate protection from damage and contamination.

7.6.4.1 Packing and Labelling of Live Bivalve Molluscs

Potential Hazards: Microbiological contamination, physical contamination, chemical contamination

Potential Defects: Incorrect labelling, presence of damaged or dead bivalve molluscs, foreign matter

Technical Guidance:

- Before packing bivalve molluscs should undergo visual inspection. Bivalve molluscs which are dead, with broken shells, with adhering soil or otherwise unwholesome, should not be passed for human consumption.
- The packaging material should avoid contamination and should be drained.
- Labels should be clearly printed and must comply with the labelling laws of the country where the product is marketed. The packaging material may be used to bear an indication as to how the bivalve molluscs should be kept from the time they were bought at the retailer. It is recommended to include the date of packaging.
- All packaging material should be stored in a clean and sanitary manner. Product containers should not have been used for any purpose, which may lead to contamination of the product. Packaging material should be inspected immediately before use to ensure that they are in a satisfactory condition and where necessary disposed of or cleaned and/or disinfected; when washed they should be well drained before filling. Only packaging material required for immediate use should be kept in the packing or filling area.”

7.6.4.2 Packing and Labelling of Raw Bivalve Molluscs

Potential Hazards: Microbiological and physical contamination

Potential Defects: objectionable matter such as shell pieces; incorrect labelling

Technical Guidance:

- Labels should be clearly printed and must comply with the labelling laws of the country where the product is marketed. The packaging material may be used to bear an indication as to how the bivalve molluscs should be kept from the time they were bought at the retailer. It is recommended to include the date of packaging
- All packaging material should be stored in a clean and sanitary manner. Only packaging material required for immediate use should be kept in the packing or filling area.
- Shucked and post harvest treated product should be packed and chilled as soon as possible.
- Freezing should take place quickly. Slow freezing will damage meat.
- If labels on post harvest treated raw bivalve molluscs make safety claims relating to the post harvest treatment, the claims should be specific to the target hazard that has been eliminated or reduced.”

7.6.5 Storage

7.6.5.1 Storage of Live Bivalve Molluscs

Potential Hazards: Microbiological contamination, chemical and physical contamination

Potential Defects: physical damage

Technical Guidance:

- The end product should be stored under such conditions as will preclude the contamination with and/or proliferation of micro-organisms. The packaging material of the end product should not have direct contact with the floor but should be placed on a clean, raised surface.
- Storage periods should be kept as short as possible.
- Reimmersion in or spraying with water of live bivalve molluscs must not take place after they have been packed and have left the distribution centre or establishment except in the case of retail sale at the distribution centre.

7.6.5.2 Storage of Raw Bivalve Molluscs

Potential Hazards: Microbiological contamination

Potential Defects: unlikely

Technical Guidance:

- Storage periods should be kept as short as possible
- Avoid damage to packaging of frozen product.

7.6.6 Distribution**7.6.6.1 Distribution of Live Bivalve Molluscs**

Refer also to Section 3.6

Potential Hazards: *Microbiological contamination*

Potential Defects: *Physical damage*

Technical Guidance:

- The product should be dispatched in the sequence of the lot numbers.
- Bivalve molluscs intended for human consumption should only be distributed in closed packaging.
- The means of transport should provide sufficient protection of the bivalve molluscs against damage to the shells from shocks. The bivalve molluscs should not be transported with other products which might contaminate them.

7.6.6.2 Distribution of Raw Bivalve Molluscs

Potential Hazards: *Microbiological contamination*

Potential Defects: *unlikely*

Technical Guidance:

- Temperature must be maintained during distribution to control microbial growth.
- The product should be dispatched in the sequence of the lot numbers.
- Transportation must be able to maintain chilled or frozen product for safety and quality.

7.7. PROCESSING TO REDUCE OR LIMIT TARGET ORGANISMS

Refer also to Sections 3.2, 3.3, 3.4, and 3.5.

Bivalve molluscs processed to reduce or limit target organisms are products prepared from live or raw bivalve molluscs that have been processed after harvest to reduce or limit specified target organisms within the product to levels that are satisfactory to the official agency having jurisdiction. Processing to reduce or limit target microorganisms is intended to retain the sensory qualities of a live bivalve mollusc. As with all live and raw bivalve molluscs, these bivalve molluscs must meet all microbiological criteria associated with traditional harvest water controls designed to prevent faecal contamination and resulting introduction of enteric pathogens as well as toxins and other contaminants. However, these traditional controls are not designed for control of pathogens that are independent from faecal contamination. Processing to reduce or limit target microorganisms may include the application of low heat, hydrostatic pressure (e.g., 60K lb/6 min.), irradiation, and individual quick freezing.

Potential Hazards: *Microbiological contamination*

Potential Defects: *Coagulation of meat, defective meat texture, hydrostatic medium forced into the flesh.*

Technical Guidance:

- Any treatment developed to eliminate or reduce pathogens should be thoroughly validated scientifically to ensure that the process is effective.
- The control treatments (heat, pressure, etc.) should be closely monitored to ensure that the product does not undergo textural changes in the flesh that are unacceptable to the consumer.

- The treatment parameters established to reduce or limit pathogens should be approved by the official agency having jurisdiction.
- Each establishment which purifies bivalve molluscs with a heat treatment must develop a heat treatment process schedule, acceptable to the official agency having jurisdiction, which addresses such critical factors as the species and size of bivalve molluscs, time of exposure to heat, internal bivalve molluscs temperature, type of heat process used, water/steam to bivalve molluscs ratios, nature of heat equipment, measurement devices and their calibration, post heating chilling operations, cleaning and sanitising of heat process equipment.

7.8 Shucking

Shucking is the processing step that removes the edible portion of the mollusc from the shell. It is usually done by hand, mechanically or through heat shock with steam or hot water. This step may expose the product to microbiological or physical contamination.

7.8.1 Hand and Mechanical Shucking and Washing,

Physical removal of shellfish meat from the shell will often expose the product to dirt, mud and detritus that should be removed before further processing through washing or other means.

Potential Hazards: *Physical contamination, microbiological contamination*

Potential Defects: *Cuts and tears of the flesh, presence of sand and mud*

Technical Guidance:

- Care should be taken to eliminate excess mud, detritus and sand from the shucking tables.
- The product should be examined to ensure that cuts and tears are minimized.
- Shucked molluscs should be rinsed or washed to further eliminate mud, sand, detritus and reduce the microbiological level of the products.

7.8.2 Heat shocking of bivalve molluscs followed by packing

Heat shocking is a method to remove shells from the bivalve molluscs.

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Physical contamination*

Potential Defects: *unlikely*

Technical Guidance:

- The bivalve molluscs must come from approved growing areas and/or after relaying in an approved relaying area or depuration in an approved depuration centre or tank. Each establishment which heat shucks bivalve molluscs should develop a heat shuck process schedule, acceptable to the official agency having jurisdiction, which addresses such critical factors as the species and size of bivalve molluscs, time of exposure to heat, internal bivalve molluscs temperature, type of heat process used, water/steam to bivalve molluscs ratios, nature of heat equipment, measurement devices and their calibration, post heating chilling operations, cleaning and sanitising of heat process equipment.
- All bivalve molluscs should be washed with pressurised potable water or clean sea water and culled for damaged and dead bivalve molluscs prior to heat treatment.
- Before heat shocking the bivalve molluscs should be inspected to determine whether the bivalve molluscs are alive and not badly damaged
- Heat shocked bivalve molluscs should be cooled to 7°C or less within two hours of being heat treated (this time includes the shucking process). This temperature should be maintained during transport, storage and distribution.
- The heat shocked bivalve molluscs should be packed as soon as possible. Before packing the bivalve molluscs should be examined for objectionable matter such as shell pieces.

7.9 DOCUMENTATION

- The transport of live bivalve molluscs from a growing area to a distribution centre, depuration centre, relaying area or establishment must be accompanied by documentation for the identification of batches of live bivalve molluscs.
- Permanent, legible and dated records of relaying and depuration should be kept concerning each lot. These records should be retained for a period of minimal one year.
- Depuration centres or tanks and distribution centres and establishments should only accept lots of live bivalve molluscs with documentation issued by or accepted by the official agency having jurisdiction. This document should contain the following information
 - the gatherer's identity and signature;
 - the date of harvesting;
 - name and quantity of bivalve molluscs;
 - the location of the growing area.
- Complete records of harvest area and date of harvest and length of time of relaying or depuration of each lot should be maintained by the distribution centre or establishment for a period designated by the official agency having jurisdiction.

7.10 LOT IDENTIFICATION AND RECALL PROCEDURES

Refer also to Section 3.7

- "Each product should have an easy identifiable lot number. This lot number must include an identification code, the number of the establishment that distributes the product, the country of origin and day and month of packing, in order to facilitate the trace-back of the product. A record keeping system should be based on these lot numbers so that individual lots of bivalve molluscs can be traced from the growing area to the end user.
- If a recall must be carried out, its success depends on having certain recall procedures prepared in advance.
- Some important aspects are:
 - The affected product must be easy identifiable by lot numbers;
 - Destination and customers of the affected product must be identifiable;
 - Competencies and responsibilities of management and personnel must be clear;
 - Names and telephone numbers of affected personnel, organisations and customers must be present.

SECTION 13 - PROCESSING OF LOBSTERS

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

This section applies to lobsters in the genus *Homarus*, and to rock lobsters, spiny lobsters, and slipper lobsters in the genera *Palinurida*, and *Scyllaridea*, and to squat lobsters in the genera *Cervimundia* and *Pleuronocodes*, and the Norwegian lobster, *Nephrops norvegicus*.

13.1 GENERAL – ADDITION TO PRE-REQUISITE PROGRAMME

In addition to the pre-requisite programme outlined in Section 3 of this document, the processing facility operators are encouraged to evaluate the design and construction of their facility and the maintenance and sanitation of their operation, specific to the processing of lobsters. Consideration should be given to the following:

13.1.1 Design and Construction of Equipment and Utensils

- in batch systems the inactivation tank, cooker and cooling tank should be located adjacent to each other and may be provided with an overhead hoist or gantry provided to transfer baskets from one to the other;
- cookers should be designed to provide constant and adequate supply of heat so that all crustaceans could be given the same time/temperature exposure during the cooking operation;
- a chamber of adequate length, through which an open link conveyor passes and which is equipped with spray nozzles so that the lobsters are sprayed from all sides, may be used for the purpose.

13.1.2 Hygiene Control Programme

- When in-factory chlorination of water is used, the minimum residual content of free chlorine should be maintained at the effective level for the use intended and at a concentration that would prevent chlorine tainting;
- Chlorinating system should follow the Draft FAO/WHO *Guide on the Use of Chlorination in Fish Processing* and should not be relied upon to solve all hygiene problems;
- water, which has been in contact with crustaceans, should not be re-used unless reconditioned to avoid taint problems;
- it is undesirable for the same workers to handle the raw as well as the cooked product. If this is unavoidable, stringent precautions should be taken to prevent cross contamination of the cooked product by micro-organisms from raw material;

13.2 General Considerations for the Handling of Lobsters

Refer to Section 4 – General Considerations for the Handling of Fresh Fish and Shellfish.

13.2.1. Potential Hazards and Defects Associated with Lobsters

Refer also to Section 4.1 Potential Hazards Associated with Fresh Fish and Shellfish and Section 5.3.3.1 Identification of Hazards and Defects

13.2.1.1 Potential Hazards

Bacteria

Staphylococcus aureus is an aerobic or facultatively anaerobic gram positive spherical micro-organism. It is coagulase-positive and ferments glucose. Some strains can produce enterotoxins.

Staphylococcus is not found in the normal microflora on fish. The natural habitat for this organism is the skin and mucous membranes of animal and man. The presence of *Staphylococcus* on fish is an indication of post-harvest contamination due to poor personal hygiene. The organism is a poor competitor and will not multiply in fish. However, in fish or shellfish products, where the normal flora is reduced or eliminated (i.e. cooked peeled shrimp or crab meat), the presence of staphylococci indicates a potential for food poisoning.

Listeria monocytogenes is widely dispersed in the environment and foods. The organism is not exceedingly heat resistant and is killed by proper cooking. *L. monocytogenes* can grow in the presence or absence of oxygen and can survive in salt concentrations up to 10% NaCl. It can also endure frozen storage. An important factor in foodborne listeriosis is that the pathogen can grow to significant numbers at refrigeration temperatures when given sufficient time.

Despite the fact that a wide variety of foods may be contaminated with *L. monocytogenes*, outbreaks and sporadic cases of listeriosis are predominately associated with ready to eat (RTE) foods. Although the data is limited, surveys suggest that RTE seafood such as cooked lobster, cooked crab and smoked fish have been found to contain this bacterium.

Chemical Hazards

Veterinary Drugs

Medicated feeds or drugs may be used to control the spread of aquatic animal diseases where lobsters and/or crabs are maintained and fed in holding pounds. Residues of veterinary drugs in excess of recommended guidelines should be considered as a potential hazard.

Biotoxins

PSP toxins (saxitoxins) have been identified in the hepato-pancreas of lobsters.

13.2.1.2 Potential Defects

Black discoloration. Black discoloration is caused by melanin formation most commonly in the ventral tail segment joints and muscle surrounding the pericardium. It develops in the integumentary tissues and muscle surfaces, but does not occur in the muscle meat tissue. The use of sulfating agents to prevent this discoloration is a common practice and may result in unacceptable residues. The potential for residues of sulfating agents leads to labelling requirements because these chemicals are common allergens.

13.2.2 Minimise the Deterioration of Crustaceans - Handling

Refer also to Section 4.3 – Minimise the Deterioration of Fish – Handling

- it is generally known that under similar conditions, the quality of crustaceans deteriorate more rapidly than fish and therefore care in maintaining the crustaceans live prior to processing is strongly recommended;
- since crustacean legs and other appendages can be easily broken and the damage can cause the risk of infection and weakening of the crustacean, care should be taken to handle live crustaceans at all times;
- tanks and wells for pounding live crustaceans should be so placed and constructed as to ensure survival of the crustaceans;
- live crustaceans should be carefully packed in clean tanks, wells, crates, open-weave bag, or in boxes covered with wet sacking and held at as low a temperature as practicable, as required of varying species;
- holding tanks are regarded as a better method of storage for long-term handling than well storage;
- the use of clean Hessian or jute bags, for transport, is preferred. Bags made of woven synthetic material should not be used;
- where bags open weave are used for transport, precautions should be taken to avoid suffocation of crustaceans due to slime or mud;
- care also should be taken to maintain the necessary humidity in holding the crustaceans live in bags for transport;
- species, which mutilate each other, should have the claws banded as soon as possible after catching;

- if it is not possible to keep crustaceans alive until the time of processing, lobsters should be killed. Tails should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible.

13.3 Processing Operations – Lobsters

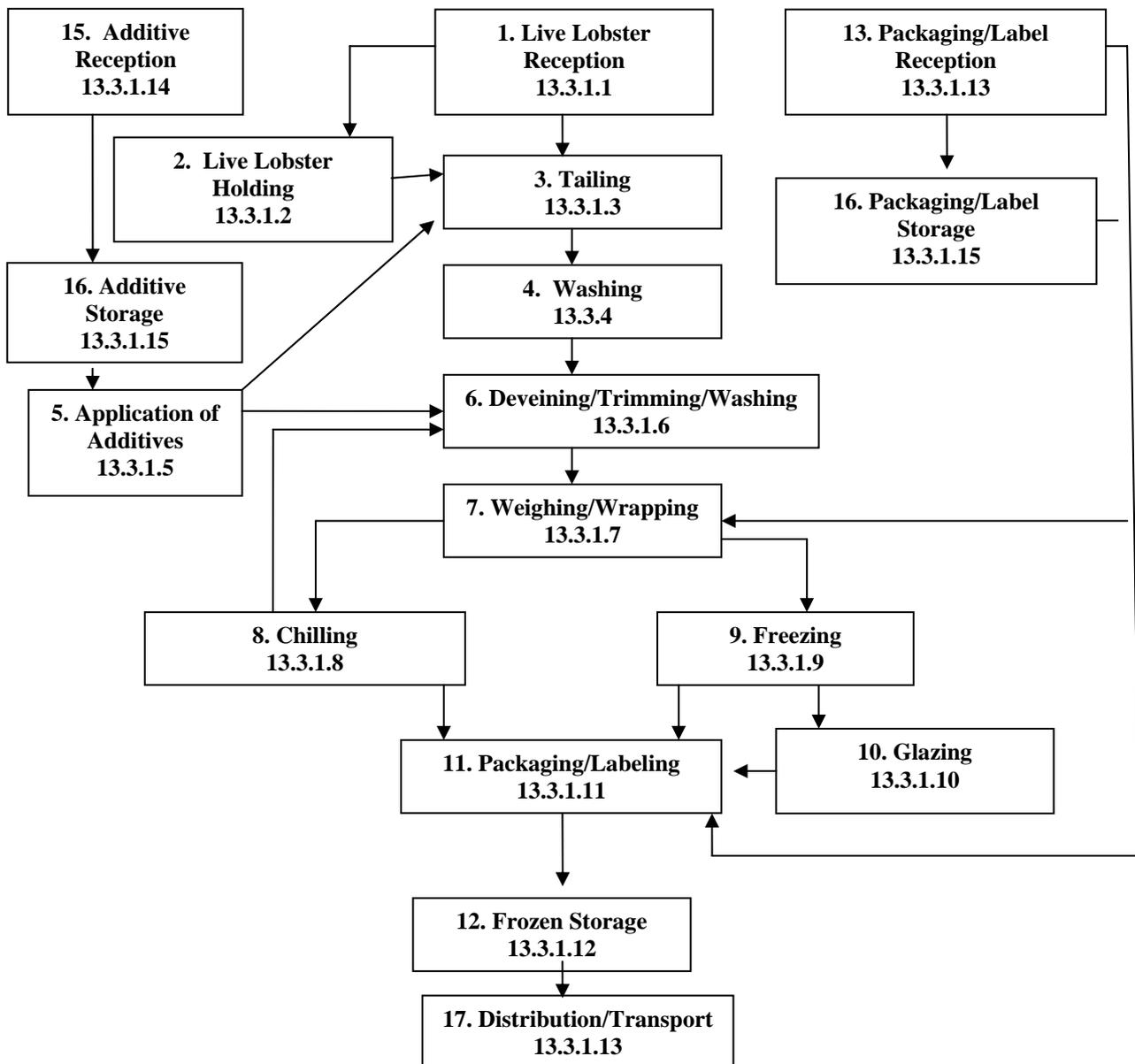
Once a processing facility has established a pre-requisite programme (Section 3) the principles of HACCP (Section 5) can be applied to each individual process within that facility.

This section provides two examples of products derived from lobsters. Special consideration was given to elaborate on products which involve heat treatment because of their potential impact on food safety (such as post processing handling). The products and their respective flow diagrams are as follows: Frozen Raw Lobster Tails (Fig. 13.1), Chilled Cooked Whole Lobster/Chilled Cooked Lobster Meat (Fig. 13.2). To provide an appreciation for other products of lobsters, a reference has been included in Appendix A and B.

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process

This flow chart is for illustrative purpose only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process

Figure 13.1 Example of flow chart for frozen raw lobster processing



13.3.1 Frozen Raw Lobster Tail

13.3.1.1 Live Lobster Reception (Processing Step 1)

Potential Hazards: Marine Biotoxins (Saxitoxins)

Potential Defects: Reception of weak or injured lobsters, lobster mortality

Technical Guidance:

- live lobsters should be inspected upon receipt to ensure that they are alive, which can be demonstrated by active leg movement and the tail of lobsters being curled lightly underneath the body when the lobster is picked up;
- lobsters which are dead or may pose a hazard to human health should not be processed, should be rejected and disposed of in a proper manner;
- weak lobsters should be processed immediately;

- since lobster legs and other appendages can be easily broken and the damage can cause to risk of infection and weakening of the lobsters, care in handling should be applied to live lobsters at all times. The necessary skills should be acquired by lobster handlers;
- training in species identification and communication in product specification should be provided to lobster handlers and appropriate personnel to ensure a safe source of incoming lobsters. Of special consideration are the reception and sorting of lobster species that poses a risk of Saxitoxins;
- lobsters should be rejected if they are known to contain harmful or extraneous substances and/or defects which will not be eliminated or reduced to an acceptable level by normal procedures of sorting or preparation. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the HACCP or DAP plan should be modified where necessary.

13.3.1.2 Live Lobster Holding (Processing Step 2)

Refer also to Section 13.2.2 – Minimise the Deterioration of Crustaceans – Handling, of this document. Refer also to “Section 6.1.2 – Growing Water Quality” and Section 6.3.2 Veterinary Drugs.

Potential Hazards: *Veterinary Drug Residues*

Potential Defects: *Lobster mortality*

Technical Guidance:

- all live lobsters should be processed as soon as possible;
- storage time should be monitored where appropriate and should be as short as practical;
- to minimise damage, black discoloration (melanosis) and mortality losses during captivity, especially for the moulting stage of lobsters, over-crowding should be avoided and this can be achieved by controlling the stocking density;
- for short-term storage, live lobsters should be held in suitable containers and in land-based tanks and wells that should be supplied with running sea water, or in dry crates;
- dead whole lobsters should not be processed and should be rejected and disposed in a proper manner. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the DAP plan should be modified where necessary.
- If drugs are used, appropriate withdrawal times must be followed.

13.3.1.3 Tailing (Processing Step 3)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Improper tailing*

Technical Guidance:

- when lobsters are not landed alive, the tail and cephalothorax should be separated immediately after catching. This practice is strongly recommended as they are brought on board. Tails should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible;
- tailing should be carried out as rapidly as possible;

13.3.1.4 Washing (Processing Step 4)

Refer also to section 8.1.5 – Washing and Gutting.

Potential Hazards: *Unlikely*

Potential Defects: *Poor cleaning*

Technical Guidance:

- lobster tails should be washed in plenty of running potable water, or clean sea water, or chlorinated water, to remove all impurities;

13.3.1.5 Application of Additives to Lobster Tails (Processing Step 5)

Potential Hazards: The use of non-approved additives; incorrect application of Sulphites¹.

Potential Defects: Physical contamination, black spots due to inadequate application of Sulphites⁷, incorrect application of Phosphates⁷.

Technical Guidance:

- Mixing and application of appropriate additives should be carried out by trained operators;
- Regular checks of the additive levels should be carried out.
- Tails with black spots should be discarded.
- Non-approved additives should not be allowed in the processing facility.

13.3.1.6 De-veining/Trimming/Washing (Processing Step 6)

Refer to Section 8.1.5 – Washing and Gutting

Potential Hazards: Microbiological contamination

Potential Defects: Incomplete de-veining, decomposition, dark membrane attached to the shell, physical contamination

Technical Guidance:

- the intestine should be removed immediately and consideration should be given to use methods such as ejection by water pressure, vacuum, or physical removal by appropriate utensils (such as scissors, knives or extractors);
- skills should be acquired by lobster handlers with particular attention being given to the removal of membrane and blood from the front end of the tail where the meat is exposed;
- an adequate supply of clean water, potable water or chlorinated water should be available for the washing of de-veined and trimmed lobster tails to ensure that no remnants of the gut or its contents remain;
- the de-veined or trimmed lobster tails should be washed and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;
- the de-veining process should be carried out quickly to prevent product spoilage. Tails waiting for de-veining should be kept on ice or refrigerated at 4°C or less.

13.3.1.7 Weighing /Wrapping (Processing Step 7)

Potential Hazards: Microbiological contamination

Potential Defects: Incorrect net weight, inadequate wrapping, inappropriate packaging material

¹ List of additive names for “sulphites” and “phosphates” can be found in the Codex Standard for Quick Frozen Lobsters (Codex Stan. 95-1981. Rev. 1-1995)

Technical Guidance:

- lobster tails should be graded into species, sizes and weights for the relevant market, to assure the economic integrity of the final product;
- calibrated balances should be provided for accurate grading;
- balances should be calibrated periodically with a standardized weight to ensure accuracy;
- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- the wrapping and packaging operation should be conducted in a sanitary manner to avoid contamination of the product;
- care should be taken to ensure that the front end of tail where the meat is exposed is completely wrapped to protect against dehydration;
- weights of finished packages should be monitored at regular intervals to assure that they are the proper net weight.

13.3.1.8 Chilling (Processing Step 8)

Refer to sections 4.2 – Time and Temperature Control.

Potential Hazards: *Unlikely*

Potential Defects: *Decomposition*

Technical Guidance:

- for lobster tails, chilling in refrigerated sea water is not recommended because excessive salt penetration into the muscle will take place rapidly. However, refrigerated clean water systems can be used for rapid pre-cooling before freezing or storage in ice;
- chilling should take place as rapidly as possible to prevent microbiological growth and deterioration.

13.3.1.9 Freezing (Processing Step 9)

Refer to section 8.3.1 – Freezing Process

Potential Hazards: *Unlikely*

Potential Defects: *Poor texture*

Technical Guidance:

- air blast, liquid nitrogen, or other freezing methods should be rapid to produce high quality tails and to ensure that the textural qualities of the product are retained;
- the freezing and storage of whole uncooked lobsters is not generally recommended.

13.3.1.10 Glazing (Processing Step 10)

Refer to Section 8.3.2 – Glazing

Potential Hazards: *Microbiological growth*

Potential Defects: *Incomplete glaze, foreign matter*

Technical Guidance:

- glazing is considered complete when the entire surface of the frozen fish product is covered with a suitable protective coating of ice and should be free of exposed areas where dehydration (freezer burn) can occur;
- if additives are used the water for glazing, care should be taken to ensure its proper proportions and application with product specifications;
- where the labelling of a product is concerned, information on the amount or proportion of glaze applied to a product or a production run should be kept and used in the determination of the net weight which is exclusive of the glaze;
- glaze water should be replaced regularly to ensure that a high bacterial load does not occur and to prevent build-up of foreign material;

- chilling of glaze water will result in a more uniform application of glaze that will better protect the product;

13.3.1.11 Final Packaging/Labelling (Processing Step 11)

Refer to Section 8.2.3 – Labelling.

Potential Hazards: Absence of labelling of allergenic additives

Potential Defects: Subsequent dehydration, incorrect labelling.

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- sulphites should be used in accordance with manufacturer's instructions and Good Manufacturing Practice;
- care should be taken to ensure that the front end of tail where the meat is exposed is completely wrapped to protect against dehydration.
- where sulphites were used in the process, care should be taken to ensure that this additive is properly declared on the label.

13.3.1.12 Frozen Storage (Processing Step 12)

Refer to Section 8.1.3 – Frozen Storage

Potential Hazards: Unlikely

Potential Defects: Freezer burn, dehydration.

Technical Guidance:

- products should be properly packaged to protect against freezer burn and dehydration;
- glaze is recommended as a further measure to ensure against dehydration;

13.3.1.13 Packaging and Label Reception (Processing Step 13)

Refer to section 8.5.1 – Reception – Packaging, Labels & Ingredients

Potential Hazards: Unlikely

Potential Defects: Contaminated packaging, incorrect labels.

Technical Guidance:

- packaging materials should be examined for signs of contamination;
- labels should be examined for accuracy and to adherence to applicable regulations;

13.3.1.14 Additives Reception (Processing Step 15)

Refer to section 8.5.1 – Reception – Packaging, Labels & Ingredients

Potential Hazards: Biological, chemical and physical contamination

Potential Defects: Contamination, mislabelling

Technical Guidance:

- Additive shipments should be examined to ensure that they are not contaminated and that the container integrity is sufficient;
- Additive shipments should be examined to ensure that they are the correct chemical and meet purchase specifications;

13.3.1.15 Additives, Packaging and Label Storage (Processing Steps 14 and 16)

Refer to Section 8.5.2 – Storage – Packaging, Labels & Ingredients.

Potential Hazards: Unlikely

Potential Defects: *Contaminated additives or packaging material.*

Technical Guidance:

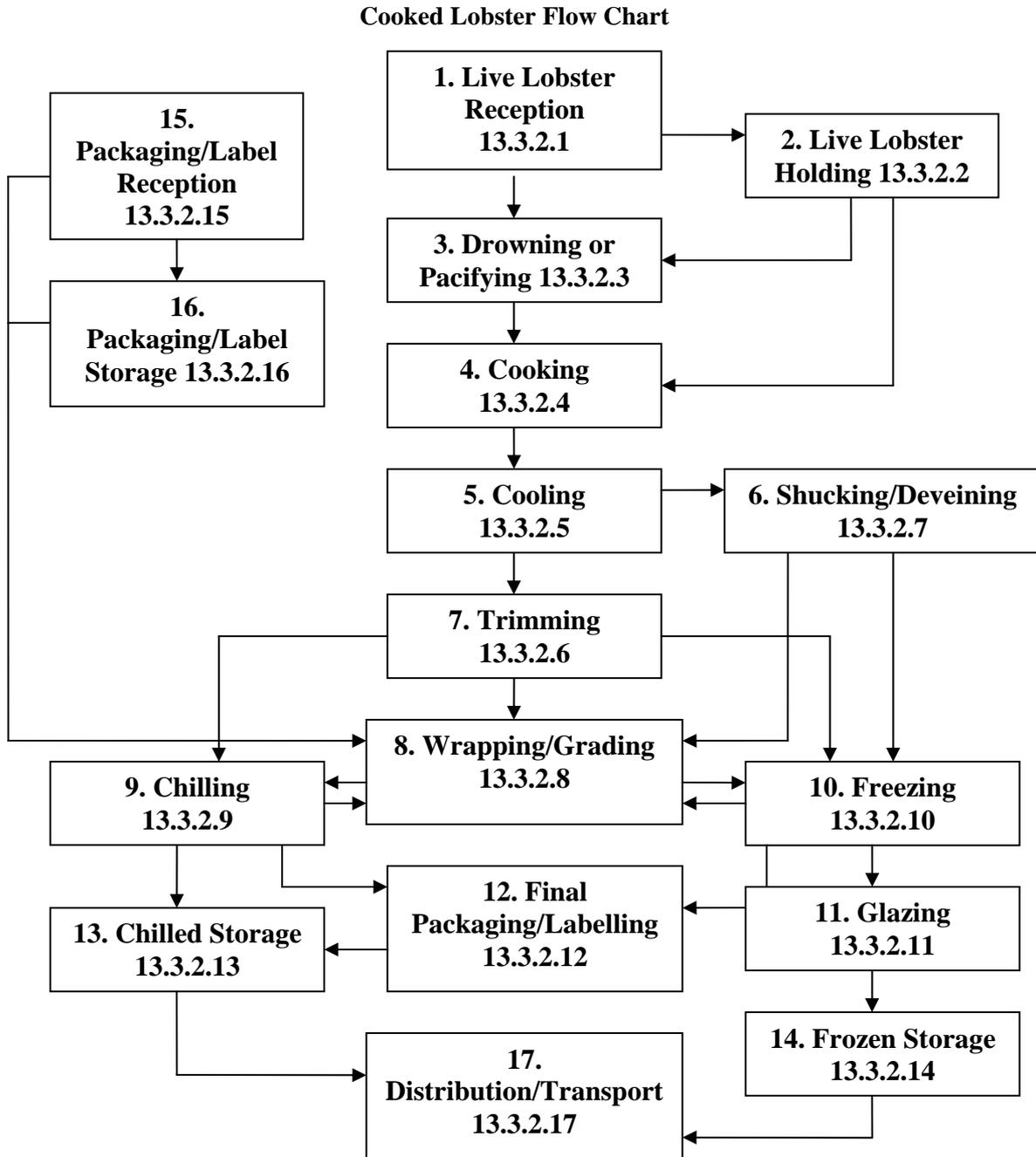
- food additives and packaging material should be protected from dust, dirt and other sources of contaminants;
- pests and insects should be excluded from the packaging storage area;

13.3.1.16 Distribution and Transport (Process Step 17)

Refer to Section 17 – Transport

This flow chart is for illustrative purpose only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process

Figure 13.2 Example of Flow Chart for Processing of Cooked Lobsters



13.3.2 Chilled and Frozen Cooked Whole Lobster and Cooked Lobster Meat

This section is designed with additional operation steps pertaining specifically to Cooked Whole Lobster and Cooked Lobster Meat.

13.3.2.1 Live Lobster Reception (Processing Step 1)

Refer to Subsection 13.3.1.1 of this document.

13.3.2.2 Live Lobster Holding (Processing Step 2)

Refer to subsection 13.3.1.4 of this document

13.3.2.3 Drowning or Pacifying (Processing Step 3)

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

- some species (not *Homarus*) are prepared for cooking by drowning suffocation in clean water with a low oxygen content or by immersing in chilled clean water;
- another possible process is an electric shock (pulse) in potable water, clean water or brine.

13.3.2.4 Cooking (Processing Step 4)

Potential Hazards: *Survival of pathogenic micro-organisms due to insufficient cooking*

Potential Defects: *Over / undercooking*

Technical Guidance:

- a cooking schedule for boiling or steaming should be designed which takes into consideration the appropriate parameters which can affect the cook such as time/temperature and size of the lobster;
- cooking should be carried out by appropriately trained personnel who have acquired the necessary skills to monitor and ensure that all lobsters are given the same time/temperature exposure and adequate heat penetration during the operation ;
- each cooker should be equipped with a suitable thermometer to show the cooking operation temperature. Fitting of a recording thermometer is strongly recommended. A simple device to indicate time of cooking should be supplied.
- lobsters should be cooked according to size until the shell is uniformly orange-red in colour, and depending on the product, until the meat can be easily removed from the shell. Overcooking causes the meat to shrink excessively, lower yields and undercooking makes it difficult to remove the meat from the shell;

13.3.2.5 Cooling (Processing Step 5)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Unlikely*

Technical Guidance:

- cooling times should be kept as short as possible and every effort should be made to avoid contamination of the product during this period;
- cooling should be done in a proper manner, immediately after cooking, to end it uniformly throughout the batch and to avoid holding at temperatures which would encourage the growth of bacteria;
- cooling should be done in cold circulated air, running potable water or clean sea water;
- where lobsters are cooked on a continuous basis, cooling is also best done on a continuous basis;
- cooling should be completed as quickly as possible and every effort should be made to avoid contamination of the product during this period;
- the same water should not be used for cooling more than one batch;
- shell removal should not be performed until the product has adequately cooled;
- care should be taken to ensure that cross contamination of cooked lobsters does not occur;

- cooked lobsters should be handled as a ready-to-eat product that has its normal microflora destroyed which can allow pathogens to proliferate.

13.3.2.6 Trimming (Processing Step 7)

Potential Hazards: Microbiological contamination

Potential Defects: Unlikely

Technical Guidance:

- an adequate supply of clean sea water, potable water or chlorinated water should be available to remove adhering coagulate protein. Spray washing on a conveyor is sometimes sufficient but it may be necessary to brush by hand. These methods can be combined;
- all surfaces and brushes should be frequently cleaned during operation in order to minimise the microbial activity of contact surface and utensils;

13.3.2.7 Shucking, De-veining and Washing (Processing Step 6)

Potential Hazards: Microbiological recontamination during shucking and de-veining, microbial proliferation, microbial toxin formation

Potential Defects: Presence of shell fragments

Technical Guidance:

- the shucking and de-veining of cooked lobsters should be done quickly and carefully, in order to provide an attractive product;
- care should be taken to prevent cross-contamination of cooked product with raw crustacean or any questionable material;
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of hazards, the shucked or de-veined cooked lobster should be washed and appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;
- lobster meat should be thoroughly washed on all surfaces in cold potable water, clean sea water or chlorinated water;

13.3.2.8 Wrapping/Grading (Processing Step 8)

Potential Hazards: Unlikely

Potential Defects: Incorrect grading, inadequate wrapping, inappropriate packaging material

Technical Guidance:

- lobster should be graded into species, sizes and weights for the relevant market, to assure the economic integrity of the final product;
- lobster meats should be uniform in size;
- calibrated balances should be provided for accurate grading;
- balances should be calibrated periodically with a standardized weight to ensure accuracy;
- wrapping material should be clean, sound, durable, sufficient for its intended use and of food grade material;

13.3.2.9 Chilling (Processing Step 9)

Refer to sections 4.2 – Time and Temperature Control.

Potential Hazards: Unlikely.

Potential Defects: Unlikely

Technical Guidance:

- chilling lobsters in refrigerated sea water is not recommended because excessive salt penetration into the muscle will take place rapidly. However, refrigerated clean water systems can be used for rapid pre-cooling before freezing or storage in ice;
- chilling should take place as rapidly as possible to prevent microbiological growth and deterioration.

13.3.2.10 Freezing (Processing Step 10)

Refer to section 8.3.1 – Freezing Process

Potential Hazards: Unlikely

Potential Defects: Unlikely

Technical Guidance:

- air blast, liquid nitrogen, or other freezing methods should be rapid to produce high quality whole lobsters and lobster meats to ensure that the textural qualities of the product are retained;
- the freezing and storage of whole uncooked lobsters is not recommended.

13.3.2.11 Glazing (Processing Step 11)

Refer to Section 13.3.1.10 of this document

13.3.2.12 Final Packaging/Labelling (Processing Step 12)

Refer to Section 8.2.3 – Labelling.

Potential Hazards: Absence of labelling of allergenic additives

Potential Defects: Subsequent dehydration, incorrect labelling.

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- care should be taken to ensure that exposed lobster meats are completely wrapped to protect against dehydration.

13.3.2.13 Chilled Storage (Processing Step 13)

Refer to Section 8.1.2 – Chilled Storage

Potential Hazards: Microbiological growth

Potential Defects: Decomposition, foreign matter

Technical Guidance:

- temperatures in chilled storage should be 4° C or less;
- product should be properly protected to avoid contamination by condensates and splashing water;

13.3.2.14 Frozen Storage (Processing Step 14)

Refer to Section 13.3.1.12 of this document.

13.3.2.15 Packaging/Label Reception (Processing Step 15)

Refer to Section 13.3.1.13 of this document.

13.3.2.16 Packaging/Label Storage (Processing Step 16)

Refer to Section 8.5.2 – Storage – Packaging, Labels & Ingredients.

Potential Hazards: Unlikely

Potential Defects: Contaminated Packaging Material.

Technical Guidance:

- packaging material should be protected from dust, dirt and other sources of contaminants;

- Pests and insects should be excluded from the packaging storage area;

13.3.2.17 Distribution and Transport (Process Step 17)

Refer to Section 17 –Transport

SECTION XX² - PROCESSING OF CRABS

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

This section applies, generally, to commercial crabs of the *Cancer* species, king crab related species (*Lithodes* and *Paralithodes*), swimming crabs (Portunidae), *Geryon* species and snow crab species (e.g. *Chionoectes* and *Opilio*) as well as other species of marine and freshwater crabs which are similar in physical structure to the above mentioned.

XX.1 GENERAL – ADDITION TO PRE-REQUISITE PROGRAMME

In addition to the pre-requisite programme outlined in Section 3 of this document, the processing facility operators are encouraged to evaluate the design and construction of their facility and the maintenance and sanitation of their operation, specific to the processing of lobsters and crabs. Consideration should be given to the following:

xx.1.1 Design and Construction of Equipment and Utensils

Refer to Section 13.1.1

xx.1.2 Hygiene Control Programme

Refer to Section 13.1.2

xx.2 General Considerations for the Handling of Crabs

Refer to Section 4 – General Considerations for the Handling of Fresh Fish and Shellfish.

xx.2.1. Potential Hazards and Defects Associated with Crabs

Refer also to Section 4.1 Potential Hazards Associated with Fresh Fish and Shellfish and Section 5.3.3.1 Identification of Hazards and Defects

xx.2.1.1. Potential Hazards

Bacteria

Refer to Section 13.2.1.1

Chemical Hazards

Veterinary Drugs

Refer to Section 13.2.1.1

Biotoxins

The US reports PSP toxins (saxitoxins) and ASP toxin in dungeness crabs, tanner crabs and red rock crabs.

xx.2.1.2 Potential Defects

Blue discoloration. Blue discoloration is a defect in canned crab meat and also, rarely, developing in crab meat several hours after boiling and cooling of the crabs. The blue colour appears more often on the surface of the shoulder and other joint meats and in the claw meat. It appears in canned horse hair crab ("kegani") more often than in king crab. It is believed to be a result of copper containing hemocyanin in the blood (hemolymph) and may be avoided by eliminating the blood to the extent practicable in the cooking and canning process.

Another form of discoloration caused by fungus infection, particularly of snow crabs, is known as "black mat". While light infections may be physically removed, crabs with heavy infections should be culled as the

² Final numbering of the section to be determined

shells cannot be completely cleaned and because there is tissue penetration of colourless hyphae that can affect the meat quality.

Other defects. Barnacles and other commensals including marine leeches are common defects in various crab species.

xx.2.2 Minimise the Deterioration of Crustaceans - Handling

Refer also to Section 4.3 – Minimise the Deterioration of Fish – Handling

- it is generally known that under similar conditions, the quality of crustaceans deteriorate more rapidly than fish and therefore care in maintaining the crustaceans live prior to processing is strongly recommended;
- since crustacean legs and other appendages can be easily broken and the damage can cause the risk of infection and weakening of the crustacean, care should be taken to handle live crustaceans at all times;
- tanks and wells for pounding live crustaceans should be so placed and constructed as to ensure survival of the crustaceans;
- time is one of the most effective methods in controlling crab product processing. It is strongly recommended that all operations in crab product processing be achieved as rapidly as possible;
- [good quality of crab butchered sections can be maintained by immediate cooking and chilling or freezing;]
- live crustaceans should be carefully packed in clean tanks, wells, crates, open-weave bag, or in boxes covered with wet sacking and held at as low a temperature as practicable, as required of varying species;
- holding tanks are regarded as a better method of storage for long-term handling than well storage;
- the use of clean Hessian or jute bags, for transport, is preferred. Bags made of woven synthetic material should not be used;
- where bags open weave are used for transport, precautions should be taken to avoid suffocation of crustaceans due to slime or mud;
- care also should be taken to maintain the necessary humidity in holding the crustaceans live in bags for transport;
- species, which mutilate each other, should have the claws banded as soon as possible after catching;
- if it is not possible to keep crustaceans alive until the time of processing, crabs should be butchered. Sections should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible.

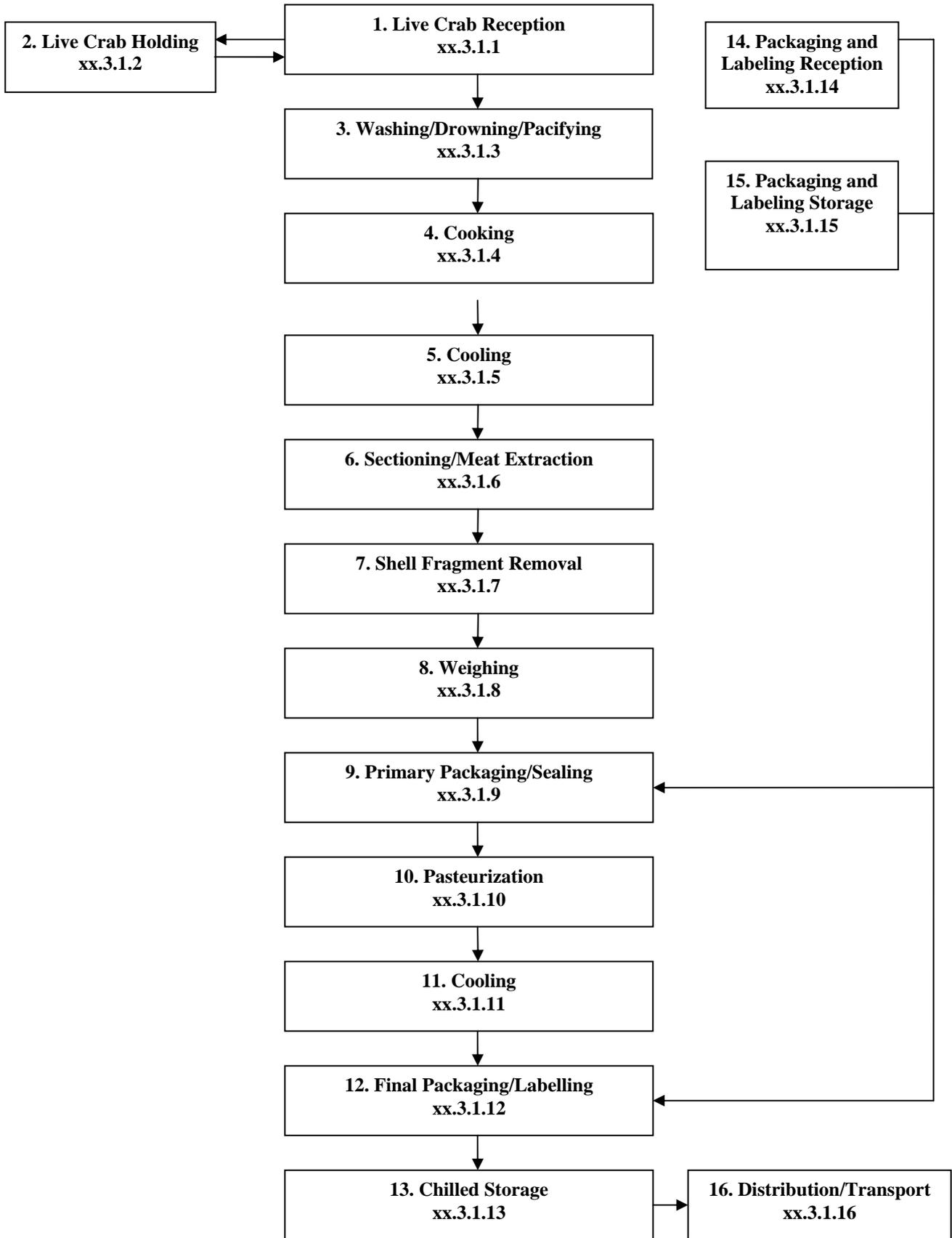
xx.2.3 Processing Operations –Crabs

Once a processing facility has established a pre-requisite programme (section 3) the principles of HACCP (Section 5) can be applied to each individual process within that facility.

This section provides two examples of products derived from crabs. Special consideration was given to elaborate on products which involve heat treatment because of their potential impact on food safety (such as post processing handling). The products and their respective flow diagrams are as follows: Chilled and Frozen Cooked Crabs (Figure 13.3) and Chilled Pasteurized Crab Meat (Fig. 13.4). To provide an appreciation for other products of crabs, a reference has been included in Appendix A and B.

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process

FIGURE xx.1 Example of a flow chart for the processing of pasteurized crabmeat



xx.3.1 Chilled Pasteurized Crab Meat

xx.3.1.1 Live Crab Reception (Processing Step 1)

Refer also to section 13.3.1.1 of this document.

Potential Hazards: *Phycotoxins (PSP and ASP),*

Potential Defects: *Reception of weak or injured crab, crab mortality, ecto-parasites, black shell.*

Technical Guidance:

- live crabs should be inspected upon receipt to ensure that they are alive, which can be demonstrated by active leg movement.
- training in species identification and communication in product specification should be provided to crab handlers and appropriate personnel to ensure a safe source of incoming crabs. Of special consideration are the reception and sorting crabs species at poses a risk of PSP and ASP toxins and parasites as well as defects, such as ecto-parasites and black shell;
- in factories which process crabs, any dead crabs should be discarded. Where sections are processed, any defective or deteriorated parts should be removed from the lot and disposed off in a proper manner;
- weak crabs should be processed immediately.

xx.3.1.2 Live Crab Holding (Processing Step 2)

Refer also to Section 6.1.2– Growing Water Quality and Section 13.3.1.2 – Live Lobster Holding

Potential Hazards: *Unlikely*

Potential Defects: *Crab Mortality*

Technical Guidance:

- live crabs should be stored in circulated sea water, at temperatures of their natural environment or slightly lower, depending on the species. Some species (e.g. *Ucides cordatus cordatus*) can be stored, during short periods, in tanks, without water;
- dead crabs should not be processed and should be rejected and disposed in a proper manner.

xx.3.1.3 Washing and Drowning or Pacifying (Processing Step 3)

Potential Hazards: *Unlikely*

Potential Defects: *Loss of Legs and claws, deterioration*

Technical Guidance:

- crabs should be washed in plenty of running potable water, or clean sea water, or chlorinated water, to remove all impurities. For some species, scrubbing by brush may be necessary. These methods can be combined;
- crabs which are to be processed whole for fresh and frozen products should be pacified or killed just prior to cooking to prevent legs and claws loss. This may be accomplished by the following methods:

--cooling the crabs for [twenty minutes or until two hours] at 0°C or lower, depending of the species;

--immersion of the crabs in potable water or clean sea water which is approximately 10-15°C warmer than the natural environment of the species;

--piercing of the two nerve centres by means of a stainless steel skewer or rod. A rod is inserted through one of the eyes and through the vent;

--stunning the crabs by passing a weak electric current through seawater or freshwater in which the crabs are immersed;

--since spoilage in dead crabs takes place very rapidly and any delay prior to cooking may reduce the meat quality, crabs that are rendered insensible or killed should be cooked immediately;

xx.3.1.4 Cooking (Processing Step 4)

Potential Hazards: *Survival of pathogenic micro-organisms due to insufficient cook, parasite (Paragonimus westermani).*

Potential Defects: *Poor texture due to overcooking, bluing discoloration due to undercooking.*

Technical Guidance:

- where the final product is to be marketed as cooked crabs in the shell or the shucked meat should be chilled to a temperature approaching 4° C. or less and either passed into the distribution chain or processed within 18 hours;
- in most cases the cooking of crabs in boiling water is preferred to steaming. Steaming has a tendency to dry the meat, resulting in the flesh adhering to the shell. Cooking utilizing continuous conveyors is recommended;
- Cooking should be carried out by appropriately trained personnel who has acquired the necessary skills to monitor and ensure that all crabs are given the same time/temperature exposure during the operation;
- adequate uniform cooking is essential because too much cooking causes excessive meat shrinkage, moisture loss, lower yields and poor texture. Too little cooking makes it difficult to remove the meat from the shell, may not adequately destroy pathogenic bacteria and may cause blue discoloration;
- cook time and temperatures must be sufficient to kill trematode parasites;
- it is difficult to specify cooking times and temperatures generally due to differences in size, structure and physiology of the different species of crabs. Considering these reasons, time and temperature should be previously determined for cooking operation to assure the accomplishment of the microbiological levels of pathogenic bacteria. In general, a minimum meat temperature of 82 to 93°C (180 to 200°F) should be achieved.
- [The following represents some general practices presently used in the industry for various crab species:

Blue crab (whole crab):

- steam retorted for 10 min after reaching 121°C retort temperature and
- boiling or steaming for a minimum of 15 min at 100°C.

King crab section:

- one-stage cook - 22-25 min in seawater at 100°C;
- two-stage cook - 10 min at 71-75°C followed by meat removal and a second cook for about 10 min at 100°C in brine and
- “green cook or partial cook” for canning where sections are blanched for 10-15 min at 100°C.

Snow crab and Geryon sections:

- one-stage cook - 7-15 min at 100°C depending on the size of the crab and
- two-stage cook - 4 -5 min in water at 71-82°C followed by meat removal and a second cook of 3-5 min in steam (100°C) .

Cancer species:

- butchered sections - 10-15 min in water or steam at 100°C and
- whole crabs - inactivation followed by boiling or steaming 100°C for 15-25 min depending on size.]

xx.3.1.5 Cooling (Processing Step 5)

Potential Hazards: *Microbiological contamination*

Potential Defects: *unlikely*

Technical Guidance:

- cooling should be done in cold circulated air, running potable water, refrigerated brine, or clean sea water;
- where crabs are cooked on a continuous basis, cooling is also best done on a continuous basis;
- cooling should be completed as quickly as possible and every effort should be made to avoid contamination of the product during this period;
- cooling in chill room must avoid cross contamination with raw product;
- the same water should not be used for cooling more than one batch;
- in some species, the body cavity contains a considerable amount of water, so that adequate drainage, in an area set aside for the purpose, is desirable;
- shell removal or sectioning should not be performed until the product has adequately cooled.

xx.3.1.6 Sectioning/Meat Extraction (Processing Step 6)

Potential Hazards: *Recontamination with pathogenic micro-organisms, microbiological growth, microbial toxin formation*

Potential Defects: *Presence of gills and viscera or foreign material*

Technical Guidance:

- after butchering, any remaining viscera and gills should be removed by brushing and washing. Proper cleaning at this stage is strongly recommended since it eliminates the risk of foreign material being included in the finished product;
- it is recommended that different staff be involved in operations with cooked and uncooked crabs, to avoid cross-contamination;
- picking or shaking operations should be carefully controlled to prevent contamination from bacteria and/or foreign materials;
- it is recommended that all types of meat are picked, packaged and either chilled [(internal temperature of 4.5°C/40°F or less) or frozen within two hours];
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of hazards, the crab meat should be appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;
- because of the possibilities of microbiological contamination, continuous mechanical processing is preferable to hand picking or shaking of white meat by batch processing;
- claws, leg tips and shell parts containing recoverable meat should be continuously separated, rapidly and efficiently, from waste material during the picking operation and should be kept chilled and free from contamination;
- meat recovery operation materials should be carried out continuously.

xx.3.1.7 Shell Fragments Removing (Processing Step 7)

Potential Hazards: *Presence of shell fragments, microbial toxin formation*

Potential Defects: *Presence of viscera, foreign material*

Technical Guidance:

- particular care should be taken to ensure that shell fragments, viscera and foreign material are removed from crab meat since they are very objectionable to consumers and in some circumstances they may be dangerous;
- to minimize time delays, the design of the meat extraction and shell fragment removal line should be continuous to permit a uniform flow without stoppages or slow-downs and removal of waste.
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of hazards, the crab meat should be appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

- the use of an ultraviolet light could improve the detection of shell fragments in crab meat. If the ultraviolet light is used it should be in compliance with the requirements of the official authorities having jurisdiction;

xx.3.1.8 Weighing (Processing Step 8)

Potential Hazards: Survival of *Clostridium botulinum* spores

Potential Defects: Underweight cans

Technical Guidance:

- net weight of the crab contents should not exceed the critical parameters specified in the scheduled process as incomplete heat penetration due to overweight cans could affect heat penetration;
- care should be taken to ensure that minimum net weights on the label declaration are met;

xx.3.1.9 Primary-Packaging/Sealing (Processing Step 9)

Refer to Section 8.2.3 “Labelling” (NOTE: check that this is standard wording)

Refer to Section 16.4.7 – Packing in Containers (Filling, Sealing and Coding)

Potential Hazards: *Subsequent microbiological contamination due to a bad sealing*

Potential Defects: *Incorrect labelling*

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- the operation, maintenance, regular inspection and adjustment of sealing machines should receive particular care;
- the sealing operation should be conducted by qualified personnel specially trained;
- packaging integrity of the finished product should be inspected at regular intervals by appropriately trained personnel to verify the effectiveness of the seal and the proper operation of the packaging machine;

xx.3.1.10 Pasteurisation (Processing Step 10)

Potential Hazards: *Survival of pathogens*

Potential Defects: *Deterioration*

Technical Guidance:

- pasteurising of product should be carried out by appropriately trained personnel who have acquired the necessary skills to monitor and ensure that all packages are given the same time/temperature exposure during the operation;
- pasteurisation should be carried out in hermetically sealed containers;
- crab meat should be pasteurised immediately after picking and packaging;
- to prevent any possible deterioration of the product the crab meat should be pasteurised immediately. It is preferable that the meat be at a temperature of approximately 18°C (64.4°F) when the containers are hermetically sealed to provide a slight vacuum after chilled storage temperatures;
- a time and temperature regime for the pasteurisation of different crab products should be established and should take into consideration the pasteurisation equipment and capacity, the physical properties of the crab and packaging container including their thermal conductivity, thickness, shape and temperature, to ensure that adequate heat penetration has been achieved for all containers in the lot;
- each container of crab meat should be exposed to a minimum processing temperature of 85°C (185°F) of at least 1 min at the geometric centre of the container;
- the water bath should be preheated to a temperature of 90°C (194°F) before the loaded basket is put into it. Special concern should be given to proper water circulation within the bath and

around each individual container being pasteurised. Hot water bath temperature should remain constant until processing is completed;

- [Proper pasteurisation procedures for blue crab usually require a cooking time of 110 to 115 min when 401 flat cans are used.];
- once proper times and temperatures are established, they must be adhered to closely and pasteurisation processes should be standardized by accurate thermocouple measuring equipment. It is recommended that new equipment be standardized after installation and re-standardize on an annual basis or when difficulties are experienced;
- calibration and appropriate maintenance of temperature recording equipment should be performed on a regular basis to ensure accuracy;

xx.3.1.11 Cooling (Processing Step 11)

Potential Hazards: *Microbiological recontamination due to a bad sealing, poor/rough handling and contaminated water, formation of Clostridium botulinum toxin.*

Potential Defects: *Unlikely*

Technical Guidance:

- the pasteurized container of meat should be immediately cooled after processing.
- cooling is best accomplished in an ice water bath. The size of the cooling bath should exceed the size of the pasteurizing water bath to allow for an excess of ice, which is needed if the water is to be kept below 8°C (46.4°F) and a maximum cooling rate is to be realised. No water agitation is required since adequate convection currents are created by differences between bath and product temperatures;
- the water used at the cooling operation should be [chlorinated] in order to avoid recontamination of the product;
- the product should be removed from the ice bath when the temperature has been reduced to below 3.0°C (38°F) with subsequent transfer to chilled storage as quickly as possible;
- crates used to hold container in chilled storage should allow free passage of air currents in order to complete the cooling cycle;
- the processing facility should implement a traffic control system that will ensure that the unpasteurised product cannot be mixed with any pasteurized product.

xx.3.1.12 Final Packaging/Labelling (Processing Step 12)

Refer to Section 8.2.3 “Labelling”

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect labelling, dehydration*

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- the operation, maintenance, regular inspection and adjustment of sealing machines should received particular care;
- the sealing operation should be conducted by qualified personnel specially trained;
- packaging integrity of the finished product should be inspected at regular intervals by an appropriately trained personnel to verify the effectiveness of the seal and the proper operation of the packaging machine;

xx.3.1.13 Chilled Storage (Processing Step 13)

Potential Hazards: *Formation of Clostridium botulinum toxin.*

Potential Defects: *Unlikely*

Technical Guidance:

- the pasteurized crab meat should be moved to the chilled storage facility without undue delay;

- the pasteurized product is perishable and unless it is kept chilled at a minimum temperature of below 3°C (38°F), there is a possibility that *Clostridium botulinum* may grow and produce toxins;
- the chillroom should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended;

xx.3.1.14 Packaging and Labelling Reception (Processing Step 14)

Refer to Section 8.5.1 Reception – Packaging, Labels & Ingredients and Section

Potential Hazards: *Unlikely*

Potential Defects: *Contaminated packaging material*

Technical Guidance:

- packaging material should be inspected for signs of contamination;
- labels should be examined for accuracy and to adherence to applicable regulations;

xx.3.1.15 Packaging/Labelling Storage (Processing Step 15)

Refer to Section 8.5.2 Storage – Packaging, Labels & Ingredients

Potential Hazards: *Unlikely*

Potential Defects: *Contaminated packaging material.*

Technical Guidance:

- packaging material should be protected from dust, dirt and other sources of contaminants;
- Pests and insects should be excluded from the packaging storage area;

xx.3.1.16 Distribution/Transport (Processing Step 16)

Refer to Section 17 – Transport

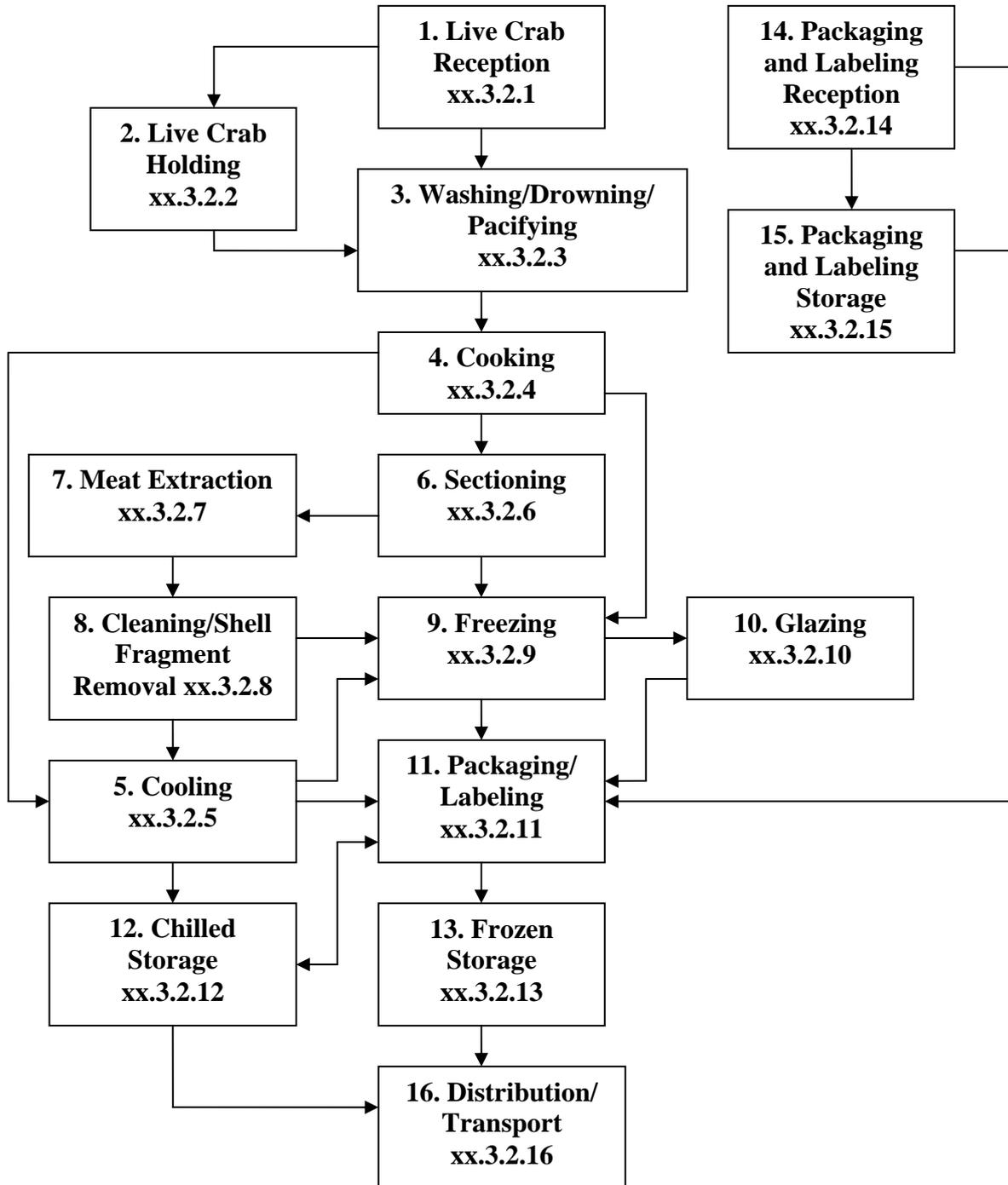
Potential Hazards: *Microbiological growth*

Potential Defects: *Thawed frozen products*

Technical Guidance:

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.

Figure xx.2 Example of flow chart for Chilled and Frozen Cooked Crab



xx.3.2 Chilled and Frozen Cooked Crab

xx.3.2.1 Live Crab Reception (Processing Step 1)

Refer to section xx.3.1.1 of this document.

xx.3.2.2 Live Crab Holding (Processing Step 2)

Refer also to Section xx.3.1.2 of this document.

xx.3.2.3 Washing and Drowning or Pacifying (Processing Step 3)

Refer to Section xx.3.1.3 of this document.

xx.3.2.4 Cooking (Processing Step 4)

Refer to Section xx.3.1.4 of this document.

xx.3.2.5 Cooling (Processing Step 5)

Potential Hazards: Microbiological contamination

Potential Defects: unlikely

Technical Guidance:

- cooling should be done in cold circulated air, running potable water, refrigerated brine, or clean sea water;
- where crabs are cooked on a continuous basis, cooling is also best done on a continuous basis;
- cooling should be completed as quickly as possible and every effort should be made to avoid contamination of the product during this period;
- cooling in chill room must avoid cross contamination with raw
- the same water should not be used for cooling more than one batch;
- in some species, the body cavity contains a considerable amount of water, so that adequate drainage, in an area set aside for the purpose, is desirable;
- shell removal or sectioning should not be performed until the product has adequately cooled;
- Care should be taken to ensure that cross contamination of cooked crabs does not occur e.g.
 - Cooling crabs in baskets should not be placed on the floor;
 - Cooling crab should be covered or otherwise protected from condensations;
 - Product contact surfaces should be washed and/or sanitized at regular intervals to avoid bacterial build up and contamination;
- Cooked crabs should be handled as a ready-to-eat product that has its normal microflora destroyed which can allow pathogens to proliferate.

xx.3.2.6 Sectioning (Processing Step 6)

Potential Hazards: Recontamination with pathogenic micro-organisms, microbiological growth, microbial toxin formation

Potential Defects: Presence of gills and viscera

Technical Guidance:

- after butchering, any remaining viscera and gills should be removed by brushing and washing. Proper cleaning at this stage is strongly recommended since it eliminates the risk of foreign material being included in the finished product;
- it is recommended that different staff be involved in operations with cooked and uncooked crabs, to avoid cross-contamination;

xx.3.2.7 Meat Extraction (Processing Step 7)

Potential Hazards: Recontamination with pathogenic micro-organisms, microbiological growth, microbial toxin formation

Potential Defects: Presence of gills, viscera or foreign material

Technical Guidance:

- it is recommended that different staff be involved in operations with cooked and uncooked crabs, to avoid cross-contamination;
- picking or shaking operations should be carefully controlled to prevent contamination from bacteria and/or foreign materials;

- it is recommended that all types of meat are picked, packaged and either chilled [(internal temperature of 4.5°C/40°F or less) or frozen within two hours];
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of hazards, the crab meat should be appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;
- because of the possibilities of microbiological contamination, continuous mechanical processing is preferable to hand picking or shaking of white meat by batch processing;
- claws, leg tips and shell parts containing recoverable meat should be continuously separated, rapidly and efficiently, from waste material during the picking operation and should be kept chilled and free from contamination;

xx.3.2.8 Shell Fragments Removing/Cleaning (Processing Step 8)

Refer to Section xx.3.1.7 of this document.

xx.3.2.9 Freezing (Processing Step 9)

Refer to section 8.3.1 – Freezing Process

Potential Hazards: Unlikely

Potential Defects: Poor texture.

Technical Guidance:

- adequate commercial freezing equipment should be used to quickly freeze the product and minimize the crystallization of moisture in the flesh (e.g. cryogenic, blast or brine freezing systems);
- brine media in brine freezing systems should be replaced regularly to prevent the build up of dirt and foreign matter;

xx.3.2.10 Glazing (Processing Step 10)

Refer to section 8.3.2 – Glazing

Potential Hazards: Unlikely

Potential Defects: Incomplete glaze, foreign material.

Technical Guidance:

- glaze water should be replaced regularly to prevent build-up of foreign material;
- chilling of glaze water will result in a more uniform application of glaze that will better protect the product;

xx.3.2.11 Packaging/Labelling (Processing Step 11)

Refer to Section xx.3.1.12 of this document

xx.3.2.12 Chilled Storage (Processing Step 12)

Refer to Section 8.1.2 – Chilled Storage.

Potential Hazards: Microbiological Growth

Potential Defects: Decomposition, foreign matter

Technical Guidance:

- temperatures in chilled storage should be 4° C. or less;
- product should be properly protected to avoid contamination by condensates and splashing water;

xx.3.2.13 Frozen Storage (Processing Step 13)

Refer to Section 8.1.3 – Frozen Storage.

Potential Hazards: *Unlikely*

Potential Defects: *Freezer burn, dehydration*

Technical Guidance:

- product should be properly packaged to protect against freezer burn and dehydration;
- glazing is recommended as a further measure to ensure against dehydration;

xx.3.2.14 Packaging/Labelling Reception (Processing Step 14)

Refer to Section xx.3.1.14 of this document.

xx.3.2.15 Packaging/Labelling Storage (Processing Step 15)

Refer to Section xx.3.1.15 of this document.

xx.3.2.16 Distribution/Transport (Processing Step 16)

Refer to Section 17 – Transport

PROPOSED DRAFT STANDARD FOR LIVE BIVALVE MOLLUSCS AND FOR RAW BIVALVE MOLLUSCS PROCESSED FOR DIRECT CONSUMPTION OR FOR FURTHER PROCESSING**(At Step 5 of the Procedure)****1. SCOPE**

This standard applies to live bivalve molluscs and to raw bivalve molluscs that have been shucked and/or frozen, and/or processed to reduce or limit target organisms while essentially retaining the sensory characteristics of live bivalve molluscs. Raw bivalve molluscs are marketed either in a frozen or chilled state. Both live and raw bivalve molluscs may be intended for direct consumption or further processing. The standard does not apply to scallops when the final product is the adductor muscle only.

Part I below applies to live bivalve molluscs while Part II applies to raw bivalve molluscs.

PART I – LIVE BIVALVE MOLLUSCS**I-2. DESCRIPTION****I-2.1 Product Definition**

Live bivalve molluscs are products that are alive immediately prior to consumption. Presentation includes the shell.

I-2.2 Process Definition

Live bivalve molluscs are harvested alive from a harvesting area either approved for direct human consumption or classified to permit harvesting for an approved method of purification, e.g. relaying or depuration, prior to human consumption. Both relaying and depuration must be subject to appropriate controls implemented by the official agency having jurisdiction.

I-2.3 PRESENTATION

Any presentation of the product shall be permitted provided that it:

- meets all requirements of this standard; and
- is adequately described on the label to avoid confusing or misleading the consumer.

The bivalve molluscs may be packed by weight, count, count per unit of weight, volume or per package.

I-3. ESSENTIAL COMPOSITION AND QUALITY FACTORS**I-3.1 Bivalve Molluscs**

Live bivalve molluscs should possess organoleptic characteristics associated with freshness, as well as an adequate response to percussion (i.e. the shellfish will close by themselves when tapped) and freedom from extraneous matter, as determined by specialists familiar with the species concerned

I-3.2 Ice for Packing

If ice is used for packing, the water used for the manufacture of ice shall be of potable quality or shall be clean sea-water. Potable water is fresh-water fit for human consumption. Standards for potability shall not be less than those contained in the latest edition of the WHO “International Guidelines for Drinking Water Quality.” Clean sea-water is sea-water which meets the same microbiological standards as potable water and is free from objectionable substances.

I-3.3 Final Product

Live bivalve molluscs shall meet the requirements of this standard when lots examined in accordance with Section I-9 comply with the provisions set out in Section I-8. Live bivalve molluscs shall be examined by the methods given in Section I-7.

I-4. FOOD ADDITIVES

Food additives are not permitted in live bivalve molluscs.

I-5. HYGIENE AND HANDLING

I-5.1 It is recommended that the products covered by provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1 – 1969, Rev 4-2003) and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

I-5.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

I-5.3 Live bivalve molluscs shall not contain numbers of faecal coliforms or *E. coli* bacteria in excess of testing regimes as follows:

- Live bivalve molluscs shall not exceed the maximum permissible level of the designated microorganism when tested in accordance with an MPN method specified in ISO 16649-3 or equivalent. In an analysis involving five (5) samples, none may contain more than 700 *E. coli*, and not more than one (1) of the five (5) samples may contain between 230 and 700 *E. coli*.

Escherichia coli/g n=5 c=1 m=2.3 M=7

where 'n' = the number of sample units, 'c' = the number of sample units that may exceed the limit 'm', and 'M' is the limit which no sample unit may exceed.

- Live bivalve molluscs must not contain more than 330 faecal coliforms. In an analysis involving five (5) samples, none may contain more than 330 faecal coliforms; and if two (2) or more of the five (5) contain between 230 and 330 faecal coliforms, the five samples must be analyzed for *E. coli*. In that analysis, no sample may contain more than 330 *E. coli*, and not more than one (1) of the five (5) samples may contain between 230 and 330 *E. coli*.

faecal coliforms/g n=5 c=2 m=2.3 M=3.3

Escherichia coli/g n=5 c=1 m=2.3 M=3.3

(iii) Live bivalve molluscs must not contain *Salmonella* in 25 g flesh and *Vibrio parahaemolyticus* 100MPN/g flesh.

(v) In the edible parts of live bivalve molluscs (the whole part or any part intended to be eaten separately) the total content of biotoxins from the saxitoxin (STX) group must not exceed 0.8 milligrams of saxitoxin (2HCL) equivalent per kilogram of mollusc flesh.

(vi) In the edible parts of live bivalve mollusc (the whole part or any part intended to be eaten separately), the total content of biotoxins from the okadaic acid (OA) group must not exceed 0.16 milligrams of okadaic equivalent per kilogram of mollusc flesh.

(vii) In the edible parts of bivalve molluscs (the whole part or any part intended to be eaten separately) the total content of biotoxins from the domoic acid (DA) group must not exceed 20 milligrams of domoic acid per kilogram of mollusc flesh.

(vii) In the edible parts of bivalve molluscs (the whole or any part intended to be eaten separately) the total content of biotoxins from the brevetoxin group must not exceed 20 mouse units or equivalent.

(viii) In the edible parts of bivalve molluscs (the whole or any part intended to be eaten separately) the total content of biotoxins from the Azaspiracid (AZP) group must not exceed 0.16 milligrams per kilogram.

I-6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1, 1991) the following specific provisions apply:

I-6.1 The Name of the Food

The name of the food to be declared on the label shall be the common or usual name of the species of bivalve molluscs in accordance with the law and custom of the country in which the food is sold and in a manner not to mislead the consumer.

I-6.1.1 There shall appear on the label, reference to the presentation provided for in Section I-2.3-Presentation in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation of the product to avoid misleading or confusing the consumer.

I-6.1.2 In addition to the specified labelling designations above, the usual or common trade names of the variety may be added so long as it is not misleading to the consumer in the country in which the product will be distributed.

I-6.2 Content Declaration

Live bivalve molluscs shall be labelled by weight, count, count per unit weight, or volume as appropriate to the product.

I-6.3 Storage Instructions

The label shall specify the conditions for storage and/or temperature that will maintain the quality/viability during transportation, storage and distribution.

I-6.4 Labelling of Non-retail Containers

At a minimum, labelling for live bivalve molluscs shall contain information adequate to:

- (i) Clearly identify the product for consumers
- (ii) Identify all traceability/product tracing information that might be needed in the event of a food safety problem, e.g., information about geographic origin, date of harvesting, purification or relaying as appropriate, as well as identification of the despatch centre or other establishment from which they were shipped
- (iii) Establish durability or shelf life

However, lot identification, and the name and address may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents in which this information is given.

I-7. SAMPLING, EXAMINATION AND ANALYSES

I-7.1 Sampling

(i) Sampling of lots for examination of the product shall be in accordance with the Codex General Guidelines on Sampling (CAC/GL 50-2004).

(ii) The portion of the shellfish analysed should be the portion considered edible. This is generally the whole tissue. Where whole-tissue analysis is not possible or practical, the most contaminated tissue (e.g. the digestive gland) may be dissected and analysed and the results converted to an edible tissue basis. The conversion factor should be supported by adequate data.

I-7.2 Sensory and Physical Examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Sections I-7.3 through I-7.5, and Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories" (CAC/GL 31-1999).

I-7.3 Determination of Count per Unit Weight or Volume

When declared on the label, the count of bivalve molluscs shall be determined by counting the numbers of bivalve molluscs in the container or a representative sample thereof and dividing the count of bivalve molluscs by the actual weight/volume to determine the count per unit weight or volume.

I-7.4 Methods of Analysis of *Escherichia coli* and faecal coliforms in shellfish meats

Recommended Procedures for the Examination of Seawater and Shellfish 4th ed. 1970. The American Public Health Association, Washington, DC (for faecal coliforms in meats), or other validated methods as accepted by the competent authority. The ISO/TS 16649-3 standard – Enumeration of beta glucuronidase-positive *Escherichia coli* in live bivalve molluscs.

In the absence of routine virus testing procedures and the establishment of virological standards, an assessment of the risks from viruses must be based on faecal bacteria counts and sanitary shoreline survey.

I-7.5 Determination of Biotoxins

The majority of the currently available methods do not meet all Codex criteria for reference methods (Type II). There are a number of chemical methods, instrumental methods and functional assays currently in use. These are listed in the table below.

<i>Provision</i>	<i>Methodology</i>	<i>Principle</i>	<i>Type</i>
<i>Saxitoxin Group</i>	<i>AOAC Official Method 2005.06 (Paralytic Shellfish Poisoning Toxins in Shellfish)</i>	<i>LC-FL</i>	<i>II</i>
	<i>AOAC International Mouse Bioassay</i>	<i>Bioassay</i>	<i>III</i>
	*	<i>Receptor Binding Assay</i>	<i>III</i>
	*	<i>Immunochemical</i>	<i>III</i>
	*	<i>LC-MS²</i>	<i>III</i>
<i>Okadaic Acid Group</i>	*	<i>LC-MS²</i>	<i>II</i>
	*	<i>Bioassay^{1,2}</i>	<i>III</i>
	*	<i>PP2A²</i>	<i>III</i>
	*	<i>LC-FL</i>	<i>III</i>
	*	<i>ELISA²</i>	<i>III</i>
<i>Domoic Acid Group</i>	<i>Quilliam LC-UVD method</i>	<i>LC-UV</i>	<i>II</i>
	*	<i>ELISA</i>	<i>III</i>
	*	<i>LC-MS</i>	<i>III</i>
	*	<i>LFIC²</i>	<i>III</i>
<i>Brevetoxin Group</i>	*	<i>LC-MS²</i>	<i>II</i>
	*	<i>ELISA²</i>	<i>III</i>
	<i>APHA mouse bioassay</i>	<i>bioassay¹</i>	<i>III</i>
<i>Azaspiracid Group</i>	*	<i>LC-MS²</i>	<i>II</i>
	*	<i>bioassay¹</i>	<i>III</i>

¹ When using the MBA for detecting lipophilic marine biotoxins, false positives may occur due to the presence of other substances such as YTX, PTX and CI, which are not known to cause human illness. When false positives are suspected, confirmatory testing, using an internationally validated method, can be carried out in order to identify the type(s) of marine biotoxins present.

² Further method development (e.g. interlaboratory validation, CRM availability) needed prior to submission for endorsement by CCMAS

* Official /recognized method title to be identified

I-8. DEFINITION OF DEFECTIVES

The sample unit shall be considered as defective when it exhibits any of the properties defined below.

I-8.1 Foreign Matter

The presence in the sample unit of any matter which has not been derived from bivalve molluscs, does not pose a threat to human health and is readily recognized without magnification or is present at a level determined by any method including magnification, that indicates non-compliance with good manufacturing and sanitation practices.

I-8.2 Dead or Damaged Product

The presence of dead or damaged product. Dead product is characterised by no response to percussion (i.e.

shellfish will close by themselves when tapped). Damaged product includes product that is damaged to the extent that it can no longer function biologically. Sample shall be rejected if dead or damaged bivalve molluscs exceed 5% by count.

I-9. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

- (i) the total number of defectives as classified according to section I-8 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (ii) the total number of sample units not meeting the count designation as defined in section I-7.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;
- (iv) the Food Additives, Hygiene and Labelling requirements of Sections I-4, I-5 and I-6 are met.

PART II – RAW BIVALVE MOLLUSCS

II-2. DESCRIPTION

II-2.1 Product Definition

Raw bivalve molluscs processed for direct consumption or for further processing are products that were alive immediately prior to the commencement of processing and comply with Section I-2.2 relating to harvesting, purification and relaying. They have been shucked and/or frozen and/or processed to reduce or limit target organisms while essentially retaining the sensory characteristics of live bivalve molluscs. Raw bivalve molluscs are marketed in a frozen or chilled state.

II-2.2 Process Definition

Raw bivalve molluscs must meet the process definition in I-2.2 before they can be processed for direct consumption or further processing.

Bivalve molluscs that have been processed to reduce or limit target organisms while essentially retaining the sensory characteristics of live bivalve molluscs are ones that have been processed to assure reduction or limitation of the target organisms to the satisfaction of the official agency having jurisdiction.

II-2.3 PRESENTATION

Any presentation of the product shall be permitted provided that it:

- meets all requirements of this standard; and
- is adequately described on the label to avoid confusing or misleading the consumer.

The bivalve molluscs may be packed by weight, count, count per unit of weight, volume or per package.

II-3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

II-3.1 Raw Bivalve Molluscs

Raw bivalve molluscs shall be of a quality fit for human consumption.

II-3.2 Glazing (for frozen bivalve molluscs)

If glazed, the water used for glazing or preparing glazing solutions shall be of potable quality or shall be clean sea-water. Potable water is fresh-water fit for human consumption. Standards of potability shall not be less than those contained in the latest edition of the WHO “International Guidelines for Drinking Water Quality.” Clean sea-water is sea-water which meets the same microbiological standards as potable water and is free from objectionable substances.

II-3.3 Other Ingredients

The packing medium and all other ingredients used shall be of food grade quality and conform to all applicable Codex standards.

II-3.4 Final Product

Raw bivalve molluscs shall meet the requirements of this standard when lots examined in accordance with Section II-9 comply with the provisions set out in Section II-8. Raw bivalve molluscs shall be examined by the methods given in Section II-7.

II-4. FOOD ADDITIVES

Only the use of the following additives is permitted in raw bivalve molluscs.

[Antioxidants

For chilled shucked molluscs any antioxidant listed in food category 09.1.2 (Fresh Molluscs, crustaceans and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995).

For raw frozen molluscs any antioxidant listed in food category 09.2.1 (Frozen fish, fish fillets, and fish products, including molluscs, crustaceans, and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995).]

II-5. HYGIENE AND HANDLING

II-5.1. It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4-2003), the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003, Rev.2-2005).

I-5.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

II-5.3 Bivalve molluscs should meet the requirements of I-5.2 prior to shucking, freezing, or processing to reduce target organisms. After shucking, freezing or processing to reduce target organisms, they should retain visual characteristics associated with freshness, including, where relevant, shells free of dirt.

II-6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1, 1991) the following specific provisions apply:

II-6.1 The Name of the Food

The name of the food to be declared on the label shall be the common or usual name of the species of bivalve molluscs in accordance with the law and custom of the country in which the food is sold and in a manner not to mislead the consumer.

II-6.1.1 There shall appear on the label, reference to the presentation provided for in Section II-2.3- Presentation in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation of the product to avoid misleading or confusing the consumer.

II-6.1.2 In addition to the specified labelling designations above, the usual or common trade names of the variety may be added so long as it is not misleading to the consumer in the country in which the product will be distributed.

II-6.2 Content Declaration

Raw bivalve molluscs shall be labelled by weight, count, count per unit weight, or volume as appropriate to the product.

II-6.3 Storage Instructions

The label shall specify the conditions for storage and/or temperature that will maintain the quality during transportation, storage and distribution.

II-6.4 Labelling of Non-retail Containers

Refer to I-6.4 Labelling of Non-retail Containers.

II-6.4.1 Every package containing bivalve molluscs that have been processed to reduce or limit target organisms must be provided with a label certifying that all molluscs have been processed to reduce the target organism to levels acceptable to the official agency having jurisdiction.

II-6.4.2 Safety claims for bivalve molluscs processed to reduce or limit target organisms should be specific

to the target organisms that have been reduced or limited and the ability to reliably achieve the appropriate reduction in the target organism(s) shall be validated by a study approved by the official agency having jurisdiction.

II-7. SAMPLING, EXAMINATION AND ANALYSES

II-7.1 Sampling

(i) Sampling of lots for examination of the product shall be in accordance with the Codex General Guidelines on Sampling (CAC/GL 50-2004).

(ii) Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the CAC.

II-7.2 Sensory and Physical Examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Sections II-7.3 through II-7.7, and Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories" (CAC/GL 31-1999).

II-7.3 Determination of Net Weight and Drained Weight

The net weight and drained weight of all sample units shall be determined by the procedures described or mentioned in sections II-7.3.1 through II-7.3.5.

II-7.3.1 Determination of Net Weight

(i) Weigh the unopened container;

(ii) Open the container and remove the contents;

(iii) Weigh the empty container, (including the end) after removing excess liquid and adhering meat;

(iv) Subtract the weight of the empty container from the weight of the unopened container.

(v) The resultant figure will be the total net content.

II-7.3.2 Determination of Net Weight of Frozen Products not Covered by Glaze

The net weight (exclusive of packaging material) of each sample unit representing a lot shall be determined in the frozen state.

II-7.3.3 Determination of Net Weight of Products Covered by Glaze

AOAC official method 963.18, Net Contents of Frozen Seafoods

II-7.3.4 The AOAC official method 963.26 should be used to determine the net weight of products with water added that is inside a "block-frozen" product.

II-7.3.5 Determination of Drained Weight

In the case of shucked bivalve molluscs, the drained weight shall be determined according to AOAC official method 953.11.

II-7.4 Determination of Count per Unit Weight or Volume

When declared on the label, the count of bivalve molluscs shall be determined by counting the numbers of bivalve molluscs in the container or a representative sample thereof and dividing the count of bivalve molluscs by the actual weight/volume to determine the count per unit weight or volume.

II-7.5 Sample Preparation

II-7.5.1 Procedures for Thawing

For frozen product, the sample unit is thawed by enclosing it in a film type bag and immersing in water at room temperature (not greater than 35 °C). The complete thawing of the product is determined by gently squeezing the bag occasionally so as not to damage the texture of the bivalve molluscs, until no hard core or ice crystals are left.

II-7.6 Methods of Analysis of *Escherichia Coli* and Faecal Coliforms in Shellfish Meats

Refer to I-7.4 Methods of Analysis of *Escherichia Coli* and Faecal Coliforms in Shellfish Meats

II-7.7 Determination of Biotoxins

Refer to I-7.5 Determination of Biotoxins

II-8. DEFINITION OF DEFECTIVES

The sample unit shall be considered as defective when it exhibits any of the properties defined below.

II-8.1 Deep Dehydration (Frozen Products)

Greater than 10% of the weight of the bivalve molluscs in the sample unit or greater than 10% of the surface area of the block exhibits excessive loss of moisture clearly shown as white or abnormal colour on the surface which masks the colour of the flesh and penetrates below the surface, and cannot be easily removed by scraping with a knife or other sharp instrument without unduly affecting the appearance of the bivalve molluscs.

II-8.2 Foreign Matter

The presence in the sample unit of any matter which has not been derived from bivalve molluscs, does not pose a threat to human health and is readily recognized without magnification or is present at a level determined by any method including magnification, that indicates non-compliance with good manufacturing and sanitation practices.

II-8.3 Odour/Flavour

Persistent and distinct objectionable odours or flavours indicative of decomposition or rancidity.

II-8.4 Texture

Textural breakdown of the flesh, indicative of decomposition, characterized by muscle structure that is mushy or paste-like.

II-9. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

- (i) the total number of defectives as classified according to section II-8 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (ii) the total number of sample units not meeting the count designation as defined in section II-2.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;
- (iv) the Food Additives, Hygiene and Labelling requirements of Sections II-4, II-5 and II-6 are met.

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS**(SECTION AT STEP 3 OF THE PROCEDURE)****2.8 SMOKED FISH**

- Cold Smoking** means smoking at a temperature of the smoked product lower than the temperature where the fish flesh shows sign of heat denaturation;
- Hot Smoking** means smoking at a temperature of the smoked product until the fish flesh is denatured throughout;
- Mechanical Smoking** means a smoking process where the smoke is generated outside the smoking chamber and by artificial ventilation forced to flow around the fish;
- Smoke** means the aerosol of particles and droplets in the combustion gases from the combustion of wood. The smoke might be submit to separation of tar before it enters the smoking chamber;
- Traditional Smoking Kiln** means an enclosed space such as a chamber or chimney where smoke is generated beneath the fish and allowed to flow around the fish by draught to a chimney;
- Wood** means wood including sawdust, shavings and chips, and woody plants in their natural or dried state. Painted, impregnated or otherwise treated wood or woody plants must not be used for the generation of smoke.

SECTION 12 - PROCESSING OF SMOKED FISH

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective actions. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

Smoking of fish has a long tradition as a preservation method for fish. As such experience regarding the potential hazards has been gained over the time.

Modern ways of smoking and keeping the smoked products refrigerated however has changed the traditional barriers to growth of bacteria and substituted them in essence by refrigeration resulting in an extended storage time.

As a result the historic knowledge of product safety is no longer sufficient but has to be extended with new knowledge.

[Whether the use of liquid smoke is a process under this code or it is to be seen as use of flavouring substances is to be discussed.]

Nevertheless the potential hazards and potential defects for the different types of raw materials used for the production of smoked fish are known.

In general the pre-requisite programme described in Section 3 applies as well as the general considerations for the handling of fresh fish in Section 4, and the description of HACCP and DAP analysis in Section 5.

The recommendations made for the production of fresh fishery products in Section 6 are valid for the preparation of fish used as raw material for the production of smoked fish. If fresh fish of species likely to harbour viable [and hazardous] parasites are to be used as raw material for a smoked product and is not during later processing steps treated in a way that will kill parasites, the fresh fish should be frozen [for at least 24 hours at -20°C] as a step in the fish preparation. As an example this may be necessary when using

wild salmon from certain waters as raw material for cold smoked salmon, if the smoked salmon is not frozen prior to sale.

Cold smoked fish should meet the requirements set out in the Codex Standard for Pre-Packed Cold Smoked Fish¹.

The objects to be dealt with in this chapter will be those covering the special features of the smoked products and the handling of these products.

Where the process, packaging or storage conditions of the product are not as described in this code, the operator should endeavour to scientifically validate the safety of such a process, packaging or storage of the product so as to eliminate further hazards to the consumer.

¹ Codex Standard for Pre-Packed Cold Smoked Fish (under elaboration)

*This flow chart is for illustrative purposes only.
For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.*

References correspond to relevant Sections of the Code.

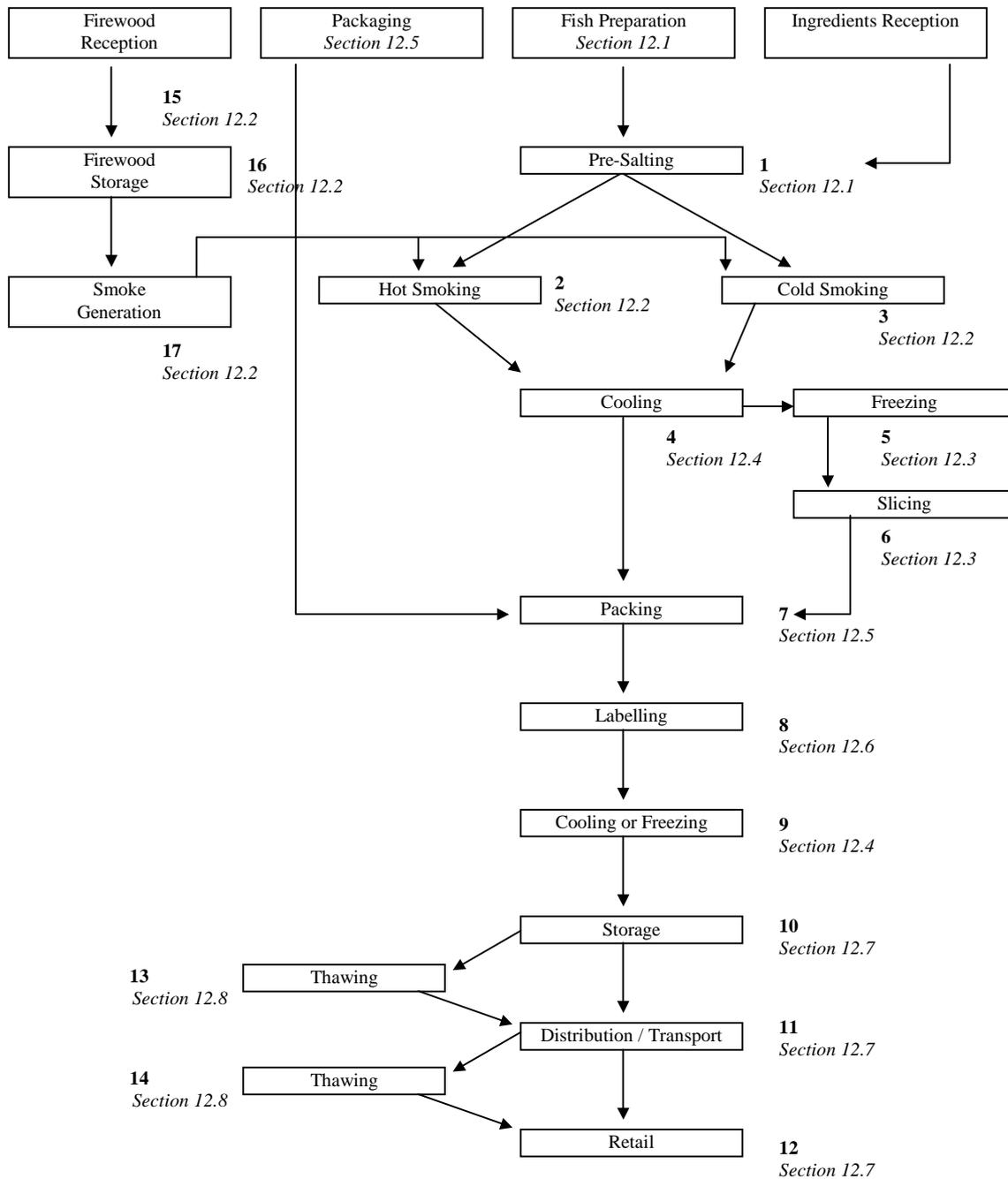


Figure 12.1 Example of a flow chart of a Hot Smoking and Cold Smoking preparation Line, including possible slicing operation at the Cold Smoking line.

12.1 PRE-SALTING (PROCESSING STEP 1)

Potential Hazards: Microbiological, chemical and physical contamination, microbiological growth, biochemical development

Potential Defects: Decomposition, physical contamination

Technical Guidance:

Usually fish for hot smoking are pre-salted only a short time to gain taste, i.e. 0-2 hours, by floating in medium strength salt brine.

Usually fish for cold smoking are dry salted or salted by pickle injection of a medium strength salt brine to gain taste. The salted fish is left to equilibrate for about 24 hours under refrigeration.

Histamine formation may take place in fish of the susceptible species, if the fish is kept at a too high temperature for a prolonged time.

- new brine should be prepared each day of production from food grade salt;
- salt content in the brine should be monitored;
- for fish for cold smoking the salt content in the fish should be more than [3%][3.5%] salt in the water phase to avoid growth of *Clostridium botulinum*;
- the brine should be kept cooled and the temperature should be monitored, in particular if the brine is recycled for pickle injection;
- if the brine is recycled a decontamination step should be instated;
- the flow of products should be maintained in such a way as to avoid undue accumulation.

12.2 THE SMOKING (PROCESSING STEPS 2 & 3)

Potential Hazards: Microbiological, chemical and physical contamination, microbiological growth, biochemical development

Potential Defects: Decomposition, physical contamination

Technical Guidance:

The smoking process usually is initiated by a drying phase. This phase should be kept short, as prolonged exposure to ambient temperature may lead to unwanted microbiological growth and to formation of histamine in susceptible species.

In the hot smoking process the temperature in the centre of the product will normally reach [63°C][72°C] for about ½ hour. Time and temperature has to be managed to ensure heat coagulation of the flesh has occurred completely in to the backbone.

In the cold smoking process the temperature of the products is kept below the coagulation temperature for the fish, usually under 30°C, but can vary between 27°C and 38°C.

To avoid cross contamination with wood dust and spores from moulds, the smoke should be generated in a separate room. Where smoke generators are part of units, special care should be exercised not to contaminate the smoke room with wood shavings and smoke emitted from generators.

Only wood that has not been treated with any chemicals such as paint or impregnating remedies should be used for smoke generation.

- wood for generating smoke should not have been treated with any chemicals;
- store wood in a dry place separated from the production rooms;
- avoid cross contamination from wood to products by placing the smoke generator in a separate room from the production rooms;
- keep drying time of fish before smoking as short as possible;
- monitor time and temperature of the smoking process.

12.3 SLICING OF COLD SMOKED PRODUCTS (PROCESSING STEPS 5 & 6)

Potential Hazards: Microbiological cross contamination, microbiological growth

Potential Defects: Unlikely

Technical Guidance:

Most cold smoked fish products are sold as packages of sliced filets of different sizes or as whole filets. Before slicing the smoked filets may be frozen to about -5°C to stabilise the fish flesh to be sliced.

The slicing process and the transport of the conveyer belts are critical to the hygienic condition of the end product.

Special care should be taken to control the presence of *Listeria monocytogenes*. Avoid undue accumulation and growth of *Listeria monocytogenes* by keeping the slicers and the conveyer belts clean and avoid any possibilities of bacterial growth.

- maintain a flow of products to avoid undue accumulation of products along the processing line;
- keep the slicer and the conveyer belts clean by frequent and planned cleaning during the process.

12.4 COOLING AND/OR FREEZING (PROCESSING STEPS 4 & 9)

Potential Hazards: Microbiological contamination, microbiological growth

Potential Defects: Decomposition, physical contamination

Technical Guidance:

Cooling after smoking (process step 4) is important and should be carried out with care.

Cooling after packing (process step 9) is equally important.

- cool hot smoked products adequately[, i.e. products should be cooled to below 10°C within 2 hours and to below 3°C within 6 hours];
- cool cold smoked products adequately[, i.e. products should be cooled to 0°C-2°C within 2 hours].

12.5 PACKING OF HOT AND COLD SMOKED PRODUCTS (PROCESSING STEP 7)

Potential Hazards: Microbiological, chemical and physical contamination, microbiological growth, dilution of preservatives from smoke by condensing water

Potential Defects: Physical contamination

Technical Guidance:

Hot smoked fish are presented to the market in many forms but mostly in boxes or pre-packaged in plastic bags, possibly evacuated or in modified atmosphere (MAP).

Cold smoked fish are presented to the market mostly in pre-packaged evacuated plastic bags or sold as freshly cut slices directly to the consumer.

If the products after cooling are packed in a room at ambient temperature condensation might occur on the surface of the smoked products leading to a dilution of the preservatives deposited by the smoking process.

- avoid condensation of water on the surface of the smoked product;
- maintain a flow of products to avoid undue accumulation of products along the processing line;
- packaging material should be clean, sound, durable, and sufficient for its intended use and of food grade material.

12.6 LABELLING (PROCESSING STEP 8)

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: Unlikely

Potential Defects: Incorrect labelling

Technical Guidance:

Hot as well as cold smoked products can be produced from fish of seasonal availability as well as throughout the year for other fish species.

The end products may be kept in storage over a period as frozen products, and then thawed and sold as chilled products.

It should be clear from the labelling if the products have been stored frozen and thawed prior to sale.

- it should be stated on the labelling if the product has been kept in storage under frozen condition and then thawed prior to sale.

12.7 STORAGE, DISTRIBUTION AND RETAIL (PROCESSING STEPS 10, 11 & 12)

Potential Hazards: Microbial growth
Potential Defects: Loss of quality characteristics of product
Technical Guidance:

Definition of storage temperature and shelf life for both cold and hot smoked products should take into account the risk of microbiological growth during chilled storage, in particular growth of *Listeria monocytogenes* in cold smoked products but also in skinned hot smoked filets en evacuated plastic bags.

12.8 THAWING (PROCESSING STEPS 13 & 14)

Potential Hazards: Microbiological growth, biochemical development and microbiological contamination
Potential Defects: Decomposition
Technical Guidance:

The thawing process should follow the relevant recommendations in Section 8.1.4.

APPENDIX I

MODIFIED ATMOSPHERE PACKING

GOOD PROCESS CONTROLS ARE ESSENTIAL WHEN PACKING FILLETS AND SIMILAR PRODUCTS IN A MODIFIED ATMOSPHERE

Modified atmosphere packing (MAP), in which the composition of the atmosphere surrounding the fillet is different from the normal composition of air, can be an effective technique for delaying microbial spoilage and oxidative rancidity in fish.

For white fish gas mixtures containing 35-45% CO₂, 25-35% O₂ and 25-35% N₂ are recommended. Gas mixtures containing up to 60% CO₂ in combination solely with N₂ are recommended for oily fish. The inclusion of CO₂ is necessary for inhibiting common aerobic spoilage bacteria such as *Pseudomonas* species and *Acinetobacter/Moraxella* species. However, for retail packs of fillets or similar products, too high a proportion of CO₂ in the gas mixture can induce pack collapse, excessive drip and may cause bleaching. Other gases, N₂ and O₂, are included as diluents to prevent these effects. O₂ is preferentially excluded from oily fish in MA packs so as to inhibit oxidative rancidity. A gas/product ratio of 3:1 is commonly recommended. Any reductions in this ratio can result in an impaired shelf-life extension.

The extent to which the shelf-life of the product can be extended by MAP will depend on the species, fat content, initial bacterial load, gas mixture, type of packaging material and, especially important, the temperature of storage. Determination of the shelf life of a particular product should be by a suitably qualified person such as a food technologist or microbiologist. Since fish can be contaminated with *Clostridium botulinum* type E great care has to be exercised when determining the shelf life. Although it is generally accepted that *Clostridium botulinum* does not grow at temperatures below +3°C other factors, e.g. salt content or pH etc., can also have an inhibitory effect. Thus when determining the shelf life of MAP fresh fish it is advisable to do challenge tests on the product which accurately reflect the product conditions and storage and distribution environment. It is very important to note that the inclusion of O₂ does not preclude the growth of *Clostridium botulinum* type E and temperature control throughout the shelf-life of the product is very important. In many circumstances it is considered undesirable to use ice to cool these packs and therefore mechanical refrigeration methods are preferred.

Seal integrity of MA packs is a critical control point since it determines whether a MA pack is susceptible to external microbial contamination and air dilution of the gas mixture. Essential checks on heat sealing should include proper alignment of the sealing heads or jaws, dwell time, temperature, pressure and machine speed. Great care should be taken to ensure that the seal area is not contaminated with product, product drip or moisture since seal integrity may be reduced. In addition, the quality of the film used is important, particularly with regard to gas permeability, and only film with a clearly defined specification from reputable manufacturers should be used.

Maintenance of the correct gas mixture injected into MA packs is essential to ensure product quality, appearance and shelf life extension. For these reasons routine gas analysis of MA packs should be included as part of the process control. Analysis of the gases within MA packs can indicate faults with seal integrity, MA materials, MAP machinery or gas mixing prior to flushing. The use of continuous gas analysers is recommended. Immediate gas analysis following packing is necessary as CO₂ absorption takes place rapidly.

APPENDIX II - OPTIONAL FINAL PRODUCT REQUIREMENTS - MOLLUSCAN SHELLFISH [TO BE COMPLETED]

APPENDIX III

OPTIONAL FINAL PRODUCT REQUIREMENTS² - FRESH, FROZEN AND MINCED FISH

These end product specifications describe the optional defects for quick frozen fish. The descriptions of optional defects will assist buyers and sellers in describing those defect provisions, which are often used in commercial transactions or in designing specifications for final products.

The following definitions are recommendations for use by purchasers or sellers of quick frozen fish in designing specifications for final product. These specifications are optional and are in addition to the essential requirements prescribed in the appropriate Codex Product Standards and may be appropriately applied for purchases or sales of fresh fish.

1.1 Quick Frozen Finfish, Uneviscerated and Eviscerated

<i>Defect</i>	<u>Recommended Defect Description</u>
a) Body Deformation	Deformation of the back (hump-back) or of the head if present (hooked snout) as a result of the extension of cartilaginous material in these areas as the fish approaches spawning condition.
b) Damage to protective coating	Voids in the ice glaze or tears in the covering membrane.
c) Surface defects:	
Discoloration from bruises	Readily discernible localised discoloration caused by diffusion of blood into the flesh.
Cuts, wounds and other skin breaks	Readily discernible damage to the skin
Discoloured skin	Readily discernible deviation from the normal characteristic colour of the species concerned.
d) Gutting and Cleaning Defects	Improper washing Belly burn or loose belly bones. Misplaced cuts made during gutting.
Gill and body cavity cuts	Incomplete removal of the viscera. Inadequate removal of slime, blood and bits of viscera from the surface of the fish and from the body cavity.
Remains of viscera	Readily discernible enzymatic damage to the tissues in the area of the belly cavity, or loose belly bones in the abdominal cavity, which have become detached from the flesh.

1.2 Quick Frozen Fish Fillets³

<u>Defect</u>	<u>Recommended Defect Description</u>						
a) Moderate Dehydration	A loss of moisture from the surface of the sample unit, which is colour masking, but does not penetrate the surface and can be easily removed by scraping. Over 10% of the total surface area; or						
	<table border="1"> <thead> <tr> <th><u>Pack Size</u></th> <th><u>Defect Area</u></th> </tr> </thead> <tbody> <tr> <td>a) <200 g units</td> <td>>25cm²</td> </tr> <tr> <td>b) 201-500 g units</td> <td>>50cm²</td> </tr> </tbody> </table>	<u>Pack Size</u>	<u>Defect Area</u>	a) <200 g units	>25cm ²	b) 201-500 g units	>50cm ²
<u>Pack Size</u>	<u>Defect Area</u>						
a) <200 g units	>25cm ²						
b) 201-500 g units	>50cm ²						

² Optional final product specifications for Quick-frozen Finfish, Uneviscerated and Eviscerated were developed from the Codex Standard for Quick-frozen Guttled Pacific Salmon (Codex Stan 36-1981).

³ In skinless Flat Fish, small pieces of white skin should not be regarded as defects, provided that the skin does not exceed more than 10% of the surface area of the fillets in the sample unit.

	c) 501- 5000 g units	>150cm ²
	d) 5001-8000 g units	>300cm ²
	e) 8000 g units	>500 cm ²
b) Ragged or Torn Fillets	Longitudinal edges markedly and excessively irregular. Each instance.	
c) Small Pieces (not applicable to fillets cut from blocks)	A fillet piece weighing less than 25 g.	
d) Skin and black membrane(does not include sub-cutaneous layer). In flat fish white skin is not regarded as defect.	Skinless fillets Each piece greater than 3 cm ²	
e) Black Membrane or Belly Lining (does not include white membrane)	Skin-on fillets Each piece greater than 3 cm ²	
f) Scales: Attached to skin Readily noticeable loose scales	Skin-on fillets - scaled Each area of scale greater than 3 cm ² Skinless fillets More than 5, or in the case of hake fillets, more than 10 loose scales	
g) Blood Clots (spots)	Any mass or lump of clotted blood greater than 5 mm in diameter.	
h) Bruises & Discoloration	Diffused blood causing distinct reddish, brownish or other off-coloration. Any aggregate area of discoloration or bruising exceeding 3 cm ² .	
i) Fins or part of fins	Two or more bones connected by membrane, including internal or external bones, or both in a cluster. Any instance where a bone in the fin exceeds 40 mm in length.	
j) Bones	Any bone greater than or equal to 10 mm in length or with a diameter greater than or equal to 1 mm; any bone greater than or equal to 5 mm in length is not to be considered if the diameter is not greater than or equal to 2 mm. The foot of a bone (where it has been attached to the vertebra) shall be disregarded if its width is less than or equal to 2 mm or if it can be easily stripped off by a finger nail	
Critical Bone	Each defect whose maximum profile cannot be fitted into a rectangle, drawn on a flat solid surface, which has a length of 40 mm and a width of 10 mm.	
k) Packaging Material	Each instance.	
l) Viscera	Each instance of the internal organs.	

1.3 Quick Frozen Blocks of Fish Fillet, Minced Fish Flesh and Mixtures of Fillets and Minces Fish Flesh

<u>Defect</u>	<u>Recommended Defect Description</u>
a) Block Irregularity (applies only to blocks intended for cutting into cores for fish slices or fish portions)	Deviations from declared dimensions (e.g. length, width and thickness of a block), non-uniformity of shape, poor angles, ragged edges, ice pockets, air pockets or other damage which would result in product loss. Deviation from declared (nominal) dimensions: Length, width and thickness (i)Over 5mm in any dimension. (ii)Edges (formed by two surfaces) A gap greater than 10 mm between the actual and true edge. (iii)Angles (formed by three edges) A gap greater than 10 mm between the actual and true corner.
b) Ice pockets	Each pocket with a surface area greater than 10 cm ² .
c) Air pockets (including troughs)	Each pocket with a surface area greater than 2 cm ² and with a depth greater than 3 mm
d)Moderate Dehydration	A loss of moisture from the surface of the sample unit which is colour masking, but does not penetrate the surface and can be easily removed by scraping. Over 10% of total surface area, or

	<u>Pack Size</u>	<u>Defect Area</u>
	a) <200g units	>25cm ²
	b) 201-500g units	>50cm ²
	c) 501-5000g units	>150 cm ²
	d) 5001-8000g units	>300 cm ²
	e) >8000g units	>500 cm ²
e) Skin and Black Membrane Skin (does not include sub-cutaneous layer). In flat fish white skin is not regarded as a defect.	Skinless fillet block Each piece greater than 3 cm ²	
f) Black Membrane or Belly Lining (does not include white membrane)	Skin-on fillet blocks Each instance greater than 3 cm ²	
g) Scales (Attached to skin)	Skin-on fillet blocks (scaled) Each area of scale greater than 3 cm ²	
Scales (Readily noticeable loose scales)	Skinless fillet blocks More than 5, in the case of hake fillets, more than 10 loose scales.	
h) Blood Clots (spots)	Any mass or lump of clotted blood.	
i) Bruises and Discoloration	Diffused blood causing distinct reddish brownish or other off coloration which appears as significantly intense discoloration due to melanin deposits, bile stains, liver stains or other causes. . Any aggregate area of discoloration or bruising exceeding 3 cm ² .	
Minced part of mixed blocks:	Objectionable discoloration, spots or particles derived from skin, black membrane, blood clots, blood spots, spinal cord or viscera. (i) Distinctly discoloured, spotted or otherwise heavily deviating from the colour of the species. (ii) Objectionable deviation from the colour of the fillet.	
j) Fins or Parts of Fins	Two or more bones connected by membrane, including internal or external bones, or both, in a cluster. Any instance where a bone in the fin exceeds 40 mm in length.	
k) Bones	Any bone greater than or equal to 10 mm in length or with a diameter greater than or equal to 1 mm; any bone less than or equal to 5 mm in length is not to be considered if the diameter is not greater than 2 mm. The foot of a bone (where it has been attached to the vertebra) shall be disregarded if its width is less than 2 mm or if it can be easily stripped off by a finger nail. Each bone whose maximum profile cannot be fitted into a rectangle, drawn on a flat solid surface, which has a length of 40 mm and a width of 10 mm.	
Critical Bone		
l) Viscera	Each instance.	
m) Packaging Material	Each instance.]	

APPENDIX IV

OPTIONAL FINAL PRODUCT REQUIREMENTS - FROZEN SURIMI

These end product specifications describe the optional defects for frozen surimi. The descriptions of optional defects will assist buyers and sellers in describing those defect provisions which are often used in commercial transactions or in designing specifications for final products.

Frozen surimi is myofibrillar protein concentrate prepared from fish meat without retaining the original shape of fish, so that it is difficult to determine its quality from its appearance. Moreover, it is generally not consumed directly, but further processed. This means that the quality of frozen surimi is measured by both the compositional properties and the functional properties for surimi-based products. Therefore, it is strongly recommended to inspect such functional properties, as the following quality attributes, that are different from those for other fishery products.

It is most important to evaluate the following primary test attributes: moisture content, pH and objectionable matter of raw surimi and gel strength, deformability, and colour of cooked surimi gel. Other secondary attributes may be measured as desired.

1. Primary Quality Attribute

1.1 Raw Surimi Tests

Preparation of test sample:

Put 2-10 kg of frozen surimi in a polyethylene bag, seal the bag, and temper the surimi at room temperature (20°C) or below so that the temperature of the surimi rises to approximately -5°C. Do not soften the surface of the test sample.

1.1.1 Moisture

Sample for moisture content should be taken from the interior of a surimi block to insure no freezer burn (surface dehydration) of the sample has occurred. Put the test sample in a polyethylene bag or polyethylene bottle, seal the bag or bottle and let the test sample thaw so that the temperature of the sealed article rises to room temperature. Then measure the moisture using any of the following methods:

In case of using a drying oven method (see AOAC Method);

In case of using an infrared lamp moisture tester, take out 5 g of the test sample precisely weighed with a sample tray, and dry it immediately [Details of the method to be provided]; or

In case of using a microwave drying moisture tester (see AOAC Method). [Details of an alternate method to be provided].

Calculate the moisture according to the following formula to the first decimal place.

In using any of the measurement methods, test two or more pieces of the test sample, and indicate the average value obtained thereby.

When measuring a fatty test sample with a microwave drying moisture tester, cover the top of the sample tray with glass fibre paper to prevent fat from splashing, as being dried.

$$\text{Moisture (\%)} = \frac{\text{Pre-dry weight (g)} - \text{After-dry weight (g)}}{\text{Pre-dry weight}}$$

1.1.2 pH

Add 90 or 190 ml as needed to disperse the sample of distilled water to 10 g of the test sample as need to disperse. Homogenize it, and then measure pH of the suspension with a glass electrode pH meter to second decimal place. Indicate the value obtained thereby.

1.1.3 Objectionable Matter

The term "objectionable matter" as used in this item shall mean skin, small bone and any objectionable matter other than fish meat.

Spread 10 g of the test sample to the thickness of 1 mm or less, and count the number of visible objectionable matter in it. Indicate the value obtained thereby, provided an objectionable matter of 2 mm or

larger shall be counted as one and an objectionable matter smaller than 2 mm shall be counted as one half, respectively, and any unnoticeable matter smaller than 1 mm shall be disregarded.

The inspection method for distinguishing scales visibly unnoticeable is specified in Section 2.1.1 of this Appendix.

1.2 Cooked Surimi Gel Tests

1.2.1 Gel Strength and Deformability

Two methods are presented here. The test to use should be decided upon between buyer and seller.

1.2.1.1 Puncture Test

Preparation of test sample:

Put 2-10 kg of frozen surimi in a polyethylene bag, seal the bag, and temper the surimi at room temperature (20°C) or below so that the temperature of the surimi rises to approximately -5°C. Do not soften the surface of the test sample.

Preparation of surimi gel for testing: Surimi gel not containing added starch

A. Comminution

Sample volume necessary for surimi paste preparation depends on the capacity of mixing instrument used. Use of 1.5 kg or more is necessary to represent the property of 10 kg of block. Regarding that enough amount of surimi is necessary for consistency of testing, equipment of large capacity which can mix surimi of 1.5 kg or more must be installed in laboratory. When you use larger size of the equipment, you also need to put in adequate amount of surimi in accordance with equipment to secure enough texture of surimi paste. Crush 1.5 kg or more of the test sample with a silent cutter, then add 3% of salt to it, and further grind and mash it for 10 minutes or more into homogenized meat paste. Remember to keep the temperature of the material to be tested, at 10°C or less.

Desirable timing for adding salt is at -1.5°C.

Desirable temperature of the test material is 5-8°C.

B. Stuffing

Stuff a polyvinylidene chloride tube of 48 mm width (30mm in diameter), when flatten, with approximately 150 g (resulting in approximately 20 cm in length) of the meat paste by the use of a stuffer with a 18 mm diameter stuffing tube, and tie the both ends of the tube.

C. Heating

Heat the test material in hot water of 84-90°C for 30 minutes.

At the time the test material is being put in, the temperature drop should not exceed 3°C.

D. Cooling

Immediately after finishing the heating treatment, put the test material in cold water and fully cool it, and then leave it at the room temperature for 3 hours or longer.

Test Method

Perform between 24 and 48 hours after cooking the following measurements of the prepared inspection sample of surimi gel of which temperature should equilibrate to the room temperature and record the temperature of the sample at the time of measurement.

Measure the gel strength and deformability of the inspection sample of surimi gel with a squeeze stress tester (rheometer). Use a spherical (plunger), of which diameter shall be 5 mm and speed shall be 60 mm/minute.

Remove film off the inspection sample of surimi gel, cut it into 25 mm long test specimen, and place test specimen on the sample deck of the tester so that the centre of the test specimen will come just under the plunger. Apply load to the plunger, and measure the penetration force in g and the deformation in mm at breakage.

Record the obtained value of the penetration and deformation in g by integral number. Record the obtained value of the deformation in mm to the first decimal place.

Prepare six or more test specimens from the same inspection sample of Surimi gel, and test each of them. Record the average values obtained thereby.

1.2.1.2 Torsion Test

Preparation of the surimi gel test specimen

A. Comminution

Temper frozen surimi at room temperature (near 25 degree C) for 1 hr., or in a refrigerated tempering room to approximately -5°C. Cut the tempered surimi blocks into slices or chunks and load into bowl of a silent cutter or cutter/mixer equipped for vacuum use. First reduce the frozen surimi to a powder by comminution at low speed without vacuum. Add sodium chloride (2% on total batch weight basis) and ice/water (sufficient to obtain 78% final moisture content on total batch weight basis). Secure the lid and begin chopping again at low speed with no vacuum, gradually (if possible) increasing to high speed (about 2000 rpm). At the point that the mixture becomes a single mass, turn on the vacuum pump and allow approximately 70-80% of a full vacuum (approximately 20- 25 inch Hg or 500-650 mm Hg) to be obtained. During comminution insure that paste is scraped from the walls and balls of paste are forced down into the blades of a cutter/mixer. Discontinue chopping when a temperature of 5-8°C is obtained. A minimum 6 minute chopping time is recommended.

B. Stuffing

Transfer the paste to the sausage stuffer with a minimum of air incorporation. Maintain paste temperature below 10°C at all times. Stuff into polycarbonate or stainless steel tubes 1.9 cm (i.d.) of an appropriate length, typically about 20 cm. Tubes should be sprayed with lecithin release agent prior to filling. Stuff the paste uniformly and without air pockets into tubes. Cap or seal both ends and place in ice bath until ready to heat process (within one hour).

C. Heating

Heat process by immersing filled tubes in a water bath previously equilibrated to the proper temperature. Time-temperature relationships for thermal processing are: low temperature setting ability: 0-4°C for 12-18 hours, followed by 90°C for 15 min; median temperature setting ability: 25°C for 3 hours, followed immediately by 90°C for 15 min; high temperature setting ability: 40°C for 30 minutes, followed immediately by 90°C for 15 min; evaluation of protease activity: 60°C for 30 minutes, followed immediately by 90°C for 15 min; rapid cooking effect: 90°C for 15 minutes. It is recommended that water baths be heated to about 5°C higher than the intended treatment temperature, to account for the heat loss experienced upon loading, and the temperature be adjusted approximately within 2 minutes, possibly requiring ice addition.

Only cold water species will demonstrate good setting ability at lower temperatures. The heat process used to prepare the sample should be specified; if not, it is assumed that only the rapid cooking effect is being assessed. Relative proteolytic activity is assessed by comparing tests conducted on gels prepared at 60/90°C with those processed only at 90°C.

Ohmic heating can be used as a means of heating method. Heat is uniformly generated through electrical resistance. Paste placed in a chlorinated PVC tube is heated between two electrodes. Internal temperature of 90 can be reached within 1 min. Heating rate (fast and slow) can be controlled linearly. This method provides another advantage: Pacific whiting surimi or others with proteolytic enzymes can be successfully gelled (without enzyme inhibitors) under ohmic heating because fast heating can inactivate the enzyme.

D. Cooling

After heat processing, quickly transfer tubes to an ice water bath and equilibrate to 0°C. Remove gels from tubes with a plunger and seal in plastic bags. Keep samples refrigerated until tested (within 48 hours).

Test Method

Perform within 24 hours the following measurements of the prepared inspection sample of surimi gel, whose temperature should be equilibrated to the room temperature (20-25°C).

Measurement of Stress and Strain:

The gel-forming ability of surimi is evidenced by the fundamental rheological properties of the test product when strained to failure (breakage). Allow refrigerated samples to reach room temperature (near 25°C)

before testing. Cut test specimens to length of about 30 mm. Attach specimens to mounting discs at each flat end with cyanoacrylate glue, being careful to place samples in centre of mounting discs. Mill centre of test specimens to a capstan shape, the milled portion being 1 cm. in diameter. Mount the milled test specimen in the torsion rheometer. Rotate top of sample to the point of sample failure (breakage) and record torque and rotational distance at this point. Calculate and report stress and strain at sample failure as: Stress = $t = 1581 \times$ (torque units); Strain = $\ln [1+(g^2/2) + g(1+g^2/4)^{0.5}]$, where $g = 0.150 \times$ (rotational distance, mm) - 0.00847 x (torque units). In practice these equations are normally programmed onto a computer linked to the torsion rheometer for data acquisition and analysis, thus yielding directly the stress and strain measurements.

1.2.2 Colour

Cut the inspection sample of Surimi gel into flat and smooth slices 15 mm or more thickness, and immediately measure with a colour-difference meter the cross section of the slice pieces in the values of L^* (lightness), a^* (red-green) and b^* (yellow-blue) to the first decimal place. Test three or more slice pieces, and indicate the averages of the values obtained thereby.

2. Secondary Quality Attributes

2.1 Raw Surimi Tests

Preparation of test sample:

Put 2-10 kg of frozen surimi in a polyethylene bag, seal the bag, and defrost the surimi at room temperature (20°C) or below so that the temperature of the surimi rises to approximately -5°C. Do not soften the surface of the test sample.

2.1.1 Objectionable Matter(Scales)

After the measurement according to Appendix.1.1.3 add 100 ml of water to the same test sample, homogenize it, further add 100 ml of 0.2M-NaOH solution to it, and dissolve it with a stirrer. Filter the dissolved solution with filter paper (No.2), wash the residue with water, and then dry it at 105 for two hours. Count the number of scales obtained thereby, and indicate that number in (brackets) appearing subsequent to the number of the objectionable matter according to Section.1.1.3 of this Appendix.

After having dissolved, leave the dissolved solution still to insure precipitation, and scoop up as much skim as possible before filtration.

2.1.2 Crude Protein Content

AOAC Kjeldahl Method

2.1.3 Sugar Content

Precisely weigh 10 g of the test sample, put it in a 50 ml beaker, add to it 10 ml of 2% trichloroacetic acid (TCA) solution, and fully stir the material. Leave it still for approximately 10 minutes, stir it again, and leave it still for 10 minutes. Filter it with filter paper(No.2), drop some part of the filtered liquid on a refractometer (for Brix 0-10% use), and read the graduation on the refractometer. Apply it to the following formula and calculate a value to the first decimal place. Indicate the value obtained thereby.

Calibrate in advance the refractometer at a specified temperature with distilled water.

$$\text{Sugar(\%)} = 2.04 \times \text{Brix(\%)} - 2.98$$

2.1.4 Crude Fat Content

Put in a mortar, a precisely weighed 5-10 g of the test sample with approximately same quantity of anhydrous sodium sulphate and a small amount of refined sea sand. Mash the material uniformly into dry powder, and put it in a cylindrical filter paper. Do not fail to take out and put in the cylindrical filter paper the powder remaining in the mortar by the use of a small amount of ethyl ether and absorbent cotton. Extract and determine the fat according to Soxhlet method, and calculate a value according to the following formula to the first decimal place. Indicate the value obtained thereby.

Fill the ends of the cylindrical filter paper with a slight amount of absorbent cotton so that the material to be tested will not fall out.

Dry the extraction receptacle in advance at 100 - 106°C, and weigh it.

Extraction speed shall be 20 times per hour.

$$\text{Crude Fat(\%)} = \frac{(W_1 - W_0)}{S} \times 100$$

S : Quantity of test sample taken(g)

W₀ : Weight of receptacle(g)

W₁ : Weight of receptacle after fat has been extracted(g)

2.1.5 Colour and Whiteness

Colour: Temper frozen surimi completely to room temperature (near 25°C). Fill into a 50 ml glass beaker (4 cm diameter, 5.5 cm height) and measure colour values of L*, a*, and b* (CIE Lab system) to the first decimal point. Complete contact between the test specimen and the colorimeter measurement port, as well as filling of the beaker with no voids, is recommended for consistent results. Measure three or more samples and record the average value.

Whiteness: Whiteness can be calculated as: whiteness = L* - 3b* or whiteness = 100 - [(100 - L*)² + a*² + b*²]^{0.5}.

2.1.6 Pressure Induced Drip

Defrost 50 g of the test sample and put it in a circular cylinder of 35 mm inner diameter and 120-150 mm long made of stainless steel or synthetic resin and having 21 holes of 1.5 mm diameter distant 3 mm from each other opened in the bottom. Immediately apply 1 kg of load with a pressurizing cylindrical rod of 34 mm diameter, of which weight shall be included in the load. Leave as it is for 20 minutes, and then measure the weight of the dripped liquid. Calculate its percentage to the weight of the test sample to the first decimal place. Indicate the value obtained thereby.

2.2 Cooked Surimi Tests

2.2.1 Preparation of test sample

2.2.1.1 Water-added Surimi gel:

A. Comminution

Sample volume necessary for surimi paste preparation depends on the capacity of mixing instrument used. Use of 1.5 kg or more is necessary to represent the property of 10 kg of block. Regarding that enough amount of surimi is necessary for consistency of testing, equipment of large capacity which can mix surimi of 1.5 kg or more must be installed in laboratory. When you use larger size of the equipment, you also need to put in adequate amount of surimi in accordance with equipment to secure enough texture of surimi paste. Crush 1.5 kg or more of the test sample with a silent cutter, then add to it 3% of salt and 20% of 3% cooled salt water, and further grind and mash it for 10 minutes or more into homogenized meat paste. However, if using the remaining water-unadded, starch-unadded test material under Section 1.2.1.1.A of this Appendix, add 20% of 3% cooled salt water only, and further grind and mash it for 5 minutes into homogenized meat paste, while keeping the temperature at 10°C or less for cold water species, such as Alaska Pollocks (*Theragra chalcogramma*). Warm water species may be processed at a slightly higher temperature (not to exceed [15°C]). However, better quality will be achieved at a lower temperature.

B. Casing

Same as Section 1.2.1.1.B of this Appendix

C. Heating

Same as Section 1.2.1.1.C of this Appendix

D. Cooling

Same as Section 1.2.1.1.D of this Appendix

2.2.1.2 Starch-added Surimi gel

A. Comminution

Add 5% of potato starch to the meat paste prepared according to the method under Section 1.2.1.1.A of this Appendix, and mix (homogenize) within 5 minutes. Remember to keep the temperature of the test material at 10°C or below all the while. Desirable temperature of the test material is 7-8°C.

B. Stuffing

Same as Section 1.2.1.1.B of this Appendix

C. Heating

Same as Section 1.2.1.1.C of this Appendix. However, if performing treatment to secure Suwari (setting), same as Section 2.2.1.3.C of this Appendix Suwari- treated surimi gel.

D. Cooling

Same as Section 1.2.1.1.D of this Appendix.

2.2.1.3 Suwari (setting)-treated Surimi gel

A. Comminution

Same as Section 1.2.1.1.A of this Appendix.

B. Casing

Same as Section 1.2.1.1.B of this Appendix.

C. Heating

After treatment to secure Suwari(setting) in warm water of 30 (28-32)°C for 60 minutes, perform the same heating as Section 1.2.1.1.C of this Appendix.

D. Cooling

Same as Section 1.2.1.1.D of this Appendix.

2.2.2 Test method

Perform between 24 and 48 hours after cooking the following measurements of the prepared inspection sample of surimi gel which temperature should equilibrate to the room temperature and record the temperature of the sample at the time of measurement.

2.2.2.1 Whiteness

Whiteness, as an index for the general appearance of a surimi gel, can be calculated as: $Whiteness = L^* - 3b^*$. or: $Whiteness = 100 - [(100 - L^*)^2 + a^{*2} + b^{*2}]^{0.5}$.

2.2.2.2 Expressible Moisture

Place a slice of surimi gel (2 cm diameter X 0.3 cm thick and about 1 g in weight) between two filter papers and press them by an oil pressure equipment under a fixed pressure (10 kg/cm²) for 20 sec.

Calculate the expressible water according to the following formula to the first decimal place.

Test three or more pieces of the test sample, and indicate the average value obtained thereby.

$$\text{Expressible water (\%)} = \frac{\text{Pre-pressed weight (g)} - \text{after-pressed weight (g)}}{\text{Pre-pressed weight (g)}}$$

Water holding capacity is also used as an index of surimi gel as well as the expressible water.

Water holding capacity (%) is calculated as follows.

$$\text{Water holding capacity (\%)} = \frac{\text{Expressible water content (g)}}{\text{Total moisture content of pre-pressed sample(g)}}$$

2.2.2.3 Folding test:

The folding test is conducted by folding a 5-millimeter thick slice of gel slowly in half and in half again while examining it for signs of structural failure (cracks). Make sure the sample is folded completely in half. Keep the folded state for five seconds, and then evaluate the change in the shape by 5 - stage merit marks.

The minimum amount of folding required to produce a crack in the gel determines the score for this test. Test three or more slice pieces of the same inspection sample, and indicate the average mark obtained. In case of folding by hand, apply constant power throughout the folding surface.

Merit Mark	Property
5	No crack occurs even if folded in four.
4	No crack occurs if folded in two but a crack(s) occur(s) if folded in four.
3	No crack occurs if folded in two but splits if folded in four.
2	Cracks if folded in two.
1	Splits into two if folded in two.

2.2.2.4 Sensory (Biting) Test

Bite a 5 mm thick slice piece of the gel sample, and evaluate its resilience upon touch to teeth and cohesiveness upon bite by 10-stage merit marks. Test three or more slice pieces of the same inspection sample by a panel consisting of three or more experts, and indicate the average mark obtained thereby. Merit marks 2, 3, 4, 5 and 6 corresponds to the folding merit marks 1, 2, 3, 4 and 5 under (2), respectively.

Merit Mark “Ashi (footing) Strength”

10	Extremely strong
9	Very strong
8	Strong
7	Slightly strong
6	Fair
5	Slightly weak
4	Weak
3	Very weak
2	Extremely weak
1	Incapable to form gel

APPENDIX V:

OPTIONAL FINAL PRODUCT REQUIREMENTS: COATED QF FISHERY PRODUCTS

Type of product	Defect	Recommended Description
Frozen state	Presence of Surplus Loose Coating	Any excessive amount of loose material in the package as percentage of declared net weight.
	Excessive Fat (Oil)	Each instance of perceptible amounts of oil which have stained the inside of and soaked through the packaging.
	Ease of separation	Upon removal from the pack units do not separate easily by slight force exerted by hand without damage and without packaging material sticking to the surface, percentage of stick (fingers) or portions (fillets) affected.
	Broken Products	Broken products, which have been separated into pieces. Each instance.
	Damaged Products	Damaged products, which have been squashed, mashed or otherwise mutilated to an extent that appearance is materially affected. Each instance
	Discoloration of Coating	Colour of individual units which are black or very dark brown. Each instance. Colour significantly different from other units in the sample. Each instance. Widespread black spots derived from burnt breadcrumbs.
	Size uniformity (if declared)	Deviation of the individual size of stick or portion expressed as percentage of weight.
	Coating	Fish sticks (fingers), portions or fillets where the surface is not completely covered by breading and/or batter.
	Ice Pockets (which may result in coating damage during cooking)	Ice pockets with a surface area greater than 1cm ² (each instance). Air pockets with a surface area of greater than 1cm ² and with a depth of greater than 3 mm, each instance.
	Deep Dehydration	An excessive loss of moisture from the surface of the sample unit, which shows clearly on the surface and cannot be easily removed by scraping. Each instance greater than 5 cm ²

Thawed state	Skin and black membranes (does not include sub-cutaneous layer silver lining)	Skinless fillet. Each piece greater than 3 cm ²
	Black membrane or belly-lining (does result in coating damage during cooking)	Skin-on fillet. Each instance greater than 3 cm ² (not including white membrane)
	Scales (attached to skin) Readily noticeable loose scales	Skin-on fillet – scaled. Each area of scale greater than 3 cm ² Skinless fillet. More than 5 loose scales except in the case of hake fillets, 10
	Blood clots (spots)	Any mass of lump of clotted blood. Each instance greater than 5 mm in diameter.
	Bruises and Discoloration	Diffused blood causing distinct reddish, brownish or other off-coloration. Any aggregate area of discoloration or bruising exceeding 3 cm ²
	Fins or part of fins	Two or more bones connected by a membrane, including internal or external bones, or both in a cluster. Any instance where a bone in the fin exceeds 40 mm in length
	Viscera	Any viscera. Each instance.
	Embedded packaging material	Each instance.

APPENDIX VI - OPTIONAL FINAL PRODUCT REQUIREMENTS - SALTED FISH [TO BE COMPLETED]

These products specifications describe the optional defects for salted fish. The descriptions of optional defects will assist buyers and sellers in describing those defect provisions. These descriptions are optional and are in addition to the essential requirements prescribed in the appropriate Codex Products Standards.

1. Product designation of Salted Fish of family Gadidae

Reference is given to Standard for Salted Fish and Dried Salted Fish of the Gadidae Family of Fishes (Codex Stan. 167-1989, Rev. 1-1995).

Produced from the following species, all belonging to the Gadidae family that have been bled, gutted, beheaded and split so that approximately two thirds of the backbone is removed, washed and 90-100 % saturated with salt.

English name	Latin name
Cod	<i>Gadus morhua</i>
Pacific cod	<i>Gadus macrocephalus</i>
Polar cod	<i>Boreogadus saida</i>
Greenland cod	<i>Gadus ogac</i>
Saithe	<i>Pollachius virens</i>
Ling	<i>Molva molva</i>
Blue ling	<i>Molva dypterygia</i>
Tusk	<i>Brosmius brosme</i>
Haddock	<i>Gadus aeglefinus / Melanogrammus aeglefinus</i>

Quality classification

Imperial/superior

Fish products in this trade category are made from fish that is thoroughly bled, well washed and rinsed to remove remains of blood and entrails, and with nape skin attached.

The fish is to be properly split and evenly salted, well pressed and restacked during processing. The fish is to be light-coloured and firm, and without blemishes.

This category may include fish with the following characteristics:

1. poorly bled bellies
2. small tears or longitudinal cracks
3. not properly rinsed
4. some blood clots
5. somewhat unevenly salted

When assessing fish for this category, special consideration will be given to fish that has been thoroughly bled and properly restacked during production. In this case, somewhat larger defects will be tolerated if the overall impression justifies this, particularly if the fish is light-coloured and firm.

Universal

Fish that do not meet the requirements to Imperial/Superior are to be classified as Universal.

This trade category may include fish with the following characteristics:

1. inadequately split
2. round tail
3. inadequately washed or rinsed
4. insufficient removal of backbone
5. moderate blood clot

6. major tears or longitudinal cracks
7. moderate cracking
8. minor blood, liver and/or bile stains

The fish must retain its natural shape. Disfiguring blemishes such as stains/lumps of dried blood or remains of entrails shall be removed.

Popular

Fish that does not satisfy the requirements to Universal, but which nevertheless is fit for human consumption is to be categorised as Popular. However, this trade category must not contain fish that is sour, has been exposed to contamination, has ragged bellies, bile or gut content, fish that is badly cracked/loose fleshed or visibly affected with red halophilic bacteria (pink) or heavily infested halophilic mould (dun).

2. Product designation of

APPENDIX VII OPTIONAL PRODUCT REQUIREMENTS – SMOKED FISH

[TO BE COMPLETED]

APPENDIX VIII - OPTIONAL FINAL PRODUCT REQUIREMENTS – LOBSTERS AND CRABS (HAS TO BE COMPLETED)

The following definitions are recommendations for use by purchasers or sellers of lobsters in designing specifications for final product. These specifications are optional and are in addition to the essential requirements prescribed in the appropriate Codex Product Standard.

Quick Frozen Lobsters

Defect

a) Appearance

Recommended Defect Description

- (i) Not easily separated without thawing when labelled as individually quick frozen.
- (ii) Colour not generally uniform and non characteristic of the product, species and habitat or areas from which harvested
- (iii) In the case of products in the shell, the shell is not firm and is broken

b) Damaged

Broken telson, cuts or scars penetrating the shell, crushed or cracked shell.

c) Soft Shell

The shell is easily flexed by hand.

d) Opacity

The raw meat is not characteristically translucent. (% affected by weight)

e) Texture

The meat of lobster, rock lobsters, spiny lobsters and slipper lobsters is tough, fibrous, mushy or gelatinous. (% affected by weight).

APPENDIX IX : OPTIONAL FINAL PRODUCT REQUIREMENTS:- SHRIMPS & PRAWNS

A. FROZEN AND IQF PEEL AND DE-VEIN SHRIMPS OR PRAWN

QUALITY FACTOR

Determination of Grade

The grade should be determined by examining the product in the frozen, thawed and cooked states, using the table of deduction:

100 to 90	First quality
89 to 80	Second quality

Flavour:	Characteristic, without unpleasant flavours.
Frozen:	Means the product with a thermal centre of maximum temperature of -18° C (0° F)
Odour:	Characteristic. Yodoform odour isn't considered a defect.
Dehydration:	The shell and/or meat of the shrimps or prawns have parts that affect appearance, texture and flavour.
Texture:	Texture should be firm, but tender and moist. Slight: fairly firm, only slightly tough or rubbery, does not form a fibrous mass in the mouth, moist but not mushy. Moderate: moderately tough or rubbery, has noticeable tendency to form a fibrous mass in the mouth, moist but not mushy. Excessive: excessively tough or rubbery, has marked tendency to form a fibrous mass in the mouth, or is very dry or very mushy.
Black spots:	The shell and/or meat of the shrimps or prawns should be absent of black spots that affect the appearance.
Broken:	Shrimps with a broken part bigger than ¾ of the size.
Piece:	Part of shrimps or prawns, minimal ¼ of the size.
Extraneous material:	All the material present in the pack that isn't part of shrimps or prawn and is not dangerous.
Uniformity of size:	Select by count 10 of the largest shrimps or prawns, and 10 of the smallest shrimps or prawns and divide the largest weight by the smallest weight to get a weight ratio.

Evaluation of flavour and odour:

For the evaluation of odour hold the shrimps or prawns close to the nose for evaluation. If the results of the raw odour evaluation indicate the existence of any off-odours, the sample shall be cooked to verify the flavour and odour.

Steam method:

Put the sample in a plastic bag, and place on a wire rack suspended over boiling water in a covered container. Steam the packaged product for 5 to 10 minutes.

Examination for physical defects:

Each of the shrimps or prawns in the sample should be examined for defects using the list of defect definitions.

Schedule of Point Deductions per Sample

Type of Product	Factor scored	Method of determining score	Deduct
Frozen State	Dehydration	Up to 5%	0
		From 5.1% to 10%	3
		More than 10%	6
		More than 15%	11
Thaw State	Black spot only in shell	Absence	0
		Up to 5%	1.5
		Each 4% additional or less	2
	Black spot in meat	Absence	0
		Up to 3%	1
		From 3.1% to 5%	2
		Each 5% additional or less	2
	Broken, damaged and pieces	Up to 1%	1
		From 1.1% to 3%	2.5
		Each 3% additional or less	2.5
	Dehydration	Absence	0
		Up to 2%	3
		From 2.1 to 5%	6
		More than 5%	11
Dehydration in meat	Absence	0	
	Slight	3	
	Moderate	6	
	Excessive	11	
Heads and unacceptable shrimps or prawns	Up to 1%	2	
	Each 1% additional or less	3	
Extraneous material, not dangerous	1 piece	1	
	2 pieces	2	
	More than 2 pieces	4	
	Sand	21	
Uniformity of size	Slightly larger or smaller. Each 3% or fraction.	1	
	Larger or smaller. Each 3% or fraction.	2	
Odour	Characteristic.	0	
	Slightly different to characteristic.	6	
	Moderately different to characteristic.	12	
	Excessively different to characteristic.	21	
Inappropriate peel and de-vein	Absence	0	
	Over 1%; not over 6%	1	
	Over 6.1%; not over 10%	2	
	More than 10%	4	
Shells	Up to 3%	0	
	Each 1% additional or less	2	
Cooked State	Texture	Firm, but tender and moist	0
		Slight	2
		Moderate	4
		Excessive	21
Odour	Characteristic	0	
	Slight Unpleasant	21	

B. BREADED SHRIMPS OR PRAWNS**QUALITY FACTOR****Determination of Grade**

The grade should be determined by examining the product in the frozen and cooked states, using the table of deduction:

100 to 85 **First quality**
84 to 75 **Second quality**

Schedule of Point Deductions per Sample:

Type of Product	Factor scored		Method of determining score	Deduct
Frozen State	Broken		Break or cut greater than $\frac{3}{4}$ of the size	15
	Uniformity of size		Over 1.0; not over 1.35 Over 1.36; not over 1.40 Over 1.41; not over 1.45 Over 1.46; not over 1.50 Over 1.51; not over 1.55 Over 1.56; not over 1.60 Over 1.61; not over 1.65 Over 1.65	0 1 1.5 2 2.5 3.0 3.5 4
	Easy of separation		Slight: Hand separation difficult. Each affected. Moderate: Separated with knife. Each affected.	1 2
Cook State	Black spot in meat		Absence Up to 5% Each 4% additional or less	0 1.5 2
	Coating defects		Absence Up to 3% From 3.1% to 5% Each 5% additional or less	0 1 2 2
	Texture	Shrimp flesh	Firm, but tender and moist	0
			Slight Moderate Excessive	2 4 15
		Coating	Moderately dry, soggy or tough Mealy, pasty, very tough	5 15

**APPENDIX X - OPTIONAL FINAL PRODUCT REQUIREMENTS - CEPHALOPODS
[TO BE COMPLETED]**

APPENDIX XI

OPTIONAL FINAL PRODUCT REQUIREMENTS - CANNED FISH

The following definitions are recommendations for use by purchasers or sellers of canned fish in designing specifications for final product. These specifications are optional and are in addition to the essential requirements prescribed in the appropriate Codex Product Standards.

1. Canned finfish

<u>Defects</u>	<u>Recommended Defect Description</u>						
a) Drained or Washed Drained Weight	The drained weight of fish (liquid pack), or the washed drained weight of fish (sauce packs) shall be not less than the following % (m/m) of water capacity of the can when packed in : <table border="0" style="margin-left: 20px;"> <tr> <td>(i) edible oil</td> <td style="text-align: right;">70%</td> </tr> <tr> <td>(ii) own juice ; brine or water ; marinade ; aspic</td> <td style="text-align: right;">60%</td> </tr> <tr> <td>(iii) sauces, also with other packing media added</td> <td style="text-align: right;">50%</td> </tr> </table>	(i) edible oil	70%	(ii) own juice ; brine or water ; marinade ; aspic	60%	(iii) sauces, also with other packing media added	50%
(i) edible oil	70%						
(ii) own juice ; brine or water ; marinade ; aspic	60%						
(iii) sauces, also with other packing media added	50%						
Exuded water (oil packs only)	Water content (expressed as % of declared net contents of can). <table border="0" style="margin-left: 20px;"> <tr> <td>(i) fish packed in oil</td> <td style="text-align: right;">> 8%</td> </tr> <tr> <td>(ii) fish packed in oil with own juice</td> <td style="text-align: right;">> 12%</td> </tr> </table>	(i) fish packed in oil	> 8%	(ii) fish packed in oil with own juice	> 12%		
(i) fish packed in oil	> 8%						
(ii) fish packed in oil with own juice	> 12%						
Separation of sauces	Sauce separated into solid and liquid (except oil)						
b) Appearance	The product in a can shall comprise fish of an appearance and colour characteristic of the genus processed and packed in the manner indicated.						
Dressed Fish and Cutlets in Various Packing Media	Cutting, Trimming and Evisceration <table border="0" style="margin-left: 20px;"> <tr> <td>(i) Parts of tail (except for small fish) and/or head</td> </tr> <tr> <td>(ii) Hard scutes (jack mackerel)</td> </tr> <tr> <td>(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.</td> </tr> </table> <p>Excessive amount of viscera (one or more fish not eviscerated).</p> <p>Non characteristic pieces</p> <table border="0" style="margin-left: 20px;"> <tr> <td>(i) Each additional small piece</td> </tr> <tr> <td>(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.</td> </tr> </table>	(i) Parts of tail (except for small fish) and/or head	(ii) Hard scutes (jack mackerel)	(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.	(i) Each additional small piece	(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.	
(i) Parts of tail (except for small fish) and/or head							
(ii) Hard scutes (jack mackerel)							
(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.							
(i) Each additional small piece							
(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.							
Fillets, Bits, and Flakes in Various Packing Media	Cutting and Trimming <p>Parts of head, tail, viscera or scutes each instance.</p> <p>Skin (fillets labelled skinless) - Each instance greater than 3 cm²</p> <p>Black Membrane - Each instance greater than 5 cm²</p> <p>Non characteristic pieces (fillets and pieces only)</p> <p>Flake or further disintegrated fish flesh clearly separated from fillets or pieces of fillets (expressed as % of drained fish solids material)</p>						
Discoloration, packing media	The packing medium not of normal colour and consistency for the type of pack.						
Fill of Container	A can not well filled with fish and packing media not in accordance with the type of pack.						

2. Canned sardines and sardine-type products

<u>Defects</u>	<u>Recommended Defect Description</u>
a) Appearance	<p>The fish in the container :</p> <p>(i) are not reasonably uniform in size ;</p> <p>(ii) are not of an appearance or colour characteristic of the species processed or packed in the manner indicated ;</p> <p>(iii) are not neatly cut to remove the head ;</p> <p>(iv) have excessive ventral breaks (unsightly rupture of the ventral area), or breaks and cracks in the flesh.</p> <p>(v) More than 40% of fish in a can having ventral breaks of half the length or more of the abdominal cavity</p> <p>(vi) The packing medium is not of normal colour and consistency for the type.</p> <p>(vii) The can is not well filled with fish.</p>
b) Exuded water (oil packs only)	Water content expressed as % of net contents of can

3. Canned tuna and bonito

No optional defects have been developed for this product.

4. Canned salmon

<u>Defect</u>	<u>Recommended Defect Description</u>
a) Appearance	(i) The can is not well filled with fish.
(i) Cross fill	(ii) In the case of regular packs, the sections of fish are not arranged so that the cut surfaces are approximately parallel to the opened end and the skin side is not parallel to the walls of the can.
(ii) Ragged appearance	Regular packs are not reasonably free from cross packs and pieces or sections of vertebrae across the top of the can.
	(iii) The oil and liquid released during processing are not normal and characteristic of the species packed.
b) Bones	Hard bone
c) Colour of Flesh	Fish having the appearance and colour of the following : (i) Mixed colours in a single can (ii) Abnormal pale colour for the species (iii) Belly burn
d) Bruising and Blood Spots	Presence of bruising or blood spots expressed as a % of the net content of the can.

5. Canned crab meat

<u>Defect</u>	<u>Recommended Defect Description</u>
Appearance	On opening the cans are not well filled and are not well arranged where appropriate for the style of presentation.

6. Canned shrimps or prawns

No optional defects have been developed for this product..

**[DRAFT STANDARD FOR STURGEON CAVIAR
DRAFT STANDARD FOR STURGEON AND [PADDLEFISH] CAVIAR
DRAFT STANDARD FOR CAVIAR FROM THE ACIPENSERIFORMES ORDER]
(At Step 6 of the Procedure)**

[1. SCOPE

- [1) This standard applies to granular sturgeon caviar of the fish of the *Acipenseridae* family.]
- [2) This standard applies to caviar prepared from fish eggs of sturgeon and paddlefish.]
- [3) This standard applies to caviar from fish eggs of the *Acipenseriformes* order.]

2. DESCRIPTION**2.1. Definitions**

The following definitions are used in this standard:

Fish eggs: oocytes separated from the connective tissue of ovaries.

Caviar: the product made from fish eggs of the [*Acipenseriformes* order] by treating with salt or mixture of salt with a food additive.

2.2 Product Definition

The product is prepared from fish eggs of sturgeon fishes belonging to the *Acipenseridae* family (four genera *Acipenser*, *Huso*, *Pseudoscaphirhynchus* and *Scaphirhynchus* and hybrid species of these genera) [and from fish eggs of the fishes belonging to the Polyodontidae family (two genera: *Polyodon* and *Psephurus*).]

The eggs are of about one size and evenly and characteristically coloured according to the species used. Colour can vary from light grey to black or from light yellow to yellowish grey. Brownish and greenish shades are permissible. The product is made with addition of salt and/or with, or without food additives, and is intended for direct human consumption. The salt content of the product is equal or above [3g/100g] and below or equal to 5g/100g in [water phase (to be clarified)] .

2.3 Process Definition

2.3.1 The product, after suitable preliminary preparation of the caviar, shall be subject to treatment or conditions sufficient to prevent the growth of spore and non-spore forming pathogenic microorganisms and shall comply with the conditions laid down hereafter.

The product shall be prepared by salting fish eggs with food grade salt, with or without food additives, packed in containers, and chilled to the temperatures of 0⁰C to -4⁰C so as to maintain the quality during storage, transportation and marketing. Freezing as well as frozen storage of caviar is not permitted due to deterioration of quality.

The product shall be packed in:

- metal tins coated inside with stable food lacquer or enamel;
- glass jars.
- other suitable food-grade containers.

2.3.2 Re-packaging of the product from larger to smaller containers under controlled conditions shall be permitted. No mixing of caviar grain from different lots shall be permitted.

The time for packaging should be minimized so as to maintain low temperature and to prevent contamination by microbial hazards and foreign material.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Raw Material

Caviar shall be prepared from ovaries extracted from sound and wholesome [*Acipenseriformes*] fishes sturgeons of biological species of the genera described in Section 2.2, which are of a quality fit to be sold fresh for human consumption.

3.2 Salt

Salt shall be of food grade quality and conform to all applicable Codex Standards.

3.3 Final Product

The product shall meet the requirements of the present Standard, when a lot examined in accordance with the requirements described in Section 10 complies with the provisions set out in Section 9.

The product shall be examined by the methods given in Section 8.

[4. FOOD ADDITIVES

4.1 The use of colorants is not allowed.

4.2 Only those food additives listed below may be used and only within the limits specified:

Boric acid (INS 284): maximum level 4g/kg (expressed as boric acid).

Sodium tetraborate (INS 285): maximum level 4g/kg (expressed as boric acid).]

5. CONTAMINANTS

5.1 Pesticide residues

The product covered by this standard should comply with those maximum residue limits established by the Codex Alimentarius Commission for these products.

5.2 Other contaminants

The product shall comply with the provisions of the Codex General Standard for Contaminants and Toxins in Food (Codex Stan 193-1995).

6. HYGIENE

6.1. It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev.4-2003) and other relevant Codex Codes of Practice.

6.2. The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

[6.3 The product shall not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission.

6.4 The final product shall be free from any foreign material that poses a threat to human health.]

7. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Pre-packaged Foods (CODEX STAN 1-1985, Rev. 1-1991) the following specific provisions apply:

7.1 The Name of the Food

7.1.1 For the *Acipenseridae* family, the name of the food shall be “caviar” or “caviar” completed with the usual name (Beluga for *Huso huso*, Ossetra for *Acipenser guldenstaedtii* and *Acipenser persicus*, Sevruga for *Acipenser stellatus*), in accordance with the law and custom of the country in which the product is sold, in a manner not to mislead the consumer.

[7.1.2 For the *Polyodontidae* family, the name of the food shall be “paddlefish caviar”.]

7.1.3 For sturgeons having no common names the name may be supplemented with the identification code of the biological species of the fish in accordance with Annex A, e.g. «Sturgeon caviar».

7.1.4 For hybrids the common name shall be supplemented with the word hybrid, and the parent sturgeon species may be shown according to Annex A, e.g. «Hybrid sturgeon caviar» or «Sturgeon HUSXRut hybrid caviar».

[7.1.5 The label shall be in compliance with the CITES labeling requirements.]

7.2 Storage Instruction

The label shall include terms to indicate that the product shall be stored under an appropriate temperature as indicated on the label.

[7.3 Country of origin

The country of origin of the product shall be declared.]

In case of repackaging of the product the facility registration code shall be identified.

7.4 Each primary container shall be labelled with the number markings of the lot.

8. SAMPLING, EXAMINATION AND ANALYSES

8.1 Sampling

8.1.1 Sampling of lots for examination of the product shall be in accordance with the General Guidelines on Sampling (CAC/GL 50-2004). A sample unit is the primary container.

8.1.2 Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the Codex Alimentarius Commission.

8.1.3 Sampling of lots for pathogenic microorganisms and parasites shall be in accordance with the Principles for the Establishment and Application of Microbiological Criteria to Foods (CAC/GL 21-1997).

8.2 Sensory and Physical/Chemical Examination

Samples taken for sensory and physical/chemical examination shall be assessed by person trained in such examination and in accordance with methods elaborated in Sections 8.2.1 – 8.2.2 and the Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

8.2.1. The Determination of Net Weight

The net weight (excluding packaging material) of each sample unit in the sample lot shall be determined by deducting the weight of the empty container from the total weight.

8.2.2 The Determination of Salt Content

The determination of salt content is performed according to the method described in the Codex Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family of Fishes (CODEX STAN 167- 1989, Rev.2-2005).

9. DEFINITION OF DEFECTS

The sample unit shall be considered as defective when it exhibits any of the properties defined in Sections 9.1- 9.4.

9.1 Foreign matter

The presence in the sample unit of any matter which has not been derived from [Acipenseriformes] eggs, does not pose a threat to human health, and is readily recognized without magnification; or is present at a level determined by any method including magnification, that indicates non-compliance with good manufacturing practices and sanitation practices.

9.2 Odour and Flavour

The product affected by persistent and distinct objectionable odour and/or flavour indicative of decomposition, oxidation, or taste of feed (in fish reared in aquaculture), or contamination by foreign substances (such as fuel oil).

9.3 Consistency and Condition

The presence of hard cover of caviar grains that is not easily chewable or tenuous.

9.4 Extraneous material

The presence of remnants of membranes and fat in finished caviar.

10. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

1. The total number of defectives as classified according to Section 9 does not exceed the acceptable number of the appropriate sampling plan given in the General Guidelines on Sampling (CAC/GL 50-2004).
2. The average net weight of all sample units is not less than the declared weight, provided no individual container is less than 95% of the declared weight.
3. The Food Additives, Hygiene, Packing and Labelling requirements of Sections 4, 2.3, 5, 6, 7 and 8 are met.

ANNEX A

Table .1 - IDENTIFICATION CODES OF STURGEON [PADDLEFISH] SPECIES

Denomination of sturgeon fishes [paddlefish] - Scientific names	Code
<i>Huso huso</i>	HUS
<i>Huso dauricus</i>	DAU
<i>Acipenser naccari</i>	NAC
<i>Acipenser transmontanus</i>	TRA
<i>Acipenser schrenkii</i>	SCH
<i>Acipenser sturio</i>	STU
<i>Acipenser baerii baikalensis</i>	BAI
<i>Acipenser sinensis</i>	SIN
<i>Acipenser dabryanus</i>	DAB
<i>Acipenser persicus</i>	PER
<i>Acipenser brevirostrum</i>	BVI
<i>Acipenser fulvescens</i>	FUL
<i>Acipenser oxyrhynchus</i>	OXY
<i>Acipenser oxyrhynchus desotoi</i>	DES
<i>Acipenser gueldenstaedtii</i>	GUE
<i>Acipenser medirostris</i>	MED
<i>Acipenser baerii</i>	BAE
<i>Acipenser micadoi</i>	MIK
<i>Acipenser stellatus</i>	STE
<i>Acipenser ruthenus</i>	RUT
<i>Acipenser nudiventris</i>	NUD
<i>Pseudoscaphirhynchus fedtschenkoi</i>	FED
<i>Pseudoscaphirhynchus hermanni</i>	HER
<i>Pseudoscaphirhynchus kaufmanni</i>	KAU
<i>Scaphirhynchus platorhynchus</i>	PLA
<i>Scaphirhynchus albus suttkusi</i>	ALB
<i>Scaphirhynchus suttkus</i>	SUS
[<i>Polyodon spathula</i>	SPA]
[<i>Psephurus gladius</i>	GLA]
<i>Hybrids: female species code x male species code</i>	<u>YYY x XXX</u>