codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

JOINT OFFICE: Viale delle Terme di Caracalla 00100 ROME Tel: 39 06 57051 www.codexalimentarius.net Email: codex@fao.org Facsimile: 39 06 5705 4593

ALINORM 05/28/18

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION
Twenty-eighth Session
Rome, Italy, 4 – 9 July 2005

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

Cape Town, South Africa
28 February – 4 March 2005

Note: This document incorporates Circular Letter CL 2005/14-FFP

J5317

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CX 5/35 **CL 2005/14-FFP**
March 2005

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 27th Session of the Codex Committee on Fish and Fishery Products (ALINORM 05/28/18)**

A. MATTERS FOR ADOPTION BY THE 28th SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Draft Standard and Code at Step 8 of the Procedure

1. Draft Code of Practice for Fish and Fishery Products (Section on Aquaculture) (para. 59, Appendix II)

2. Draft Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family (para. 34, Appendix IV)

Governments wishing to propose amendments or comments on the above documents 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 Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 May 2005**.

Proposed Draft Code at Step 5/8 of the Procedure

3. Proposed Draft Code of Practice for Fish and Fishery Products (Shrimps and Prawns; Cephalopods; Transport; Retail; and relevant Definitions) (para. 91, Appendix III)

Governments wishing to propose amendments or comments on the above documents 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 Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 May 2005**.

Proposed Draft Standard at Step 5 of the Procedure

4. Proposed Draft Standard for Sturgeon Caviar (para. 148, Appendix VI)

Governments wishing to submit comments on the implications which the Draft Amendment 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 Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 May 2005**.

B. REQUEST FOR COMMENTS AND INFORMATION

Proposed Draft Standards and Code at Step 3 of the Procedure

5. Proposed Draft Standard for Live and Non-Viable Bivalve Molluscs (para. 98, Appendix VIII)

Governments wishing to submit comments should do so in writing to Ms. Melissa Ellwanger, Consumer Safety Officer, Office of Seafood (HFS-416), Food and Drug Administration, 5100 Paint Branch Parkway, College Park, Maryland 20740, USA, Fax: +301436 2599, Email: melissa.ellwanger@cfsan.fda.gov,with copy to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy, **before 15 June 2005.**

6. Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat (para. 115, Appendix VII)

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

8. Proposed Draft Standard for Smoked Fish (para. 129, Appendix V)

Governments wishing to submit comments should do so in writing to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy, with a copy to the **before 30 November 2005.**

SUMMARY AND CONCLUSIONS

The summary and conclusions of the 27th Session of the Codex Committee on Fish and Fishery Products are as follows:

Matters for adoption by the Commission:

The Committee:

- advanced to Step 8 the Draft Code of Practice for Fish and Fishery Products (Section on Aquaculture) (para. 59, Appendix II);
- advanced to Step 5/8 the Proposed Draft Code of Practice for Fish and Fishery Products (Shrimps and Prawns; Cephalopods; Transport; Retail; and relevant Definitions) (para. 91, Appendix III);
- advanced to Step 8 the Draft Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family (para. 34, Appendix IV);
- advanced to Step 5 the Proposed Draft Standard for Sturgeon Caviar (para. 148, Appendix VI);
- agreed to propose new work on the elaboration of a Code of Practice on the Processing of Scallop Meat (para. 114).

Other matters of interest to the Commission:

The Committee:

- agreed to return to Step 3 the Proposed Draft Standard for Live and Non-Viable Bivalve Molluscs (para. 98, Appendix VIII);
- agreed to return to Step 3 the Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat (para. 115, Appendix VII);
- agreed to return to Step 3 the Proposed Draft Standard for Smoked Fish (para. 129, Appendix V);
- agreed to return to Step 3 the Proposed Draft Code of Practice for Fish and Fishery Products (other sections) (para. 92, Appendix IX);
- agreed to consider further at its next session the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine Type Products (*Clupea bentincki*); the review of the procedure for the inclusion of additional species; and a proposal for the amendment of the labelling section in the Standard for Canned Sardines and Sardine-Type Products (para. 155).

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LIST OF APPENDICES

INTRODUCTION

1) The Codex Committee on Fish and Fishery Products held its 27th Session in Cape Town, South Africa from 28 February to 4 March 2005, at the kind invitation of the Government of South Africa. The Session was chaired by Dr Bjørn Røthe Knudsen, Regional Director of Norwegian Food Safety Authority and co-chaired by Mr Gideon Joubert of the South African Bureau of Standards. The Session was attended by 135 delegates representing 46 Member States, one Member Organization (EC) and one 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 Ms M.K Matsau, Deputy Director General: Strategic Health Programme, Department of Health, who, on behalf of the Minister of Health, Dr M Tshabalala-Msimang welcomed the delegates and emphasized that with the increased globalization of food trade there was a potential for spreading of food borne diseases and other risks. She drew the attention of the delegates to the fact that the World Trade Organization Agreements on Sanitary and Phytosanitary Measures and Technical Barriers to Trade were the basis for international food trade and that Codex standards played an important role in assuring the public health protection and facilitation of international food trade through the setting of international standards, which were used by developing countries for the harmonization of national legislation to protect their consumers and facilitate trade. Noting the importance of the work of the Committee on Fish and Fishery Products in this regard, she wished an enjoyable stay in Cape Town and all success to the delegates.

ADOPTION OF THE AGENDA (Agenda Item 1)[1]

3) The Committee accepted the proposal of the Chairperson and agreed to consider Agenda Item 4 after Item 6 as a new working document had been made available at the Session for Agenda Item 4. With this modification it adopted the Provisional Agenda as proposed.

4) The Delegation of the European Community presented CDR 4 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:

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

5) The Committee noted that a number of matters arising from the 27th Session of the Commission were for information purposes or would be discussed while considering the relevant Agenda Items or discussed by other Codex Committees (Guideline Levels for Methylmercury in Fish; Lead in Fish (CCFAC)) and terms of reference for Joint Expert Consultation on Active Chlorine (CCFAC and CCFH). In addition the Committee considered the matters referred to the Committee as follows.

Draft Standard for Salted Atlantic Herring and Salted Sprat

6) The Committee noted request of the Codex Committee on Food Labelling to consider how the reference to "custom" could be interpreted in relation to national legislation and whether this term should be retained in the standards for fish and fishery products.

7) The Committee noted that national legislation typically establishes the principle that labelling should not be false or misleading to consumers as it requires the use of a common or usual name that is familiar to consumers. The Committee also noted that such names are often based on custom, and may also include regional names that are well known to consumers.

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1 CX/FFP 05/27/1; CRD 4 (Division of competence between the European Community and its Member States).

2 CX/FFP 05/27/2, CRD 23 (Report of the Working Group on the Use of Analytical Results: Sampling Plans, Relationship between the Analytical Results, the Measurement of Uncertainty, Recovery Factors and Provisions in Codex Standards)

8) The Committee, recognizing the importance of custom in the choice of common names at the national level, agreed to retain the reference to "law and custom" as it is appropriate for fish and fishery products even though it might not be appropriate for other products.

The Use of Analytical Results

9) The Committee recalled that the Codex Committee on Methods of Analysis and sampling requested comments from Commodity Committees on the Use of Analytical Results: Sampling Plans, Relationship Between the Analytical Results, the Measurement Uncertainty, Recovery Factors and Provisions in Codex Standards. In order to reply to the Codex Committee on Methods of Analysis and Sampling, the Committee established an *Ad Hoc* Working Group[3] to study issues involved in analytical and sampling considerations.

10) The Committee accepted the proposal of the *Ad Hoc* Working Group and agreed to report to the CCMAS the following:

- The proposed guidance document outlines important issues and the CCFFP supports the principles while noting that interpretation will need to be appropriate to each standard considered.

- With respect to sampling plans, this proposed guidance document should clarify how the Codex '*General Guidelines on Sampling*' document: Section 2.1.2 – General (ALINORM 04/27/23, Appendix III) should be referenced in order to ensure coherence and consistency. The Codex '*General Guidelines on Sampling*' document, Section 2.1.2 – General contains additional important guidance and provides more detailed information regarding a sampling plan in a draft Codex standard. The co-existence of this guidance document and the "*General Guidelines on Sampling*" document, without appropriate linkage, could potentially lead to confusion on the application of provisions regarding sampling plans.

- Regarding the section on recovery, for sensory analysis of fish and fishery products and for the analysis of container integrity in the case of canned fish and fishery products, they would require other performance criteria. The proposed guidance document is clearly applicable to classical chemical and microbiological analysis.

- This proposed guidance document needs more complete descriptions and definitions of terms so that it could be useful and understood by a broader audience. For example, the interpretation of "recovery" could be different for a chemist or microbiologist.

- Many of the aspects apparently being considered regarding method performance would have been criteria used for the original method validation. These would not need to be incorporated into the standards.

- With respect to statements under "Issues Involved", regarding choices of "*every item must comply*" verses "*average of a lot*", Codex Fish standards typically imply every unit must comply for food safety hazards. Whereas for non-health and safety defectives, the standards typically use "lot average". Consideration should be given to allow flexibility as appropriate for the attributes being tested and how the results are to be applied to lot acceptance.

- CCFFP questions whether there is an expectation to apply this guidance retroactively to adopted standards.

MATTERS REFERRED FROM FAO AND WHO: JOINT FAO/IOC/WHO AD HOC EXPERT CONSULTATION ON BIOTOXINS IN MOLLUSCAN BIVALVES (Agenda Item 2 b)[4]

Expert Consultation on Biotoxins

11) The Representatives of FAO and WHO jointly presented the outcomes of the Joint FAO/IOC/WHO *ad hoc* Expert consultation on biotoxins in bivalve molluscs held in Oslo, Norway, 26-30 September 2004, to answer the request of scientific advice expressed by the CCFFP at its 26th session.

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[3] Canada (Chair), El Salvador, United Kingdom and United States.

[4] Advanced copy of the Joint FAO/IOC/WHO ad hoc Expert Consultation on Biotoxins in Bivalve Molluscs, Oslo, Norway, Sept. 26-30, 2004; CRD 7 (Comments of the European Community).

12) Using the risk assessment approach, and based on the available information and the discussions during the expert consultation, the report provided for each toxin group, when applicable, a provisional acute reference dose and presented the derived guidance levels comparing results based on the consumption of 100g, 250g or 380g shellfish meat by adults.

13) Available methods of analysis were reviewed for the 8 toxin groups and recommendations have been made for choice of a reference method, management of analytical results and development of standards and reference material.

14) The expert consultation recommended implementation of integrated shellfish and micro-algal monitoring programmes to provide expanded management capability and enhanced consumer protection and development of micro-algal and shellfish sampling protocols over time and space.

15) Comparison of guidance levels derived by the Expert Consultation with current regulatory maximum levels in force in some countries showed great differences for certain toxin groups. The FAO/WHO Representatives pointed out that the Expert Consultation did not have enough time to fully evaluate epidemiological data and to assess the effects of cooking or processing for deriving the provisional guidance levels/maximum levels for several toxin groups (especially the AZA and STX groups). They also indicated that the Consultation agreed that there is a need for a further in-depth review of these data to better derive the guidance levels/maximum levels, and difficulties to reply to further questions unless the Consultation receive additional data The Consultation encouraged Member states to generate more toxicological data to perform more accurate risk assessments and facilitate validation of toxin detection methods in shellfish. The Consultation also indicated that consideration should be given to the situation in developing countries, when selecting detection methods.

16) The Representatives were of the view that the results of the consultation should assist CCFFP in the development of Standards and Code of Practice to address issues related to biotoxins in bivalve molluscs.

17) The Committee thanked FAO and WHO for holding the Expert Consultation, for the presentation and thanked the experts for their excellent work on the preparation of the report.

18) Some delegations drew the attention of the Committee to the fact that the methodology proposed was not clear enough and required further elaboration, especially as very sophisticated methods were not available for the use in developing countries. It was also indicated that there were discrepancies between different risk assessments especially for determining methods of analysis for certain marine biotoxins and in relation to established maximum limits.

19) The Committee noted that the report of the expert consultation had been made available just before the session and that there was not enough time for governments to study it in more detail with national experts, therefore agreed to establish an *Ad Hoc* Working Group[5] to develop the Scope for the Working Group which would work between the current and future session of the Committee in order to prepare a document for consideration by the next session of the Committee.

Risk Assessments on *Vibrio* spp. in seafood

20) The Secretariat informed the Committee that FAO/WHO were undertaking five risk assessments on *Vibrio* spp. in seafood to address the following pathogen/commodity combinations:

- *Vibrio vulnificus* in oysters;
- Choleragenic *Vibrio cholerae* in warm waters shrimp for export market;
- *Vibrio parahaemolyticus* in bloody clams;
- *Vibrio parahaemolyticus* in finfish; and
- *Vibrio parahaemolyticus* in oysters.

21) The Secretariat also informed the Committee that the four first risk assessments were at the stage of final editing or peer review and would be published in 2005. The risk assessment on *Vibrio parahaemolyticus* in oysters has not been advanced due to resource limitations, however work was scheduled to begin in March 2005.

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[5] Canada, Chile, EC, Denmark, France, Ireland, Japan, New Zealand, Norway, South Africa, Thailand, United Kingdom, United States and FAO.

PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR CANNED SARDINES AND SARDINE TYPE PRODUCTS (Agenda Item 3)[6]

22) The Committee recalled that its last Session had recommended that the Executive Committee, as standards management body, discuss whether to discontinue work on the amendment or to propose other appropriate action (ALINORM 04/27/18, para. 7). The 54th Session of the Executive Committee had recognized that there was no consensus and that the proposal to discontinue work would require further discussion by the Commission (ALINORM 04/27/4, paras 28-31).

23) The Committee also recalled that the 27th Session of the Commission had recognized that there was no consensus on the discontinuation of work and agreed to return the Proposed Draft Amendment to the Committee on Fish and Fishery Products, where it had been held at Step 4 pending advice from the Commission.

24) Due to a long history of consideration of this matter and the fact that consensus had not been reached neither in the Committee nor in the Executive Committee and the Commission, the Chairperson invited delegations to put forward only new elements which could allow the Committee to proceed forward.

25) The Delegation of Chile pointed out that all procedures for the inclusion of Chilean sardine species (*Clupea bentincki)* in the Standard for Canned Sardines and Sardine Type Products had been followed and that the work on the inclusion of *Clupea bentincki* species in the above standard should proceed to a conclusion.

26) The Delegation of Morocco drew the attention of the Committee to the fact that the criteria and parameters for the inclusion of new species in the Procedure had not been established, that there was no new element to justify further discussion on the amendment and supported to consider this issue in conjunction with Agenda Item 11. The Delegation indicated that the way forward was presented under Agenda item 10 with the revision of the procedure and Agenda item 11 with the amendment of the labelling provisions, and supported consideration of *Clupea* in conjunction with these two items.

27) The Delegation of the EC indicated that the present situation with the labelling of canned fish products was not satisfactory and not in line with Codex objectives as species such as anchovies or herring when canned could be labelled as sardines and this might mislead consumers; this was the rationale behind its position taken at the 27th Session of the Commission. The Delegation further underlined the link between this Agenda Item and Agenda Item 11 on labelling requirements and invited Codex Members to place the interests of consumers at the highest priority.

28) In view of time constraints and relevant issues involved, the Committee accepted the proposal of the Chairperson and agreed to discuss the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine Type Products in conjunction with the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery products (Agenda Item 10) and an Amendment to the Labelling Section in the Standard for Canned Sardines and Sardine-Type Products (Agenda Item 11).

DRAFT AMENDMENT TO THE STANDARD FOR SALTED FISH AND DRIED SALTED FISH (Agenda Item 4)[7]

29) The Committee recalled that at its 26th Session it had agreed to forward the proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish to the 27th Session of the Commission for adoption at Step 5 and that it had agreed that the Delegations of Norway, Canada and Portugal would prepare a paper outlining problems in relation to the use of methods for determination of water in Section 7.4 Determination of Water Content.

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6 CX/FFP 05/27/3; CRD 3 (regional Strategies to Address Problems in the Application of Codex Standards), CRD 7 (Comments ofthe EC), CRD 15 (Comments ofChile)

7 ALINORM 04/27/18 Appendix VI; CL 2004/36-GEN; CX/FFP 05/27/4 (Comments of Mexico, United States); CX/FFP 05/27/4-Add.1(Comments of European Community); CRD 2 (Report on the proposed Draft Amendments in the Standard for Salted Fish and Dried salted Fish of the *Gadidae* Family of Fishes, prepared by Norway in cooperation with Canada and Portugal); CRD 25 (Codex Standard for Salted Fish and Dried Salted Fish of the Gadidae Family, containing amendments in relation to determination of water content, prepare by Norway and Canada)

30) The Delegation of Norway introduced CRD 2 and indicated that at the last session some amendments had been proposed to clarify description of the methods, however the need for a new specific method in the standard had been questioned as an AOAC method 937.07 existed for sampling of fish for the determination of water in fish, which was similar to the one proposed, and it was not clear whether proposed amendments could be considered as an alternative. The Delegation informed the Committee that it had conducted an informal comparison regarding the proposed method and the AOAC method 937.07 for dried salted cod and wet salted cod from which it resulted that the two different methods of sampling did not appear to give a significant difference in calculated salt content in the water phase and salt content of the fish. The proposed method appeared to give the closest result compared to water content determined by drying the whole fish. In the trade of products defined in paragraph 6.1.3 and 6.1.4 in the standard, there was a need for an official method for determination of water content.

31) The Delegation proposed to amend the standard for Salted Fish and Dried Salted Fish of the *Gadidae* family of Fishes by inserting new provisions in relation to the preparation of the fish sample, and to the method used for determination of water content.

32) It was noted that proposal (ii) contained a reference to the Section for Salted Fish in the Proposed Draft Code of Practice for Fish and Fishery Products, which had not been finalized, and that this could create confusion in the application of the Standard. The Committee requested the delegations of Norway and Canada to take this into account and to clarify the proposals for amendment in the standard for Salted Fish and Dried Salted Fish.

33) The Committee accepted the proposal of Delegations of Norway and Canada to restructure and to introduce new Sections 7.4 - Preparation of Fish Sample and 7.6 - Determination of Water Content, and to insert the new method as a new Annex B, as proposed in CRD 25.

Status of the Draft Amendment for Determination of Water Content in Codex Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family

34) The Committee agreed to forward the draft amendment to Step 8 for adoption by the next Session of the Commission (see Appendix IV).

DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS: SECTION ON AQUACULTURE (Agenda Item 5a)[8]

35) The Committee recalled that the 27th Session of the Commission had adopted the Draft Section on Aquaculture at Step 5 as some delegations did not support its adoption at Steps 5/8, and that it had been sent for comments at Step 6 in Circular Letter CL 2004/42-FP. The Committee considered the Draft Sections on Definitions and on Aquaculture section by section and made the following amendments and comments.

Section 2.2 Definitions

36) The Delegation of Malaysia, supported by the Delegation of the EC, proposed to replace the current definition of "Aquaculture" with the definition used by FAO, with a slight modification, for the purpose of consistency. Other delegations however pointed out that the current definition had been established specifically for the purpose of the code following considerable discussion, whereas the FAO definition did not specify the types of products to be covered by the code and did not clarify the reference to "fish" throughout the Code. After some discussion, the Committee agreed to retain the current definition.

37) The Delegation of the European Community proposed to replace the definitions of "chemicals" and "residues" respectively with the definition of contaminants and veterinary drugs in the Procedural Manual, and to use the definition of "withdrawing time" and "withholding time" defined in the Glossary of Terms and Definitions for veterinary drugs.

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[8] CL 2004/42-FFP, CX/FFP 05/27/5 (comments of Canada, Chile, EC, New Zealand, South Africa, United States), CX/FFP 05/27/5-Add.1 (comments of EC), CRD 5 (comments of Malaysia), CRD 13 (comments of Thailand)

38) Some delegations pointed out that terms such as “chemicals” or “residues” were used throughout the code with another meaning than the definitions in the Procedural Manual and therefore specific definitions were needed.

39) The Chair recalled that the definitions were intended “for the purpose of this Code” and that the definitions in the Procedural Manual were generally applicable throughout Codex. After some further discussion, the Committee agreed to retain both the general definitions from the Procedural Manual and the definitions that applied specifically to the Code. The definition of “pesticide residue” was also corrected to make it consistent with the Procedural Manual.

40) The Delegation of Chile noted that the definitions of “aquaculture establishment” and “fish farm” were very similar and proposed to merge them into a single definition. Other delegations however expressed the view that these terms were used separately throughout the Code and both definitions were retained.

41) The Committee agreed to amend the following definitions: “colouring” to reflect that it did not apply only to fish flesh; “extensive farming”, “semi-intensive farming” and “intensive farming” for clarification purposes; “diseased fish” to refer to abnormalities “that affect safety and quality”; and “good aquaculture practices” to refer to the production of safe food (in addition to “quality food”).

42) The Delegation of Norway proposed to use the definitions of “feed additives” and “fish feed” included in the Code of Practice on Good Animal Feeding (CAC/RCP 54-2004), however the Committee agreed to retain the current definitions.

Preamble

43) The Delegation of New Zealand expressed the view that some provisions in the Preamble and throughout the text addressed environmental or animal welfare issues and should be deleted since the Code should be limited to matters directly affecting food safety and quality.

44) The Chair recalled that the last session of the Committee had agreed to insert cross references to other texts (FAO and OIE), recognizing that some areas were not of the competence of the Committee but were important references to ensure consistency. The Committee agreed to retain the current text of the Preamble and to discuss further the provisions that may refer to issues outside the scope of the Code in the relevant sections, where necessary.

45) The Delegation of Thailand, supported by other delegations, proposed to specify that the application of HACCP was optional for aquaculture since HACCP was very useful for the control of hazards in food processing but for primary production, the application of good aquaculture practice was adequate to ensure food safety and quality. After some discussion, the Committee agreed that the current text of the Preamble did not indicate that the HACCP system had to be applied to aquaculture but referred to guidance on the application of HACCP when countries decided to apply it, as follows: “in preparing a HACCP and/or a DAP plan it is essential to consult section 5 which provides guidance for the application of the principles of HACCP and DAP analysis.” With this clarification, the Committee agreed to retain the current text of the Preamble.

Flow Chart

46) The Committee agreed to reinsert an arrow between feed and veterinary drugs and to insert a new box on seed and fry production before “growing culture” in the flow chart, with the relevant links to veterinary drugs.

6.1.1 Site selection

47) In the second paragraph, the Committee agreed to add a reference to salinity in the first sentence and to add a second sentence on re-circulation systems in the paragraph. New provisions were inserted in the sixth paragraph concerning the need for adequate facilities for the treatment of effluent, and the last paragraph was clarified as regards the relationship between the operation of the site and the impact on human health.

6.1.2 Growing water quality

48) The Committee agreed to add a new requirement concerning the need to monitor water quality (second paragraph).

6.2 Identification of hazards and defects

49) The section was amended to clarify the hazards specific to fish from aquaculture, especially as regards withdrawal time and deterioration of water quality.

6.3. Production operation

50) The Committee recalled the recommendation of the Committee on Residues of Veterinary Drugs in Foods to replace the provisions listed as technical guidance with a reference to relevant codes of practice. Some delegations expressed the view that the reference to the Codes should be retained in sections 6.3.1 Feed Supply and 6.3.2 Veterinary Drugs; however the current technical guidance specifically to aquaculture, which was not specifically covered in the Code of Practice on Good Animal Feeding. The Committee therefore agreed to retain and update the reference to the relevant codes, and the technical guidance, with the following amendments.

51) In section 6.3.1, the second paragraph was amended to clarify the requirements for storage of dry feeds and moist feeds, and the reference to veterinary drugs was deleted in the last paragraph as it applied only to medicated feeds. It was also agreed to add provisions on the identification and storage of medicated feeds in a new paragraph (14).

52) The Committee discussed the provisions for offal in paragraphs 8 and 9 and agreed on the following amendments: paragraph 8 was reworded to refer only to fresh and frozen fish, paragraph 9 on rejects from animal slaughterhouses was deleted as it was not relevant, and replaced with provisions on the use of fish silage and offal in relation to potential hazards.

53) Several editorial amendments and minor changes for clarification purposes were made throughout the section.

6.3.2 Veterinary Drugs

54) The Committee agreed to reword the last paragraph on the control of MRLs to clarify the action to be taken when fish did not comply with MRLs for veterinary drugs.

6.3.3 Growing

55) The provisions concerning diseased and dead fish in the third paragraph were clarified. A new paragraph was inserted at the end of the section to address the cleaning and disinfection of equipment and holding facilities, and a similar amendment was made to sections 6.3.4 and 6.3.5.

6.3.4 Harvesting

56) In the first paragraph a reference was added to the variations of salinity, in addition to temperature, and a new (fourth) paragraph was inserted concerning the need to purge fish where necessary.

6.3.6 Storage and Transport of Live Fish

57) The Committee agreed to renumber sections 6.3.7 and 6.3.8 as sub-sections of section 6.3.6 as they both addressed the transport of live fish.

58) In section 6.3.8 (new 6.3.6.2) the purpose of the conditioning of fish was clarified at the beginning of the first paragraph, and it was agreed to refer to “approved anaesthetics” in the third paragraph.

Status of the Draft Code of Practice for Fish and Fishery Products: Section on Aquaculture

59) The Committee agreed to advance the Draft Code to Step 8 for adoption by the 28th Session of the Codex Alimentarius Commission (see Appendix II).

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS: OTHER SECTIONS (Agenda Item 5b)[9]

60) The Committee recalled that its last session had returned several sections of the Code to Step 3 for further comments and consideration. The Committee agreed to consider the sections on Cephalopods; Transport; Retail; and Shrimps and Prawns, together with the relevant Definitions, as a matter of priority, with the understanding that it would consider other sections if time allowed.

SECTION 15. PROCESSING OF CEPHALOPODS

61) The Committee retained the current Definition (section 2.11) without change and made the following amendments to section 15.

Flow Chart

62) The Committee agreed that Box 9 should refer to Packing and Labelling to reflect the title of section 15.8, and added a new box on the Application of Additives (between Boxes 7 and 8).

15.1 Reception of Cephalopods

63) The Committee agreed to clarify that organoleptic characteristics were also an indicator of fitness for consumption. It was also agreed that the Potential Hazards should refer consistently to "microbiological contamination" throughout the text, when applicable.

15.2.2 Frozen Storage

64) In reply to a question, the Delegation of Germany indicated that, according to scientific studies, cadmium migrated from the intestine of cephalopods into the flesh during storage and therefore represented a potential hazard if the intestines were not removed. As regards potential defects (freezer burn), a new paragraph was added concerning protection of products against dehydration.

15.4 Splitting, Gutting and Washing

65) The Committee noted that microbiological contamination could occur at that stage and amended the Potential Hazards accordingly. The Potential Defects were amended to include the presence of beaks and decomposition. Consequential changes were made to section 15.5.

15.6 Application of Additives (new)

66) The Committee agreed to add a new section on additives, based on the proposal from Canada (CRD 11) with an additional reference to the General Standard for Food Additives, for consistency with the adopted Code (section 8.4.3 in Minced Fish).

15.6 (new 15.7) Grading/Packing

67) The Committee agreed that the section should include labelling, and therefore added a reference to section 8.2.3. Labelling and a new paragraph concerning proper labelling of sulphites. The Committee noted that such labelling was required under the General Standard for the Labelling of Prepackaged Foods (section 4.2.1.4).

SECTION 17. TRANSPORT

68) The Committee noted that there was no definition related to transport (Section 2.13) and made the following amendments to Section 17.

69) The Committee agreed to insert a reference to the relevant Codes of Practice at the beginning of the Preamble in order to provide general guidance.

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[9] ALINORM 04/27/18, Appendix VIII, CX/FFP 05/27/6 (comments of Brazil, New Zealand, United States), CX/FFP 05/27/6-Add.1 (section on shrimps and prawns revised by the United Kingdom), CX/FFP 05/27/6-Add.2 (proposal from Germany and the United States), CRD 1 (comments of Brazil), CRD 7 (comments of EC), CRD 11 (comments of Canada), CRD 14 (comments of Thailand), CRD 20 (redrafted sections)

70) In section 17.1 the Committee added a reference to Section 3.6 Transportation and agreed that chemical contamination with fuel was a potential hazard. The first paragraph was replaced with a requirement to check the temperature of the product before loading. In the last paragraph, all square brackets were deleted and the 4th indent was amended to clarify the conditions of use for chilled sea water.

71) In section 17.4, a new paragraph was added to provide technical guidance on waste management.

SECTION 18. RETAIL

72) The Committee agreed to retain the Definitions in Section 2.14 as currently drafted and made the following amendments to Section 18.

73) In the Preamble, the Committee agreed to insert a new sentence concerning the responsibility of retail operators for maintaining the quality and safety of products, in order to address concerns as to their possible deterioration at the retail stage, especially following import.

74) The Committee agreed to refer to toxin formation when *Clostridium botulinum* was mentioned throughout the document.

75) In section 18.1, the conditions of cross contamination were clarified in the second paragraph and new technical guidance was added on the examination of temperature records as a last paragraph.

76) In section 18.1.3, it was agreed that all relevant elements should be taken into account to ensure appropriate product rotation and the paragraph was amended accordingly.

77) In Section 18.1.7, the Committee agreed to insert a new paragraph requiring proper labelling of seafood in full service display cases in order to provide adequate information to consumers.

SECTION 2.10 DEFINITIONS - SHRIMPS AND PRAWNS

78) The Committee agreed to amend the definition of "shrimp" to refer to the FAO listing of shrimps, FAO Fisheries Synopsis No. 125, Volume 1, Shrimps and Prawns of the World.

SECTION 14. PROCESSING OF SHRIMPS AND PRAWNS

79) The Committee considered the revised version of the Section as proposed by the Delegation of the United Kingdom in CX/FFP 05/27/6-Add.1 and made the following amendments.

Flow Diagram

80) The Committee agreed that the header of the Flow Chart should be consistent with similar headers throughout the code. The Committee agreed that the first box should refer to raw, fresh and frozen fish for consistency with the title of section 14.2.1. Some amendments and editorial corrections were made to the flow chart as a result of the discussion of the different sections.

14.1 Frozen Shrimps and Prawns – General

81) The Committee agreed to amend the second paragraph referring to production in tropical and sub-tropical countries in order to reflect the situation of shrimp processing in different regions of the world. The last paragraph was deleted as the need to process shrimps as soon as possible was a general requirement and should not apply only to shrimps from estuaries or coastal waters.

14.2.1 Raw Fresh and Frozen Shrimp Reception

82) The Committee agreed to list chemical contamination as a potential hazard at this step; to use "microbiological contamination" in potential hazard and "decomposition" in the potential defects consistently throughout the text. The second paragraph was amended to clarify the need for product tracing, and the fourth paragraph was deleted as microbiological checks should not be used as a monitoring procedure at this step of the process.

83) Some minor amendments for clarification purposes were made in sections 14.2.3, 14.2.4 and 14.2.5, and the first paragraph of 14.2.6 Size Grading was amended to refer to manual size grading of shrimps.

14.2.7 Addition of Ingredients and Use of Additives

84) The Committee agreed to refer to improper use of food additives as a potential defect, to insert a reference to additives where relevant, and to clarify that sulphites, which are used to prevent blackspot formation, are a potential hazard.

85) The Delegation of Indonesia expressed the view that the use of chlorinated water should be addressed in the Code. The Committee however noted that the use of active chlorine was under consideration in the Committee on Food Hygiene from a general point of view and agreed that it should not be considered at this stage.

14.2.11 Cooking Process

86) The Committee agreed to retain under-cooking as a potential hazard and over-cooking as a potential defect, and to clarify the use of monitoring methods in the fourth paragraph.

14.2.12 Mechanical Peeling Cooked Prawns

87) The title was amended to refer to shrimps as the section did not apply to prawns and the first paragraph on the peeling process was clarified.

14.2.14 Freezing Process

88) The Committee discussed the opportunity of including microbiological contamination as a hazard in the freezing process. Some delegations expressed the view that no microbiological contamination could occur at freezing temperatures, while other delegations pointed out that, although there would be no microbial growth, contamination could occur through the equipment. The Representative of FAO noted that the section included technical guidance on cleaning and maintenance of equipment, which was consistent with a risk of contamination in the process. The Committee agreed to refer to "cross contamination" as a potential hazard.

Coated Products and other sections

89) The Delegation of the United States, referring to its joint proposal with Germany in CX/FFP 04/27/6-Add.2, proposed to transfer all sections regarding coated products in the Code to the Section on Quick Frozen Coated Fish, including the relevant sections concerning shrimps and prawns. The Committee agreed that at the present session the provisions on coated products could not be discussed as they involved other parts of the Code that had not yet been discussed, such as molluscs, and that they should be circulated at Step 3 for comments. It was also agreed that the general provisions included under the current section 14.3 should be transferred to the end of section 14.2, with some amendments (CRD 20).

90) The Committee agreed to add sections 14.2.16 Weighing Packing and Labelling of All Products, with the insertion of provisions on sulphites as a potential hazard; 14.2.17 Metal Detection; and 14.2.18 Frozen Storage of End Product, in order to complete the section on shrimps and prawns.

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

91) The Committee agreed to advance Sections 2.10 to 2.14 of the Definitions; Sections 14. Shrimps and Prawns; 15. Cephalopods; 17. Transport; and 18. Retail to Step 5 with the recommendation that the Commission omit Steps 6 and 7 and adopt them at Step 8 (see Appendix III).

92) The Committee agreed to return all other sections to Step 3 for further comments and consideration at the next session (see Appendix IX). The Committee invited lead countries to provide additional comments on the sections they had developed, as required.

PROPOSED DRAFT STANDARD FOR LIVE AND RAW BIVALVE MOLLUSCS (Agenda Item 6)[10]

93) The Committee recalled that its last session had returned the Proposed Draft Standard to Step 3 for further comments as several important issues remained to be addressed, especially the scope, the use of post harvest treatment, and the maximum levels for pathogens and biotoxins.

94) The Delegation of the United States informed the Committee that it had redrafted the Standard in the light of the comments received and discussion at the last session (CRD 18), dividing the text into Part I on Live Bivalve Molluscs and Part II on Non-viable Molluscs in order to address the major issues of the scope and the use of post harvest treatment. The Delegation indicated that post harvest treatment was as a scientifically valid process to eliminate target pathogens that cannot be controlled through other measures, and that "non viable molluscs" include those that have been treated to eliminate target pathogens but retain the characteristics of the live mollusc. The Delegation pointed out that the redrafting did not change the substance of the provisions in the standard but the structure and the terminology used, in order to clarify issues and facilitate further progress.

95) The Delegation of the European Community noted that the revised version provided a good basis for further discussion to address several complex issues, but that there had been a major restructuring of the standard and therefore member countries would need more time to review the proposals carefully. The Delegation proposed to reinsert the square brackets which appeared in the earlier version in order to identify the sections that required further discussion.

96) After some discussion, the Committee agreed to circulate the redrafted version of the Standard with a note indicating that it had not been discussed and was circulated to obtain comments rapidly with a view to its further revision. The Committee agreed that the Delegation of the United States would revise the Proposed Draft on the basis of the comments received for further circulation prior to the next session.

97) The Committee welcomed the proposal of Norway, as host country, to consider the feasibility of holding a Working Group in conjunction with the next session in order to discuss the standard and the comments received and to facilitate further progress in the plenary session.

Status of the Proposed Draft Standard

98) The Committee agreed to return the Proposed Draft Standard for Live and Non-Viable Bivalve Molluscs Processed for Direct Consumption or for Further Processing (amended version) to Step 3 for comments, redrafting by the Delegation of the United States and consideration by the next session (see Appendix VIII).

Issues related to the need for scientific advice

99) The Committee recalled that its last session had discussed questions related to risk management strategies for *Vibrio spp*. in seafood, and Biotoxins. Further to its decision to establish a working group on biotoxins under Agenda Item 2, the Committee agreed that a Working Group chaired by the Delegation of Japan would meet to consider *Vibrio spp* risk management and related issues. The Committee considered the outcome of both working groups as follows.

Biotoxins

100) The Committee considered the conclusions of the working group that had met during the session to discuss the conclusions of the Joint FAO/IOC/WHO Expert Consultation on Biotoxins and further action by the Committee, as presented in CRD 21.

101) The Secretariat informed the Committee that it was unlikely that FAO and WHO would be able to establish a standing committee on biotoxins due to lack of resources and that the possibility of convening a new expert consultation could be considered in the future in view of further request for scientific advice, availability of new data and availability of resources.

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[10] ALINORM 04/27/18, Appendix IX, CX/FFP 05/27/7 (comments of New Zealand, United States) , CRD 18 (redraft of the standard prepared by the United States), CRD 5 (comments of Malaysia), CRD 7 (comments of EC), CRD 27 (Report from the Working Group on *Vibrio* spp. , version 2), CRD 19 (comments of Japan), CRD 21 (Report of the Working Group on Biotoxins)

102) The Committee agreed to establish a Working Group chaired by Canada that would work between the sessions to examine the advice from the WHO/FAO/IOC *ad hoc* Expert Consultation on Biotoxins in Molluscan Bivalves and prepare a discussion paper for consideration by the CCFFP with the following terms of reference:

- Assess how the CCFFP might use the expert advice and make recommendations with respect to approaches that the CCFFP could consider to integrate the advice into the Proposed Draft Standard for Live and [Raw] Molluscs and the section of the Code on Live and [Raw] Bivalve Molluscs;
- Identify new questions that the CCFFP may wish to pose to WHO/FAO;
- Identify areas in the report that may need further clarification;
- As appropriate, make recommendations on the validation of methodology (e.g. such as identifying other international organisations that are working in this area);
- As appropriate, make recommendations on possible changes to the Proposed Draft Standard for Live and [Raw] Molluscs and the section of the Code on Live and [Raw] Bivalve Molluscs arising from the expert advice and other issues arising from the deliberations of the Working Group.

103) The Committee had an exchange of views on the need for a physical working group, as it was recalled that the Commission recommended that priority should be given to electronic working groups. Several delegations and the Representative of FAO pointed out that it would be difficult to achieve a concrete result without a physical working group. The Committee therefore agreed that the Working Group would work both electronically and meet physically, the date and place to be determined later. It was noted that Canada, as Coordinating country, would issue an invitation to all members to participate in the working group. The Committee thanked the Delegation of Canada and the Working Group for their useful work on important food safety issues.

***Vibrio spp.* risk management**

104) The Chair of the Working Group, Dr Hajime Toyofuku (Japan), presented its conclusions and indicated that the questions put forward by the last session had not been modified due to the complexity of the issues involved and time constraints. It was proposed to circulate the questions for comments, however the Committee noted that such comments could be considered by the next session of the CCFFP in October 2006 and in the meantime the Committee on Food Hygiene would already have met and provided additional advice. The Committee agreed with the other recommendations of the Working Group, as follows.

105) The Committee agreed that further work on risk management of *Vibrio spp*. in seafood was essential and encouraged the Committee on Food Hygiene to proceed with its work in this area. Noting that the Committee on Food Hygiene would consider risk profile of viruses in food at its next session, the Committee also encouraged CCFH to undertake work on viruses due to their specific relevance for the safety of bivalve molluscs.

106) The Delegation of Indonesia pointed out that there are two different group of *Vibrio parahaemolyticus*, namely pathogenic Kanagawa positive and non-pathogenic Kanagawa negative groups respectively. Therefore the Delegation suggested that this matter should be taken into consideration when addressing this issue in future work.

107) The Committee also agreed to forward the relevant sections of the Proposed Draft Standard to the Committee on Food Hygiene for advice in order to strengthen cooperation and interaction between the Committees.

108) The Committee expressed its thanks to the Delegation of Japan and to the Working Group for their constructive proposals on important food safety issues.

PROPOSED DRAFT STANDARD FOR QUICK FROZEN SCALLOP ADDUCTOR MUSCLE MEAT (Agenda Item 7)[11]

109) The Committee recalled that its 26th Session had agreed to retain the proposed draft Standard at Step 4 until the issue of moisture content was resolved and had agreed that the Delegation of Canada with the assistance of other delegations would prepare a discussion paper on this issue.

110) The Delegation of Canada introduced the discussion paper (CX/FFP 05/27/8) in which four options were considered. Although all countries agreed that it was important to prevent fraudulent practices whereby scallops might be sold which contain excessive amounts of water, there was no consensus on an international limit or a means to derive such a limit due to the variability of scallops (i.e. species, season, fishing technology, harvest practices, fishing technology, harvest practices). Therefore a principle based statement was recommended to the Committee and two examples were provided in CRD 15, which may be used as a basis for further discussion on how to proceed further.

111) The Delegation of the EC drew the attention of the Committee to the fact that it was necessary to protect consumers from economic fraud by providing the correct information about the product and preferred the third option with one moisture limit or moisture/protein ratio. As a compromise, the Delegation noted that further consideration could be given to the second example of a statement in CRD 15.

112) The Delegation of the United States pointed out the practical difficulties their experienced at national level while trying to establish a moisture limit and supported Option 1 Statement of Principle and further consideration of the two examples in CRD 15 in order to facilitate further progress.

113) The Delegation of France drew the attention of the Committee to the fact that Good Manufacturing Practice was very important to provide standardized guidance and proposed to start work on the Code of Practice on the processing of scallop meat on the basis of Annex 1 of document CX/FFP 05/27/8 and along the lines of the project document provided by Canada in CRD 8. Several delegations supported this proposal.

114) It was proposed to develop such a Code in the framework of the Code of Practice for bivalve molluscs, however it was clarified that scallop processing was quite different, therefore the Committee agreed to initiate the elaboration of the Code of Practice in the framework of the Code of Practice for Fish and Fishery Products. The Committee requested the Delegation of Canada to prepare a project document for new work on the Code of Practice on the Processing of Scallop Meat.

Status of the Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat

115) The Committee agreed to replace the current section 3.3.2 with Examples one and two from CRD 15 in the Standard for Quick Frozen Scallop Adductor Muscle Meat and to circulate the Proposed Draft at Step 3 for further comments and consideration at the next session (see Appendix VII).

PROPOSED DRAFT STANDARD FOR SMOKED FISH (Agenda Item 8)[12]

116) The Committee recalled that at its 26th Session it had considered the Proposed Draft Standard for Smoked Fish and agreed to circulate the text for comments and also agreed that the Delegation of Denmark, assisted by interested countries, would review the comments received and prepare a document for circulation at Step 3 and consideration at the next session (ALINORM 04/27/18, paras 146-152).

117) The Committee decided to consider the proposed Draft Standard Section by Section and in addition to editorial amendments made the following changes.

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11 ALINORM 03/18, Appendix VIII; CX/FFP 05/27/8; CRD 8 (Project Document for Work on a New Section in the Code of Practice for Fish and Fishery products on the Processing of Scallop Meat, prepared by Canada); CRD 9 (comments of Canada); CRD 15 (Discussion on Moisture Content in the proposed Draft Standard for Scallop Adductor Muscle meat, prepared by Canada, Australia, France, Germany, Japan and Thailand).

12 CL 2004/43-FFP; CX/FFP 05/27/9 (Comments of Australia, Brazil, European Community, New Zealand, South Africa, United States); CRD 5 (Comments of Malaysia); CRD 16 (Comments of European Community); CRD 22 (Comments of United States); CRD 26 (Comments of Canada).

Scope

118) The Committee clarified that the provisions in this standard should apply to smoked fish that will eventually be added as an ingredient to another product in order to ensure the safety of that other product and amended the last sentence to make it clear that this standard does not apply to fish treated with carbon monoxide ("tasteless" or filtered smoke) and canned fish.

Section 2.1 Product definition

119) Since the smoked fish should be easily recognized by consumer, additional wording "It should have smoked sensory characteristics" was added at the end of the first sentence. Provisions regarding the evisceration of fish were added in order to decrease the risk of *Clostridium botulinum* on the basis of the text used in the Standard for Salted Atlantic Herring and Salted Sprat.

Section 2.2 Process definition

120) The definition of hot smoking was amended to clarify that temperature should cause the complete coagulation of the fish flesh. It was clarified that smoke could be generated not only by smouldering wood but also with other plant material in the definition of hot smoking and consequently throughout the text.

121) Several delegations expressed the view that the use of liquid smoke should be allowed provided the conditions for smoking were clearly defined. The Delegation of the Netherlands expressed its concern with limitations of the use of liquid smoke, in view of current technologies for fish smoking.

122) The Delegation of Ireland, supported by several delegations, proposed to clarify the use of liquid smoke by inserting additional wording clarifying conditions for liquid smoking at the end of the definitions. As no consensus could be reached on this proposal, the Committee decided to put this wording in square brackets for further comments. The Delegation of Ireland also proposed to add a sentence to the Scope to the effect that "Furthermore the standard does not apply to fish that are solely smoke flavoured".

123) An additional definition on freezing was inserted by reference; the last definition on storage was clarified to reflect that smoked fish is typically stored refrigerated; and frozen temperature was amended to "less than or equal" to-18^{o}C.

124) The last sentence of this section was substituted by new wording to clarify that the selection made for packaging, storage and salt in water phase, can have the effect of preventing some microbiological hazards.

Section 3.1 The raw material

125) In order to be consistent with other fish standards the term "*visibly"* was deleted from the second sentence.

Section 3.3 Wood for generation of smoke

126) The section was amended to clarify that wood or plant material used to generate smoke should not contain toxic substances occurring naturally or through contamination.

Section 3.6 Decomposition

127) The square brackets were deleted from the provisions on histamine as an indicator of decomposition. The Committee noted that these provisions were consistent with the provisions on histamine in other fish standards.

128) Due to time constraints the Committee was not able to discuss the remaining sections.

Status of the Proposed Draft Standard for Ready-to-Eat Smoked Fish

129) The Committee agreed to attach the Proposed Draft Standard, as amended during this session, to the report for comments at Step 3 and consideration at the next session (see Appendix V).

PROPOSED DRAFT STANDARD FOR GRANULAR STURGEON CAVIAR (Agenda Item 9)[13]

130) The Committee recalled that its last session had agreed to return the Proposed Draft Standard to Step 3 for comments and that the Delegation of the Russian Federation, with the assistance of interested countries, would redraft the text in the light of the comments received for consideration at the next session.

131) The Committee considered the Proposed Draft Standard Section by Section and in addition to editorial amendments made the following changes.

Title

132) As sturgeon caviar was only sold in its granular form in international trade, the Committee amended the title to read: *Proposed Draft Standard for Sturgeon Caviar* and replaced *granular caviar* with *caviar* in the rest of the text. Some delegations proposed that in the future other standards might be developed for fish roe from other species.

Scope

133) The Committee amended the Scope to clarify that the Standard applies to the fish from *Acipenseridae* family only.

Section 2.1 Definitions

134) Since the term *ovules* was not defined it was substituted with *oocytes* in the definition of fish eggs. It was agreed that the third definition should refer to *Stage IV oocytes* from ovaries which have reached maximum size.

135) The Committee agreed to delete the definitions of caviar lot, as it was covered in the Codex General Standard for the Labelling of Prepackaged Foods, and of primary and secondary package as these terms had not been used in the text, as proposed in the comments of Iran.

Section 2.2 Product definition

136) It was clarified that the product could be made from four genera with addition of salt and with or without food additives.

Section 2.4 Handling practice

137) The Committee noted that the sanitary condition for sturgeon fishes should be *appropriate* rather that *stringent* and that water used to remove clots of blood should be of *potable* quality. The term *roe* was replaced with *fish eggs* in this section and in the rest of the Standard.

Section 3.2 Other ingredients

138) The Committee agreed that water used should comply with the WHO Guidelines for Drinking Water Quality and the quality of other ingredients should conform to applicable Codex Standards.

Section 3.3 Final product

139) The Committee had an exchange of views regarding the need for Table 1 and where to place its content. It was proposed to remove it as it appeared that some provisions such as *taste and odour* or *foreign matter* duplicated provisions in Section 9 – Definition of Defects, however the Committee agreed to leave it unchanged.

Section 4 Food Additives

140) The Committee agreed that the use of colorants should not be allowed in the products and that only two additives: Boric acid (INS 284) at maximum level 4g/kg and Sodium tetraborate (INS 285)at maximum level 4g/kg can be used.

Section 6 Hygiene

141) The Committee agreed to use the standard wording for this section, as provided in the Codex Procedural Manual for commodity standards.

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[13] CX/FFP 05/27/10-Add.1 (Revised version prepared by the Russian Federation), CX/FFP 05/27/10 (Comments of Canada, United States), CX/FFP 05/27/10-Add.2 (Comments of Islamic republic of Iran); CRD 16 (Comments of the European Community); CRD 17 (Comments of Russian Federation).

Section 7 Labelling

142) The Committee agreed to add a sentence in Section 7.1 to clarify that this standard apply without prejudice of the implementation of CITES recommendations.

Section 7.3 Country of origin

143) The Committee was of the view that the country of origin was very important for consumer information and agreed that "it shall be declared". The provisions in relation of repacking of product were amended by taking out the reference to ISO country codes.

Section 7.4 Source identification

144) The Committee agreed to put the provisions containing labelling of aquaculture produced sturgeon product in square brackets for further comments and consideration at the next session.

Section 8 Sampling, examination of analyses

145) The Committee deleted the second paragraph in relation to a lot of caviar, and Section 8.2 regarding the endorsement of methods of analysis and sampling.

146) Section 8.2.1 in relation to sensory evaluation was amended to include a reference to the existing Codex Guidelines for Sensory Evaluation of Fish and Shellfish in Laboratories.

Section 9.4 Extraneous material

147) The square brackets were deleted from this section.

Status of the Proposed Draft Standard for Sturgeon Caviar

148) The Committee noted the progress made on the development of the Proposed Draft Standard and agreed to forward it, as amended at the present session, to the next Session of the Commission for adoption at Step 5 (see Appendix VI).

DISCUSSION PAPER ON THE PROCEDURE FOR THE INCLUSION OF ADDITIONAL SPECIES IN STANDARDS (Agenda Item 10) [14]

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

149) Following its earlier decision under Agenda Item 3, the Committee considered these items jointly. Due to time constraints, the document on the Procedure for the Inclusion of Additional Species in Standards under Agenda Item 10 could not be discussed.

150) The Delegation of Peru expressed the view that the provisions in the current Standard were adequate to provide clear information on the product and did not support any amendment to the Standard.

151) The Delegation of Canada, supported by the Delegation of Chile, pointed out that the draft project document for the revision of the procedure for the inclusion of species (Appendix 2 to the working document) should be limited to sensory requirements.

152) The Delegation of Morocco, supported by the Delegation of the EC, expressed the view that in order to avoid confusion for consumers, the Committee should consider an amendment of the labelling provisions in the Standard and proposed to hold further consideration of the inclusion of *Clupea bentincki* until the amendment of the labelling section had been finalized. The Delegation proposed that both amendments, when finalized, be put forward concurrently for adoption by the Commission, in order to facilitate consensus, as a compromise. The Delegation also supported the document prepared by France on the inclusion of additional species.

153) The Delegation of Thailand expressed the view that the current provisions in the Standard were adequate and should be retained and that according to the information on the FAO website (www.fishbase.org), *Clupeidae* can be called "sardines".

[14] CX/FFP 05/2711, CX/FFP 05/2712, CRD 24 (comments of Thailand)

154) The Delegation of Chile expressed the view that clear information should be provided to the consumer but that labelling provisions should not be used as a barrier to trade and did not support linking the amendment concerning *Clupea bentincki* and the revision of the labelling provisions in the Standard.

155) The Committee could not discuss the question further due to lack of time and agreed that consideration of Agenda Items 3, 10 and 11 would be deferred until the next session.

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

156) There was no other business to discuss by the Committee.

Date and place of Next Session

157) The Committee was informed that the next Session of the Committee would take place in October 2006, subject to further discussions and confirmation by the host Governments and the Codex Secretariat.

SUMMARY STATUS OF WORK

Subject Matter	**Step**	**Action by**	**Document Reference in ALINORM 05/28/18**
Draft Code of Practice for Fish and Fishery Products (Aquaculture)	8	Governments 28th CAC	para. 59 Appendix II
Proposed Draft Code of Practice for Fish and Fishery Products (Shrimps and Prawns; Cephalopods; Transport; Retail; and relevant Definitions)	5/8	Governments 28th CAC	para. 91 Appendix III
Draft Amendment to the Standard for Salted Fish and Dried Salted Fish	8	Governments 28th CAC	para. 34 Appendix IV
Proposed Draft Standard for Sturgeon Caviar	5	Governments 28th CAC	para. 148 Appendix VI
Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (*Clupea bentincki*)	4	28th CCFFP	para. 155
Proposed Draft Standard for Smoked Fish	3	Governments 28th CCFFP	para. 129 Appendix V
Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat	3	Governments 28th CCFFP	para. 183 Appendix VII
Proposed Draft Standard for Live and Non-Viable Bivalve Molluscs	3	Governments/ United States/ 28th CCFFP	para. 98 Appendix VIII
Proposed Draft Code of Practice for Fish and Fishery Products (other sections)	3	Governments 28th CCFFP	para. 92 Appendix IX
Proposed Draft Code of Practice on the Processing of Scallop Meat	1/2/3	Canada / 28th CAC 28th CCFFP	para. 114
Consideration of proposals for new work:			
Revision of the Procedure for the Inclusion of Species		28th CCFFP	para. 155
Amendment of the Standard for Canned Sardines and Sardine-Type Products		28th CCFFP	para. 155

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CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

DRAFT SECTION ON AQUACULTURE

(At Step 8 of the Procedure)

SECTION 2. DEFINITIONS FOR THE PURPOSE OF THIS CODE:

2.2 AQUACULTURE

Aquaculture	means the farming during part or the whole of their life cycle of all aquatic animals, except mammalian species, aquatic reptiles and amphibians intended for human consumption, but excluding species covered in section 7 of this code. These aquatic animals are hereafter referred to as "fish" for ease of reference in section 2.2 and section 6;
Aquaculture Establishment	is any premises for the production of fish intended for human consumption, including the supporting inner infrastructure and surroundings under the control of the same management;
Chemicals	includes any substance either natural or synthetic which can affect the live fish, its pathogens, the water, equipment used for production or the land within the aquaculture establishment;
Colouring	means obtaining specifically coloured feature (e.g. flesh/shell/gonad) of a targeted organism by incorporating into the fish food a natural or artificial substance or additive approved for this purpose by the agency having jurisdiction;
Diseased Fish	means a fish on or in which pathological changes or other abnormalities that affect safety and quality are apparent;
Extensive farming	means raising fish under conditions of little or incomplete control over the growing process and production conditions where their growth is dependent upon endogenously supplied nutrient inputs;
Feed Additives	means chemicals other than nutrients for fish which are approved for addition to their feed;
Fish farm	is an aquaculture production unit (either land-or water based); usually consisting of holding facilities (tanks, ponds, raceways, cages), plant (buildings, storage, processing), service equipment and stock;
Fish Feed	means fodder intended for fish in aquaculture establishments, in any form and of any composition;
Good Aquaculture (or Good Fish Farming) Practices	are defined as those practices of the aquaculture sector that are necessary to produce quality and safe food products conforming to food laws and regulations
Harvesting	Operations involving taking the fish from the water

Intensive farming	means raising fish under controlled growing process and production conditions where their growth is completely dependent on externally supplied fish feed .
Official Agency Having Jurisdiction	means the official authority or authorities charged by the government with the control of food hygiene (sometimes referred to as the competent authority) as well as/or with sanitation in aquaculture;
Pesticide	means any substance intended for preventing, destroying, attracting, repelling or controlling any pest including unwanted species of plants or animals during the production, storage, transport, distribution and processing of food, agricultural commodities, or animal feeds or which may be administered to animals for the control of ectoparasites. The term normally excludes fertilisers, plant and animal nutrients, food additives, and veterinary drugs;
Pesticide Residue	means any specified substance in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities considered to be of toxicological significance;
Residues	means any foreign substances including their metabolites, which remain in fish prior to harvesting as a result of either application or accidental exposure.
Semi-intensive farming	means raising fish under conditions of partial control over the growing process and production conditions where their growth is dependent upon endogenously supplied nutrient inputs and externally supplied fish feed.
Stocking density	is the amount of fish stocked per unit of area or volume;
Veterinary Drug	means any substance applied or administered to any food-producing animal, such as meat or milk-producing animals, poultry, fish or bees, whether used for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behaviour;
Withdrawal Time	is the period of time necessary between the last administration of a veterinary drug to fish, or exposure of these animals to a veterinary drug, and harvesting of them to ensure that the concentration of the veterinary drug in their edible flesh intended for human consumption, complies with the maximum permitted residue limits.

SECTION 6 - AQUACULTURE PRODUCTION

Preamble

Aquaculture establishments should operate in a responsible way such that they comply with the recommendations of the Code of Conduct for Responsible Fisheries (FAO, Rome, 1995) in order to minimize any adverse impact on human health and environment including any potential ecological changes.

Fish farms should operate effective fish health and welfare management. Fry and fingerlings should be disease free and should comply with the OIE Codes of Practice (International Aquatic Animal Health Code, 6th Edition, 2003). Growing fish should be monitored for disease. When using chemicals at fish farms, special care should be exercised so that these substances are not released into the surrounding environment.

Whilst the fish health, environment, and ecological aspects are important considerations in aquaculture activities, this section focuses on food safety and quality aspects.

This Section of the Code applies to industrialised and commercial aquaculture production, producing all aquatic animals, except mammalian species, aquatic reptiles and amphibians for direct human consumption, but excluding bivalve molluscs covered in section 7 of the code, hereafter referred to as “fish that are intended for direct human consumption. Such intensive or semi-intensive aquaculture systems use higher stocking densities, stock from hatcheries, use mainly formulated feeds and may utilise medication and vaccines. This Code is not intended to cover extensive fish farming systems that prevail in many developing countries or integrated livestock and fish culture systems. This section of the code covers the feeding, growing, harvesting and transport stages of aquaculture production. Further handling and processing of fish are covered elsewhere in the code.

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.

The Example flow diagram will provide guidance to some of the common steps in aquaculture production.

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.

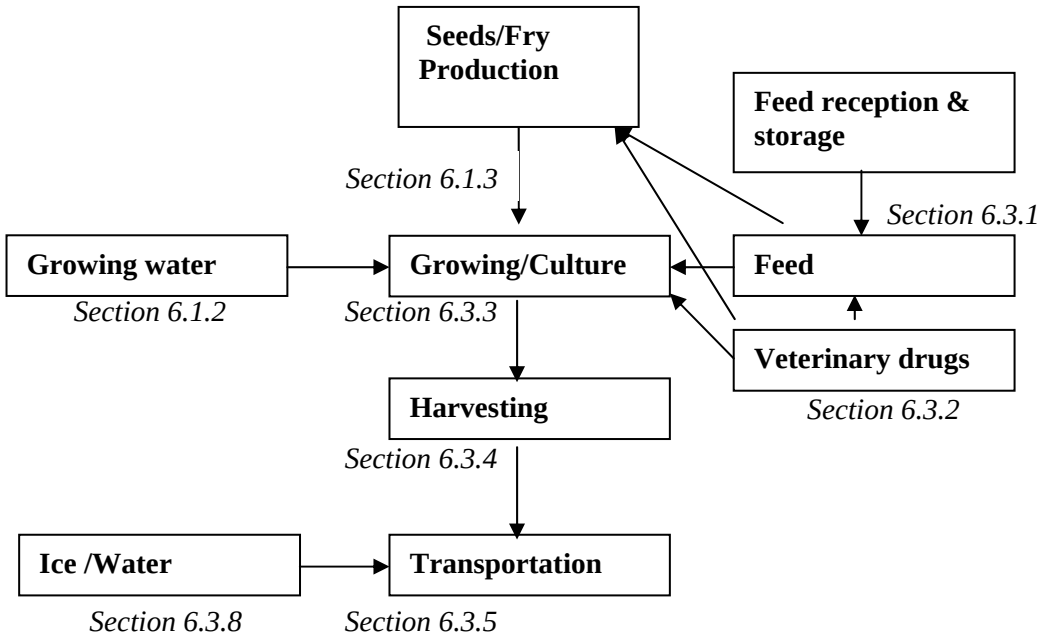


Figure 6.1 Example of a flow chart for aquaculture production

6.1 GENERAL

The general principles in Section 3 apply to aquaculture production, in addition to the following:

6.1.1 Site selection

- The siting, design and construction of fish farms should follow principles of good aquaculture practice, appropriate to species;
- The physical environment with regard to temperature, current, salinity and depth should also be considered since different species have different environmental requirements. Closed recirculation systems should be able to adapt the physical environment to the environment requirements of the farmed fish species;
- Fish farms should be located in areas where the risk of contamination by chemical, physical or microbiological hazards is minimal and where sources of pollution can be controlled;
- Soil for the construction of earthen ponds should not contain such concentrations of chemicals and other substances, which may lead to the presence of unacceptable levels of contamination in fish;
- Ponds should have separated inlets and discharge canals, so that water supplies and effluent are not mixed;
- Adequate facility for treatment of effluent should be provided to allow sufficient time for sediments and organic load settlement before used water is discharged into the public water body
- Water inlets and outlets to ponds should be screened to prevent the entrance of unwanted species;
- Fertilizers, liming materials or other chemicals and biological materials, should be used in accordance with good aquaculture practice;
- All sites should be operated so as to not adversely impact human health from the consumption of the fish in farm.

6.1.2 Growing Water Quality

- The water in which fish are raised should be suitable for the production of products which are safe for human consumption;
- The water quality should be monitored regularly such that the health and sanitation of the fish is continuously maintained to ensure aquaculture products are safe for human consumption;
- Fish farms should not be sited where there is a risk of contamination of the water in which fish are reared;
- Appropriate design and construction of fish farms should be adopted to ensure control of hazards and prevention of water contamination.

6.1.3 Source of Fry and Fingerlings

- The source of postlarvae, fries and fingerlings should be such to avoid the carryover of potential hazards into the growing stocks.

6.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Consumption of fish and fishery products can be associated with a variety of human health hazards. Broadly the same hazards are present in aquaculture products as in corresponding varieties caught in the wild (Section 4.1). The risk of harm from a particular hazard might be increased, under some circumstances, in aquaculture products compared with fish caught in the wild - for instance if the withdrawal time for residues of veterinary drugs has not been observed. High stocking densities, compared with the natural situation, might increase the risk of cross-infection of pathogens within a population of fish and might lead to deterioration of water quality. On the other hand, farmed fish can also present a lower risk of harm. In systems where the fish receive formulated feeds, the risks associated with transmission of hazards through

the food consumed by the fish could be reduced. For example, infection with nematode parasites is absent from, or very much reduced in, farmed salmon compared with salmon caught in the wild. Raising fish in cages in the marine environment poses few hazards and low risks. In closed recirculation systems hazards are even further reduced. In those systems, the water is constantly refreshed and reused and water quality is controlled within safe measures.

6.2.1 Hazards

Aquaculture products possess broadly the same hazards that are present in corresponding varieties caught in the wild (Section 5.3.3.1). Potential hazards that are specific to aquaculture products include: residues of veterinary drugs in excess of recommended guidelines and other chemicals used in aquaculture production, contamination of faecal origin where the facilities are close to human habitation or animal husbandry.

6.2.2 Defects

The same defects are present in aquaculture products as in corresponding varieties caught in the wild (Section 5.3.3.1). A defect which may occur is objectionable odours/flavours . During transport of live fish, it is important to reduce stress, as stressing fish can lead to deterioration in quality. Also, care should be taken to minimise physical damage to fish as this can lead to bruising.

6.3 PRODUCTION OPERATIONS

6.3.1 Feed Supply

Feeds used in aquaculture production should comply with the Codex Recommended Code of Practice on Good Animal Feeding (CAC/RCP- 54 (2004)).

Potential Hazards: *Chemical contamination, mycotoxins and microbiological contamination.*

Potential Defects: *Decomposed feeds, fungal spoilage*

Technical Guidance:

- Feed and fresh stocks should be purchased and rotated and used prior to the expiry of their shelf life;
- Dry fish feeds should be stored in cool and dry areas to prevent spoilage, mould growth and contamination. Moist feed should be properly refrigerated according to manufacturers instructions;
- Feed ingredients should not contain unsafe levels of pesticides, chemical contaminants, microbial toxins, or other adulterating substances.
- Industrially produced complete feeds and industrially produced feed ingredients should be properly labelled. Their composition must fit the declaration on the label and they should be hygienically acceptable.
- Ingredients should meet acceptable, and if applicable, statutory standards for levels of pathogens, mycotoxins, herbicides, pesticides and other contaminants which may give rise to human health hazards.
- Only approved colours of the correct concentration should be included in the feed.
- Moist feed or feed ingredients should be fresh and of adequate chemical and microbiological quality.
- Fresh or frozen fish should reach the fish farm in an adequate state of freshness.
- Fish silage and offal from fish, if used, should be properly cooked or treated to eliminate potential hazards to human health
- Feed which is compounded industrially or at the fish farm, should contain only such additives, growth promoting substances, fish flesh colouring agents; anti-oxidising agents, caking agents or veterinary drugs which are permitted for fish by the official agency having jurisdiction.
- Products should be registered with the relevant national authority as appropriate.
- Storage and transport conditions should conform to the specifications on the label.
- Veterinary drug and other chemical treatments should be administered in accordance with recommended practices and comply with national regulations.

- Medicated feeds should be clearly identified in the package and stored separately, in order to avoid errors.
- Farmers should follow manufacturers' instructions on the use of medicated feeds.
- Product tracing of all feed ingredients should be assured by proper record keeping.

6.3.2 Veterinary Drugs

Potential Hazards: *Residues of veterinary drugs*

Potential Defects: *Unlikely*

Technical Guidance:

- All veterinary drugs for use in fish farming should comply with national regulations and international guidelines (in accordance with the Recommended International Code of Practice for Control of the Use of Veterinary Drugs (CAC/RCP 38-1993) and the Codex Guidelines for the Establishment of a regulatory programme for control of veterinary drugs residues in foods (CAC/GL 16-1993)).
- Prior to administering veterinary drugs, a system should be in place to monitor the application of the drug to ensure that the withdrawal time for the batch of treated fish can be verified.
- Veterinary drugs or medicated feeds should be used according to manufacturers' instructions, with particular attention to withdrawal periods.
- Products should be registered with the appropriate national authority.
- Products should only be prescribed or distributed by personnel authorised under national regulations.
- Storage and transport conditions should conform to the specifications on the label.
- Control of diseases with drugs should be carried out only on the basis of an accurate diagnosis
- Records should be maintained for the use of veterinary drugs in aquaculture production.

- For those fish which tested with drug residue concentrations above the MRL (or in some countries, by an industry imposed lower level), harvest of the batch should be postponed until the batch complies with the MRL. After an assessment of the Good Aquaculture Practices regarding pre-harvest measures, appropriate steps should be taken to modify the drug residue control system.
- A post harvest control should reject all fish that do not comply with the requirements set for veterinary drug residues by the relevant national authority.

6.3.3 Growing

Potential Hazards: *Microbiological and chemical contamination*

Potential Defects: *Abnormal colour, muddy flavour, physical damage*

Technical Guidance:

- Source of postlarvae, fries and fingerlings should be controlled to assure healthy stock.
- Stocking densities should be based on culture techniques, fish species, size and age, carrying capacity of the fish farm, anticipated survival and desired size at harvesting.
- Diseased fish should be quarantined when necessary and appropriate and dead fish should be disposed immediately in a sanitary manner that will discourage the spread of disease and the cause of death should be investigated.
- Good water quality should be maintained by using stocking and feeding rates that do not exceed the carrying capacity of the culture system.
- Growing water quality should be monitored regularly, so as to identify potential hazards and defects.
- The fish farm should have a management plan that includes a sanitation programme, monitoring and corrective actions, defined fallowing periods, appropriate use of agrochemicals, verification procedures for fish farming operations and systematic records.

- Equipment such as cages and nets should be designed and constructed to ensure minimum physical damage of the fish during the growing stage.
- All equipment and holding facilities should be easy to clean and to disinfect and should be cleaned and disinfected regularly and as appropriate.

6.3.4 Harvesting

Potential Hazards: *Unlikely*

Potential Defects: *Physical damage, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Appropriate harvesting techniques should be applied to minimise physical damage and stress.
- Live fish should not be subjected to extremes of heat or cold or sudden variations in temperature and salinity.
- Fish should be free from excessive mud and weed soon after being harvested by washing it with clean seawater or fresh water under suitable pressure.
- Fish should be purged, where necessary, to reduce gut contents and pollution of fish during further processing.
- Fish should be handled in a sanitary manner according to the guidelines in Section 4 of the Code.
- Harvesting should be rapid so that fish are not exposed unduly to high temperatures.
- All equipment and holding facilities should be easy to clean and to disinfect and should be cleaned and disinfected regularly and as appropriate.

6.3.5 Holding and Transportation

Potential Hazards: *microbiological and chemical contamination*

Potential Defects: *physical damage, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Fish should be handled in such a way as to avoid unnecessary stress.
- Fish should be transported without undue delay.
- Equipment for the transport of live fish should be designed for rapid and efficient handling without causing physical damage or stress.
- All equipment and holding facilities should be easy to clean and to disinfect and should be cleaned and disinfected regularly and as appropriate.
- Records for transport of fish should be maintained to ensure full product tracing.
- Fish should not be transported with other products which might contaminate them.

6.3.6 Storage and transport of live fish

This section is designed for the storage and transportation of live fish originating from aquaculture or capture.

Potential Hazards: *microbiological contamination, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, physical damage, off flavours, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Only healthy and undamaged fish should be chosen for live storage and transport. Damaged, sick and dead fish should be removed before introduction to the holding or conditioning tanks.
- Holding tanks should be checked regularly during storage and transportation. Damaged, sick and dead fish should be removed immediately when found.
- Clean water utilised to fill holding tanks, or to pump fish between holding tanks, or for conditioning fish, should be similar in properties and composition to the water from where the fish was originally taken to reduce fish stress.

- Water should not be contaminated with either human sewage or industrial pollution. Holding tanks and transportation systems should be designed and operated in a hygienic way to prevent contamination of water and equipment.
- Water in holding and conditioning tanks should be well aerated before fish is transferred into them.
- Where seawater is used in holding or conditioning tanks, for species prone to toxic algae contamination, seawater containing high level of cell concentrations should be avoided or filtered properly.
- No fish feeding should occur during storage and transport of live fish. Feeding will pollute water of holding tanks very quickly and, in general, fish should not be fed 24 hours before transporting.
- Material of holding and conditioning tanks, pumps, filters, piping, temperature control system, intermediate and final packaging or containers should not be harmful to fish or present hazards to humans.
- All equipment and facilities should be cleaned and disinfected regularly and as needed.

6.3.6.1 Live fish stored and transported at ambient temperature

Potential Hazards: *microbiological contamination, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, physical damage, off flavours , physical/biochemical change due to stress of live fish*

Technical Guidance:

- Depending on the source of water, requirements of the species and time of storage and/or transport, it could be necessary to re-circulate the water and filter it through mechanical and/or biofilters.
- Water intake of holding tanks on board of vessels should be located so as to avoid contamination from vessel's sewage, waste and engine cooling discharge. Pumping of water should be avoided when the vessel comes into harbour or sailing through waters near sewage or industrial discharges. Equivalent precautions should be adopted for water intake on land.
- Facilities for storing and transportation (holding tanks) of live fish should be capable to:
  - maintain the oxygenation of water in the holding tanks through either, continuous water flow, direct oxygenation (with oxygen or air bubbling), or regularly and as needed changing of the water of the holding tank;
  - maintain the temperature of storage and transport, for species sensitive to temperature fluctuations. It may be necessary to insulate the holding tanks and install a temperature control system;
  - keep water in reserve which might be needed in case the holding tank should drain. The volume in fixed facilities (storage) should be at least of the same volume of the total holding tanks in operation. The volume in land transport facilities should be at least capable to compensate water for evaporation, leakage, purges, filter cleaning and eventual mixing of water for control purposes;
- For species known to exhibit strong territoriality or cannibalism or hyperactivity when under stress, these fish should be separated in individual tanks or appropriately secured/banned to prevent damage (an alternative method is reduction of temperature).

6.3.6.2 Live fish stored and transported at low temperatures

Potential Hazards: *microbiological contamination, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, physical damage, off flavours, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Conditioning should aim at reducing the metabolic rate of fish in order to minimize the stress to them. Conditioning of the fish at low temperatures should be done according to the characteristics of the species (minimum temperature, cooling rate, water/humidity requirements, packaging conditions). Conditioning is a biological operation to reduce the metabolic rate of the fish minimising the stress to them.
- The level of temperature to be reached should be in accordance with the species, transport and packaging conditions. There is a range of temperature in which fish do not exhibit or have reduced physical activity. The limit is attained at the temperature at which the metabolic rate of the fish is minimised without causing adverse effects to them (basal metabolic rate).
- When performing conditioning, only approved anaesthetics and procedures accepted by the regulations should be used.
- Conditioned fish should be packed without delay in proper insulated containers.
- Remaining water or water for use with packaging material for conditioned fish should be clean, of similar composition and pH to the water the fish was taken from, but to the temperature of storage.
- Water absorbent pads, shredded wood, wood shavings or sawdust and tying material that may be utilised for packaging conditioned fish should be clean, first use, free of possible hazards and be wet right at the time of packaging.
- Conditioned and packed fish should be stored or transported under conditions that assure proper temperature control.

ALINORM 05/28/18
APPENDIX III

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS
(Sections at Step 5/8)

TABLE OF CONTENTS

2.10 SHRIMPS AND PRAWNS

Dehead	means to remove the head from the entire shrimp or prawn;
De-veined shrimp	means all the shrimp which have been peeled, the back of the peeled segments of the shrimp have been open out and the gut ("vein") removed;
Fresh shrimp	are freshly caught shrimp which have received no preserving treatment or which have been preserved only by chilling. It does not include freshly cooked shrimp;
Peeled shrimp	are shrimps with heads and all shell removed;
Raw headless shrimp	are raw shrimps with heads removed and the shell on;
Shrimp	The term shrimp (which includes frequently used term "prawn") refers to the species covered by the most recent edition of the FAO listing of shrimps, FAO Fisheries Synopsis No. 125, Volume 1, Shrimps and Prawns of the World.

2.11 CEPHALOPODS

Splitting	is the process of cutting cephalopods along the mantle to produce a single fillet;

2.13 TRANSPORT

2.14 RETAIL

Retail	means an operation that stores, prepares, packages, serves, or otherwise provides fish, shellfish and their products directly to the consumer for preparation by the consumer for human consumption. This may be free standing seafood markets, seafood sections in grocery or department stores, packaged chilled or frozen and/ or full service.
Packaged	means packaged in advance and displayed chilled or frozen for direct consumer pick up.
Full Service Display	means a display of chilled fish, shellfish and their products to be weighed and wrapped by establishment personnel at the request of the consumer.

SECTION 14 – PROCESSING OF SHRIMPS AND PRAWNS

Scope: Shrimp frozen for further processing may be whole, head-off or deheaded or raw headless, peeled, peeled and de-veined or cooked on board harvest or processing vessels or at on shore processing plants.

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.

14.1 FROZEN SHRIMPS AND PRAWNS – GENERAL

- shrimps for frozen product originate from a wide variety of sources as varied as deep cold seas to shallow tropical inshore waters and rivers through to aquaculture in tropical and semi tropical regions.
- the methods of catching, or harvesting and processing are as equally varied. Species in northern regions may be caught by freezer vessels, cooked, individually quick frozen and packed on board in their final marketing form. More often however, they will be raw IQF on board for further processing at on-shore plants, or even landed chilled on ice. Shrimps of these species are invariably pre-cooked at onshore plants through in-line integrated process lines, followed by mechanical peeling, cooking, freezing, glazing and packing. A much larger product line is produced in tropical and sub-tropical countries from wild caught and cultivated *Penaeus* species: whole, headless (head off), peeled, peeled and deveined raw and/or cooked products presented in different marketing forms (easy-peel, tail-on, tail-off, butterfly,

stretched, sushi shrimp). This wide range of products is prepared in shrimp processing plants that may be small and use manual techniques or large dimensions fully mechanised equipments. Cooked shrimp products are generally peeled after cooking.

- warm water shrimps may also be subject to further added value processes such as marinading and batter and crumb coatings.
- since some raw shrimp products, as well as cooked ones, may be consumed without further processing safety considerations are paramount.
- the processes described above are captured on the flow chart, but it must be appreciated that because of the diverse nature of production methods individual HACCP/DAP plans must be devised for each product.
- Other than the previous description of on-board cooking, there is no reference to processing of shrimps at sea or in farms. It is assumed that product will be correctly handled and processed in line with the relevant sections in the code of practice and that where appropriate some element of pre-preparation, such as de-heading, will have taken place prior to receipt at processing plants.

Figure 14.2 *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.*

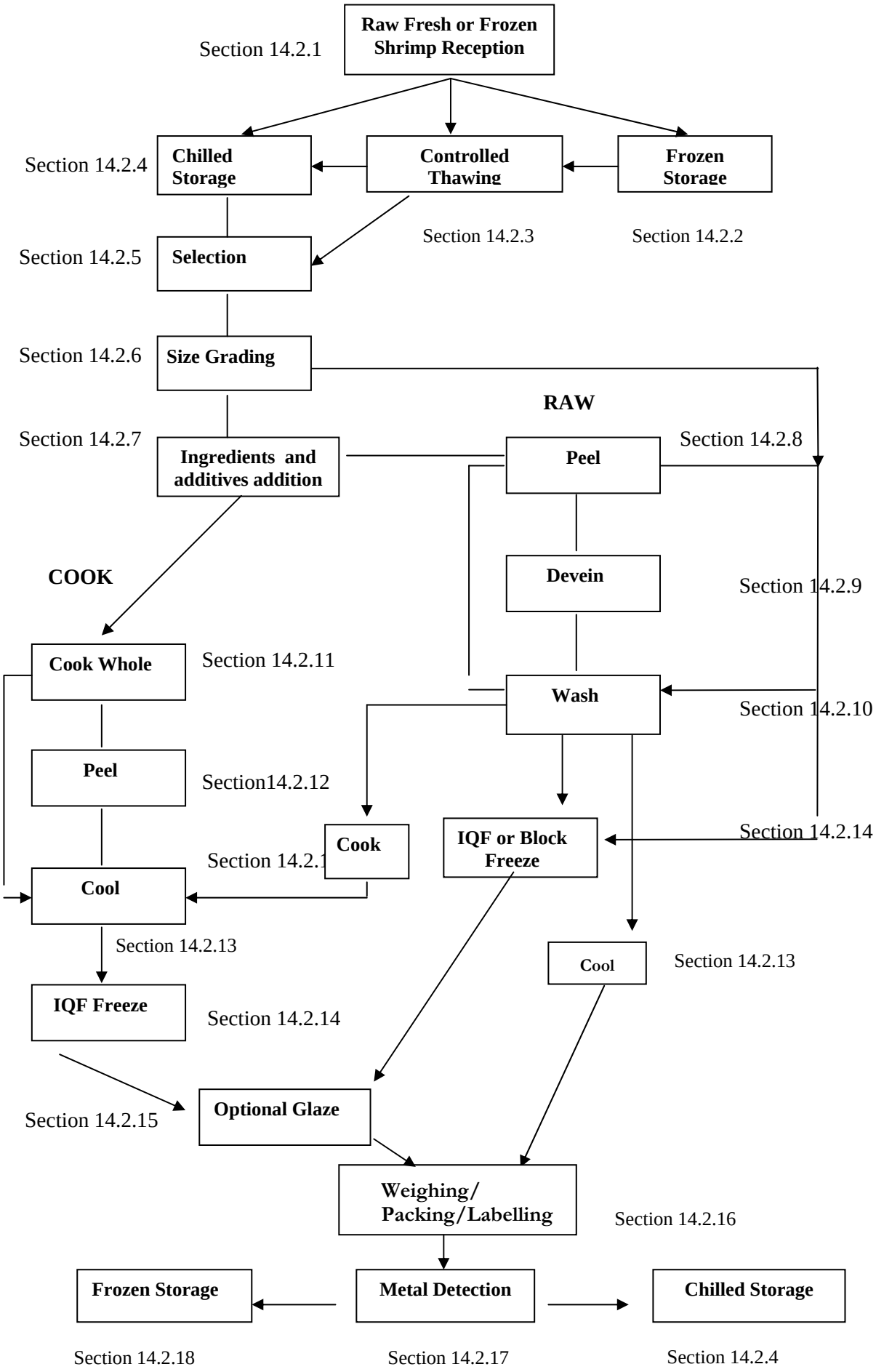


Figure 14.2 Example of a flow chart of a shrimp and prawn processing line

14.2 SHRIMP PREPARATION (PROCESSING STEPS 14.2.1 TO 14.2.18)

14.2.1 Raw Fresh and Frozen Shrimp Reception (Process Steps)

Potential Hazards: *phytotoxins (e.g. PSP)*
microbiological contamination
antioxidants
sulphites
pesticides
fuel oil (chemical contamination)

Potential Defects: *variable batch quality*
mixed species
taints
blackspot
softening from head enzymes
decomposition

Technical Guidance:

- inspection protocols should be devised to cover identified quality , HACCP and DAP plan parameters together with appropriate training for inspectors to undertake these tasks.
- shrimps should be inspected upon receipt to ensure that they are well iced or deep frozen and properly documented to ensure product tracing.
- the origin and previous known history will dictate the level of checking that may be necessary for, for example, phytotoxins in sea caught shrimps for potential antibiotics presence in aquaculture shrimps, particularly if there is no supplier assurance certification. In addition, other chemical indicators for heavy metals, pesticides and indicators of decomposition such as TVBN's may be applied.
- shrimps should be stored in suitable facilities and allocated use-by times for processing to ensure quality parameters are met in end products.
- incoming lots of shrimp should be monitored for sulphites at harvesting.
- a sensory evaluation should be performed on incoming lots to ensure that the product is of acceptable quality and not decomposed.
- it is necessary to wash fresh shrimps after receiving in an adequate equipment with a series of low velocity sprays with chilled clean water.

14.2.2 Frozen Storage

Potential Hazards: *unlikely*
Potential Defects: *protein denaturation, dehydration*
Technical Guidance:

- protective packaging should be undamaged, otherwise repacking to exclude possibilities of contamination and dehydration.
- cold storage temperatures to be suitable for storage with minimum fluctuation.
- product to be processed within the best before time on the packaging, or before as dictated at reception.
- the cold storage facility should have a temperature monitoring device preferably a continuous recording unit to properly monitor and record ambient temperature.

14.2.3 Controlled Thawing

Potential Hazards: *microbiological contamination*
contamination from wrapping
Potential Defects: *decomposition*
Technical Guidance:

- thawing processes may be undertaken from block frozen or IQF shrimps depending on the raw material source. The outer and inner packaging should be removed prior to defrosting to prevent contamination and extra care should be taken on block frozen prawns where inner wax or polyethylene packaging may be entrapped with blocks.
- thawing tanks should be purpose designed and allow for 'counter current' water defrosting where necessary to maintain lowest temperatures possible. However water re-use is discouraged.

- Clean sea water or water and ice of potable quality should be used for thawing with a water temperature no higher than 20°C (68°F) by use of additional ice.
- thawing should be achieved as quickly as possible to maintain quality.
- it is desirable for the exit conveyor, leading from the defrost tanks, to be equipped with a series of low velocity sprays to wash the shrimps with chilled clean water.
- immediately after thawing, the shrimps should be re-iced or held in chill to avoid temperature abuse before further processing.

14.2.4 Chilled Storage

Potential Hazards: *microbiological contamination*

Potential Defects: *decomposition*

Technical Guidance:

- chilled storage, preferably under ice in chill rooms at less than 4°C after reception.
- the chilled storage facility should have a temperature monitoring device (preferably a continuous recording unit) to properly monitor and record ambient temperatures.

14.2.5 Selection

Potential Hazards: *unlikely*

Potential Defects: *decomposition*

Technical Guidance:

- shrimps may be selected for different quality grades according to specification requirements. This should be undertaken with minimum of delay followed by re-icing of the shrimps

14.2.6 Size Grading

Potential Hazards: *microbiological contamination*

Potential Defects: *decomposition*

Technical Guidance:

- Size grading of shrimps is undertaken through mechanical graders of various degrees of sophistication and manually. There is a possibility of shrimps becoming trapped in the bars of the graders so that regular inspection is required to prevent 'carry over' of old prawns and bacteriological contamination.
- Shrimp should be re-iced and stored in chill prior to further processing.
- The grading process should be carried out promptly to prevent unnecessary microbiological growth and product decomposition.

14.2.7 Addition of Ingredients and Use of Additives

Potential Hazards: *chemical and microbiological contamination*
sulphites

Potential Defects: *decomposition*
improper use of additives

Technical Guidance:

- according to specification and legislation, certain treatments may be applied to shrimps to improve organoleptic quality, preserve yield or preserve them for further processing.
- examples would including sodium metabisulphite to reduce shell blackening, sodium benzoate to extend shelf-life between processes and sodium polyphosphates to maintain succulence through processing and prevent black spot after peeling, whilst common salt would be added as brine for flavour.
- these ingredients and additives can be added at various stages, for instance common salt and sodium polyphosphates at defrost stages or chilled brine as a flume conveyor between cooking and freezing, or as glaze.
- at whatever stage ingredients and additives are added, it is essential to monitor the process and product to ensure that any legislative standards are not exceeded, quality parameters are met and that where dip baths are used, the contents are changed on a regular basis according to drawn up plans.
- chill conditions to be maintained throughout.

- sulphites used to prevent blackspot formation autolysis should be used in accordance with manufacturer's instructions and Good manufacturing Practice

14.2.8 Full and Partial Peeling

Potential Hazards: *microbiological cross contamination*

Potential Defects: *decomposition*
shell fragments
foreign matter

Technical Guidance:

- this process applies mainly to warm water prawns and could be as simple as inspecting and preparing whole large prawns for freezing and down-grading blemished prawns for full peeling.
- other peeling stages could including full peeling or partial peeling leaving tail swimmers intact.
- whatever the process, it is necessary to ensure that the peeling tables are kept clear of contaminated shrimps and shell fragments with water jets and the shrimps are rinsed to ensure no carry over of shell fragments.

14.2.9 Deveining

Potential Hazards: *microbiological cross contamination*
metal contamination

Potential Defects: *objectionable matter*
decomposition
foreign matter

Technical Guidance:

- the vein is the gut which may appear as a dark line in the upper dorsal region of prawn flesh. In large warm water prawns, this may be unsightly, gritty and a source of bacterial contamination.
- removal of the vein is by razor longitudinally cutting along the dorsal region of the shrimp with a razor slide and removal of the vein by pulling. This may be partially achieved with head-off shell-on shrimps as well.
- this operation is considered to be a mechanical though labour intensive process so that:
- cleaning and maintenance schedules should be place and cover the need for clearing before, after and during processing by trained operatives.
- further, it is essential to ensure that damaged and contaminated shrimps are removed from the line and that no debris build up is allowed.

14.2.10 Washing

Potential Hazards: *microbiological contamination*

Potential Defects: *decomposition*
foreign matter

Technical Guidance:

- washing of peeled and deveined shrimps is essential to ensure that shell and vein fragments are removed.
- shrimps should be drained and chilled without delay prior to further processing.

14.2.11 Cooking Processes

Potential Hazards: *undercooking, microbiological cross contamination*

Potential Defects: *over cooking*

Technical Guidance:

- the cooking procedure, in particular time and temperature, should be fully defined according to the specification requirements of the final product, for example whether it is to be consumed without further processing and the nature and origin of the raw shrimp and uniformity of size grading.

- the cooking schedule should be reviewed before each batch and where continuous cookers are in use, constant logging of process parameters should be available.
- only potable water should be used for cooking, whether in water or via steam injection.
- the monitoring methods and frequency should be appropriate for the critical limits identified in the scheduled process.
- maintenance and cleaning schedules should be available for cookers and all operations should only be undertaken by fully trained staff.
- adequate separation of cooked shrimps exiting the cooking cycle utilising different equipment is essential to ensure no cross contamination.

14.2.12 Peeling of Cooked Shrimps

Potential Hazards: *microbiological cross contamination*

Potential Defects: *presence of shell*

Technical Guidance:

- cooked shrimps have to be properly peeled through mechanical or manual peeling in line with cooling and freezing processes.
- cleaning and maintenance schedules should be available, implemented by fully trained staff to ensure efficient and safe processing are essential.

14.2.13 Cooling

Potential Hazards: *microbiological cross contamination and toxin formation*

Potential Defects: *unlikely*

Technical Guidance:

- cooked shrimps, should be cooled as quickly as possible to bring the temperature of the product to a temperature range limiting bacteria proliferation or toxin production
- cooling schedules should enable the time-temperature requirements to be met and maintenance and cleaning schedules should be in place and complied with by fully trained operatives.
- only cold/iced potable water should be used for cooling and should not be used for further batches, although for continuous operations a top-up procedure and maximum run-length will be defined.
- raw/cooked separation is essential.
- after cooling and draining, the shrimps should be frozen as soon as possible, avoiding any environmental contamination.

14.2.14 Freezing Processes

Potential Hazards: *microbiological contamination*

Potential Defects: *slow freezing – textural quality and clumping of shrimps*

Technical Guidance:

- the freezing operation will vary tremendously according to the type of product. At its simplest, raw whole or head-off shrimps may be block or plate frozen in purpose-designed cartons into which potable water is poured to form a solid block with protective ice.
- cooked and peeled *Pandalus* cold water prawns, at the other extreme, tend to be frozen through fluidised bed systems, whilst many of the warm water shrimp products are IQF frozen either on trays in blast freezers or in continuous belt freezers.
- whichever the freezing process, it is necessary to ensure that the freezing conditions specified are met and that for IQF products, there is no clumping, i.e. pieces frozen together. Putting product into a blast freezer before it is at operating temperature may result in glazed, slow frozen product and contamination.
- freezers are complex machines requiring cleaning and maintenance schedules operated by fully trained staff.

14.2.15 Glazing

Potential Hazards: *microbiological cross-contamination*

Potential Defects: *inadequate glaze, too much glaze, spot welding, incorrect labelling.*

Technical Guidance:

- glazing is applied to frozen shrimps to protect against dehydration and maintain quality during storage and distribution.
- ice block frozen shrimps is the simplest form of glazing, followed by dipping and draining frozen shrimps in chilled potable water. A more sophisticated process is to pass frozen size graded shrimps under cold-water sprays on vibratory belts such that the shrimps pass at a steady rate to receive an even and calculable glaze cover.
- ideally, glazed shrimps should receive a secondary re-freezing prior to packing, but if not, they should be packaged as quickly as possible and moved to cold storage. If this is not achieved, the shrimps may freeze together and 'spot weld' or clump as the glaze hardens.
- there are Codex methods for the determination of glaze.

14.2.16 Weighing, Packing and Labelling of All Products

Potential Hazards: *sulphites*
Potential Defects: *incorrect labelling*
decomposition
Technical Guidance:

- all wrappings for products and packaging including glues and inks should have been specified to be food grade, odourless with no risk of substances likely to be harmful to health being transferred to the packed food.
- all food products should be weighed in packaging with scales appropriately tared and calibrated to ensure correct weight.
- where products are glazed, checks should be carried out to ensure the correct compositional standards to comply with legislation and packaging declarations.
- ingredients lists on packaging and labelling should declare presence of ingredients in the food product in descending order by weight, including any additives used and still present in the food.
- all wrapping and packaging should be carried out in a manner to ensure that the frozen products remain frozen and that temperature rises are minimal before transfer back to frozen storage.
- sulphites should be used in accordance with manufacturer's instructions and Good manufacturing Practice.
- where sulphites were used in the process, care should be taken that they are properly labelled.

14.2.17 Metal Detection

Potential Hazard: *presence of metal*
Potential Defect: *unlikely*
Technical Guidance:

- products should be metal detected in final pack through machines set to the highest sensitivity possible.
- larger packs will be detected at a lower sensitivity than smaller packs so that consideration should be given to testing product prior to packing. However, unless potential re-contamination prior to packing can be eliminated, it is probably still better to check in-pack.

14.2.18 Frozen Storage of End Product

Potential Hazard: *unlikely*
Potential Defects: *texture and flavour deviations due to fluctuations in temperature, deep freezer burn, cold store flavour, cardboard flavour*
Technical Guidance:

- frozen products should be stored at frozen temperature in a clean, sound and hygienic environment.
- the facility should be capable of maintaining the temperature of the shrimp at or below minus 18^{o}C with minimal temperature fluctuations (+ or -3^{o}C).
- the storage area should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended.
- a systematic stock rotation plan should be developed and maintained.

- products should be properly protected from dehydration, dirt and other forms of contamination.
- all end products should be stored in the freezer to allow proper air circulation.

SECTION 15 - PROCESSING OF CEPHALOPODS

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 fresh and processed cephalopods including cuttlefish (Sepia and Sepiella), squid (*Alloteuthis, Berryteuthis, Dosidicus, Ilex, Lolliguncula, Loligo, Loliolus, Nototodarus, Ommastrephes, Onychoteuthis, Rossia, Sepiola, Sepioteuthis, Symplectoteuthis* and *Todarodes*) and octopuses (*Octopus* and *Eledone*) intended for human consumption.

Fresh Cephalopods are extremely perishable and should be handled at all times with great care and in such a way as to prevent contamination and inhibit the growth of micro-organisms. Cephalopods should not be exposed to direct sunlight or to the drying effects of winds, or any other harmful effects of the elements, but should be carefully cleaned and cooled down to the temperature of melting ice, 0°C (32°F), as quickly as possible.

This section shows an example of a cephalopod process. Figure 15.1 lists the steps associated with receiving and processing fresh squid. It should be noted that there are a variety of processing operations for cephalopods and this process is being used for illustrative purposes only.

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.

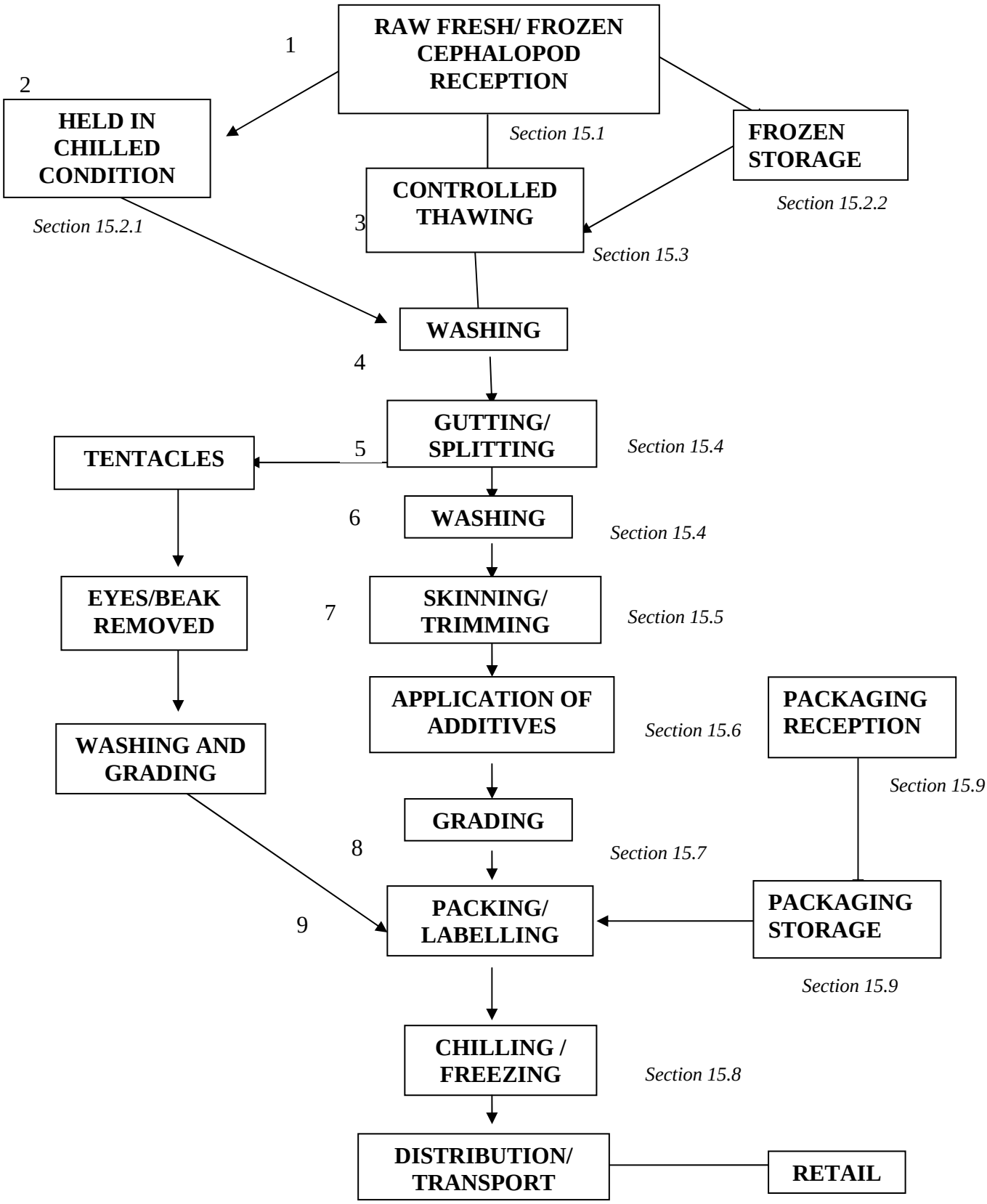


Figure 15.1 Example of a possible squid processing line

15.1 RECEPTION OF CEPHALOPODS (PROCESSING STEP 1)

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

Potential Defects: *Damaged products, foreign matter*

Technical Guidance:

- The processing facility should have in place a programme for inspecting cephalopods on catching or arrival at the factory. Only sound product should be accepted for processing.
- Product specifications could include:
  - organoleptic characteristics such as appearance , odour, texture etc. which can also used as indicators of fitness of consumption;
  - chemical indicators of decomposition and / or contamination e.g. TVBN, heavy metals (cadmium);
  - microbiological criteria;
  - parasites e.g. *Anisakis* foreign matter;
  - the presence of lacerations, breakages and discolouration of the skin, or a yellowish tinge spreading from the liver and digestive organs inside the mantle, which are indicative of product deterioration.
- Personnel inspecting product should be trained and experienced with the relevant species in order to recognise any defects and potential hazards.

Further information can be found on Section 8 "Processing of Fresh, Frozen and Minced Fish" and Codex Guidelines for Sensory Evaluation of Fish and Shellfish in Laboratories.

15.2 STORAGE OF CEPHALOPODS

15.2.1 Chilled storage (Processing steps 2 and 10)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Decomposition, physical damage*

Technical Guidance:

Refer to Section 8.1.2 "Chilled Storage"

15.2.2 Frozen Storage (Processing steps 2 & 10)

Potential Hazards: *Heavy metals e.g. cadmium migration from the gut.*

Potential Defects: *Freezer-burn*

Technical Guidance:

Refer to Section 8.1.3 "Frozen Storage".

- Consideration needs to be given to the fact that when there are high cadmium levels in the gut contents there may be migration of this heavy metal into the flesh.
- Products should be properly protected from dehydration by sufficient packaging or glaze.

15.3 CONTROLLED THAWING (PROCESSING STEP 3)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Decomposition, discoloration*

Technical Guidance:

- The thawing parameters should be clearly defined and include time and temperature. This is important to prevent the development of pale pink discoloration.
- Critical limits for the thawing time and temperature of the product should be developed. Particular attention should be paid to the volume of product being thawed in order to control discoloration.
- If water is used as the thawing medium then it should be of potable quality
- If re-circulated water is used then care must be taken to avoid the build up of micro organisms

For further guidance refer to Section 8.1.4 "Control Thawing".

15.4 SPLITTING, GUTTING AND WASHING (PROCESSING STEPS 4, 5, 6, 11, 12 &13)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Presence of gut contents, parasites, shells, ink discolouration, beaks, decomposition.*

Technical Guidance:

- Gutting should remove all intestinal material and the cephalopod shell and beaks if present.
- Any by-product of this process which is intended for human consumption e.g. tentacles, mantle should be handled in a timely and hygienic manner.
- Cephalopods should be washed in clean seawater or potable water immediately after gutting to remove any remaining material from the tube cavity and to reduce the level of micro-organisms present on the product.
- An adequate supply of clean seawater or potable water should be available for the washing of whole cephalopods and cephalopod products

SKINNING, TRIMMING (PROCESSING STEP 7)

Potential Hazards: *Microbiological contamination*

Potential Defects: *presence of objectionable matter, bite damage, skin damage, decomposition*

Technical Guidance:

- The method of skinning should not contaminate the product nor should it allow the growth of micro-organisms e.g. enzymatic skinning or hot water techniques should have defined time/temperature parameters to prevent the growth of micro-organisms.
- Care should be taken to prevent waste material from cross contaminating the product.
- An adequate supply of clean seawater or potable water should be available for the washing or product during and after skinning.

15.6 APPLICATION OF ADDITIVES

Potential Hazards: *Physical contamination, non approved additives, non fish allergens*

Potential Defects: *Physical contamination, additives exceeding their regulatory limits*

Technical Guidance:

- Mixing and application of appropriate additives should be carried out by trained operators
- It is essential to monitor the process and product to ensure that regulatory standards are not exceeded and quality parameters are met
- Additives should comply with requirements of the Codex general Standard for Food Additives.

15.7 GRADING/PACKING/LABELLING (PROCESSING STEPS 8 & 9)

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: *chemical or physical contamination from packaging*

Potential Defects: *incorrect labelling, incorrect weight, dehydration*

Technical Guidance:

- Packaging material should be clean, be suitable for it’s intended purpose and manufactured from food grade materials;
- Grading and packing operations should be carried out with minimal delay to prevent deterioration of the cephalopod;
- Where sulphites were used in the process, care should be taken that they are properly labelled.

15.8 FREEZING (PROCESSING STEP 10)

Potential Hazards: *parasites*

Potential Defects: *freezer burn, decomposition, loss of quality due to slow freezing.*

Technical Guidance:

Cephalopods should be frozen as rapidly as possible to prevent deterioration of the product and a resulting reduction in shelf life due to microbial growth and chemical reactions.

- The time/temperature parameters developed should ensure rapid freezing of product and should take into consideration the type of freezing equipment, capacity, the size and shape of the product, and production volume. Production should be geared to the freezing capacity of the processing facility;
- If freezing is used as a control point for parasites, then the time/temperature parameters need to ensure that the parasites are no longer viable need to be established;
- The product temperature should be monitored regularly to ensure the completeness of the freezing operation as it relates to the core temperature;
- Adequate records should be kept for all freezing and frozen storage operations;

For further guidance refer to Section 8.3.1 “Freezing Process” and to Annex 1 on Parasites.

15.9 PACKAGING, LABELS AND INGREDIENTS – RECEPTION AND STORAGE

Consideration should be given to the potential hazards and defects associated with packaging, labelling and ingredients. It is recommended that users of this code consult Section 8.5 “Packaging, Labels and Ingredients”.

SECTION 17 – TRANSPORT

Refer to the Recommended International Code of Practice-General Principles of Food Hygiene, Section VIII – Transportation, CAC/RCP 1969, Rev. 4 (2003) and the Code of Hygienic Practice for the Transport of Food in Bulk and Semi-Packaged Food (CAC/RCP 47-2001).

Transportation applies to all sections and is a step of the flow diagram which needs specific skills. It should be considered with the same care as the other 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.

It is particularly important throughout the transportation of fresh, frozen or refrigerated fish, shellfish and their products that care is taken to minimise any rise in temperature of the product and that the chill or frozen temperature, as appropriate, is maintained under controlled conditions. Moreover, appropriate measures should be applied to minimize damage to products and also their packaging.

FOR FRESH, REFRIGERATED AND FROZEN PRODUCTS

Refer to 3.6 Transportation.

Potential Hazards: *Biochemical development (histamine). Microbial growth and contamination*

Potential Defects: *Decomposition, physical damage. Chemical contamination (fuel) .*

Technical Guidance:

- check temperature of product before loading;
- avoid unnecessary exposure to elevated temperatures during loading and unloading of fish, shellfish and their products;
- load in order to ensure a good air flow between product and wall, floor and roof panels ; load stabilizer devices are recommended
- monitor air temperatures inside the cargo hold during transportation; the use of a recording thermometer is recommended
- during transportation

- frozen products should be maintained at –18°C or below (maximum fluctuation +3°C)
- fresh fish, shellfish and their products should be kept at a temperature as close as possible to 0°C. Fresh whole fish should be kept in shallow layers and surrounded by finely divided melting ice; adequate drainage should be provided in order to ensure that water from melted ice does not stay in contact with the products or melted water from one container does not cross contaminate products in other containers.
- transportation of fresh fish in containers with dry freezer bags and not ice should be considered where appropriate;
- transportation of fish in an ice slurry, chilled sea water or refrigerated sea water (e.g. pelagic fish) should be considered where appropriate. Chilled sea water or refrigerated sea water should be used under approved conditions;
- refrigerated processed products should be maintained at the temperature specified by the processor but generally should not exceed 4° C.
- provide fish, shellfish and their products with adequate protection against contamination from dust, exposure to higher temperatures and the drying effects of the sun or wind.

17.2 FOR LIVE FISH AND SHELLFISH

- refer to the specific provisions laid down in the relevant sections of the code.

17.3 FOR CANNED FISH AND SHELLFISH

- refer to the specific provisions laid down in section 16.

17.4 FOR ALL PRODUCTS

- before loading, the cleanliness, suitability and sanitation of the cargo hold of the vehicles should be verified;
- loading and transportation should be made in order to avoid damage and contamination of the products and to ensure the packaging integrity
- after unloading, the accumulation of waste should be avoided and should be disposed of in a proper manner.

SECTION 18 - RETAIL

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.

Fish, shellfish and their products at retail should be received, handled, stored and displayed to consumers in a manner that minimizes potential food safety hazards and defects and maintains essential quality. Consistent with the HACCP and DAP approaches to food safety and quality, products should be purchased from known or approved sources under the control of competent health authorities that can verify HACCP controls. Retail operators should develop and use written purchase specifications designed to ensure food safety and desired quality levels. Retail operators should be responsible to maintain quality and safety of products.

Proper storage temperature after receipt is critical to maintain product safety and essential quality. Chilled products should be stored in a hygienic manner at temperatures less than or equal to 4°C (40°F), MAP products at 3°C (38°F) or lower, while frozen products should be stored at temperatures less than or equal to -18°C (0°F).

Preparation and packaging should be carried out in a manner consistent with the principles and recommendations found in Section 3, Prerequisite Programmes and Codex Labelling Standards. Product in an open full display should be protected from the environment such as use of display covers (sneeze guards). At all times, displayed seafood items should be held at temperatures and conditions that minimize the development of potential bacterial growth, toxins and other hazards in addition to loss of essential quality.

Consumer information at the point of purchase, for example placards or brochures, that inform consumers about storage, preparation procedures and potential risks of seafood products if mishandled or improperly prepared, is important to ensure that product safety and quality is maintained.

A system of tracking the origin and codes of fish, shellfish and their products should be established to facilitate product recall or public health investigations in the event of the failure of preventive health protection processes and measures. These systems exist for molluscan shellfish in some countries in the form of molluscan shellfish tagging requirements.

18.1 RECEPTION OF FISH, SHELLFISH AND THEIR PRODUCTS AT RETAIL – GENERAL CONSIDERATIONS

Potential Hazards: *see Reception 7.1, 8.1*

Potential Defects: *see Reception 7.1, 8.1*

Technical Guidance:

- The transport vehicle should be examined for overall hygienic condition. Products subject to filth, taint or contamination should be rejected.
- The transport vehicle should be examined for possible cross contamination of ready to eat fish and fishery products by raw fish and fishery products. Determine that cooked-ready-to-eat product has not been exposed to raw product or juices or live molluscan shellfish and that raw molluscan shellfish have not been exposed to other raw fish or shellfish.
- Seafood should be regularly examined for adherence to purchasing specifications.
- All products should be examined for decomposition and spoilage at receipt. Products exhibiting signs of decomposition should be refused
- When a log of the cargo hold temperature for the transport vehicle is kept, records should be examined to verify adherence to temperature requirements.

18.1.1 Reception of Chilled Products at Retail

Potential Hazards: *Pathogen growth, microbiological contamination, chemical and physical contamination, Scombrotoxin formation, C. botulinum toxin formation*

Potential Defects: *Spoilage (decomposition), Contaminants, Filth*

Technical Guidance:

- Product temperature should be taken from several locations in the shipment and recorded. Chilled fish, shellfish and their products should be maintained at or below 4°C (40°F). MAP product, if not frozen, should be maintained at or below 3°C (38°F).

18.1.2 Reception of Frozen Products at Retail

Potential Hazards: *Unlikely*

Potential Defects: *Thawing, Contaminants, Filth*

Technical Guidance:

- Incoming frozen seafood should be examined for signs of thawing and evidence of filth or contamination. Suspect shipments should be refused.
- Incoming frozen seafood should be checked for internal temperatures, taken and recorded from several locations in the shipment. Frozen fish, shellfish and their products should be maintained at or below -18°C (0°F).

18.1.3 Chilled Storage of Products at Retail

Potential Hazards: *Scombrotoxin formation, microbiological contamination, pathogen growth, chemical contamination, C. botulinum toxin formation*

Potential Defects: *Decomposition, Contaminants, Filth*

Technical Guidance:

- Products in chilled storage should be held at 4°C (40°F). MAP product should be held at 3°C (38°F) or below.
- Seafood should be properly protected from filth and other contaminants through proper packaging and stored off the floor.
- A continuous temperature recording chart for seafood storage coolers is recommended.
- The cooler room should have proper drainage to prevent product contamination.
- Ready-to-eat items and molluscan shellfish should be kept separate from each other and other raw food products in chilled storage. Raw product should be stored on shelves below cooked product to avoid cross contamination from drip.
- A proper product rotation system should be established. This system could be based on first in, first out usage, production date or best before date on labels, sensory quality of the lot, etc, as appropriate.

18.1.4 Frozen Storage of Products at Retail

Potential Hazards: *Unlikely*

Potential Defects: *Chemical decomposition (rancidity), Dehydration*

Technical Guidance:

- Product should be maintained at -18°C (0°F) or less. Regular temperature monitoring should be carried out. A recording thermometer is recommended.
- Seafood products should not be stored directly on the floor. Product should be stacked to allow proper air circulation.

18.1.5 Preparation and Packaging Chilled Product at Retail

Refer to Section 8.2.3, “Labelling”.

Potential Hazards: *Microbiological contamination, Scombrotoxin formation, pathogen growth, physical and chemical contamination, allergens*

Potential Defects: *Decomposition, Incorrect Labelling*

Technical Guidance:

- Care should be taken to ensure that handling and packaging product is conducted in accordance to guidelines in Section 3, Pre-requisite Programmes.
- Care should be taken to ensure that labelling is in accordance to guidelines in Section 3, Pre-requisite Programmes and Codex Labelling Standards especially for known allergens.
- Care should be taken to ensure that product is not subjected to temperature abuse during packaging and handling.
- Care should be taken to avoid cross contamination of ready-to-eat and raw shellfish, shellfish and their products at the work areas or by utensils or personnel.

18.1.6 Preparation and Packaging of Frozen Seafood at Retail

Refer to Section 8.2.3, “Labelling”.

Potential Hazards: *Microbiological contamination, chemical or physical contamination, allergens*

Potential Defects: *Thawing, Incorrect Labelling*

Technical Guidance:

- Care should be taken to ensure that allergens are identified, in accordance to Section 3, Pre-requisite Programmes and Codex Labelling Standards.

- Care should be taken to avoid cross contamination of ready-to-eat and raw product.
- Frozen seafood products should not be subjected to ambient room temperatures for a prolonged period of time.

18.1.7 Retail Display of Chilled Seafood

Potential Hazards: *Scombrotoxin formation, microbiological growth, microbiological contamination, C. botulinum toxin formation.*

Potential Defects: *Decomposition, Dehydration*

Technical Guidance:

- Products in chilled display should be kept at 4°C (40°F) or below. Temperatures of product should be taken at regular intervals.
- Ready-to-eat items and molluscan shellfish should be separated from each other and from raw food products in a chilled full service display. A diagram of display is recommended to ensure that cross contamination does not occur.
- If ice is used, proper drainage of melt water should be in place. Retail displays should be self-draining. Replace ice daily and ensure ready-to-eat products are not placed on ice upon which raw product was previously displayed.
- Each commodity in a full service display should have its own container and serving utensils to avoid cross contamination.
- Care should be taken to avoid arranging product in such a large mass/depth that proper chilling cannot be maintained and product quality is compromised.
- Care should be taken to avoid drying of unprotected products in full service displays. Use of an aerosol spray, under hygienic conditions is recommended
- Product should not be added above the "load line" where a chilled state cannot be maintained in self-service display cases of packaged product.
- Product should not be exposed to ambient room temperature for a prolonged period of time when filling/stocking display cases.
- Seafood in full service display cases should be properly labelled by signs or placards to indicate the commonly accepted name of the fish so the consumer is informed about the product.

18.1.8 Retail Display of Frozen Seafood

Potential Hazards: *Unlikely*

Potential Defects: *Thawing, Dehydration (Freezer Burn)*

Technical Guidance:

- Product should be maintained at -18°C (0°F) or less. Regular temperature monitoring should be carried out. A recording thermometer is recommended.
- Product should not be added above the "load line" of cabinet self-service display cases. Upright freezer self-service display cases should have self-closing doors or air curtains to maintain a frozen state.
- Product should not be exposed to ambient room temperature for a prolonged period of time when filling/stocking display cases.
- A product rotation system to ensure first in, first out usage of frozen seafood should be established.
- Frozen seafood in retail displays should be examined periodically to assess packaging integrity and the level of dehydration or freezer burn.

DRAFT AMENDMENT TO THE CODEX STANDARD FOR SALTED FISH AND DRIED SALTED FISH OF THE GADIDAE FAMILY OF FISHES
(CODEX STAN 167-1989, Rev. 1-1995)
(At Step 8 of the Procedure)

7. SAMPLING, EXAMINATION AND ANALYSES

7.1 SAMPLING

(i) Sampling of lots for examination of the product shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CAC/RM 42-1969). A sample unit shall be the primary container or where the product is in bulk, the individual fish is the sample unit.

(ii) Sampling for net weight shall be carried out in accordance with the FAO/WHO Sampling Plans for the Determination of Net Weight (under elaboration).

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 Annex A and in accordance with *Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31 - 1999).*

7.3 DETERMINATION OF NET WEIGHT

The net weight (excluding packaging material and excess salt) of each sample unit in the sample lot shall be determined.

7.4 PREPARATION OF FISH SAMPLE

1. Before preparing of a subsample adhering salt crystals should be removed by brushing from the surface of the sample without using water.

2. The preparation of fish samples for the determination of salt content, and water content in order to calculate the % salt saturation of the fish should be carried out according to AOAC 937.07. The analysis should be on the edible portion of the fish.

3. Determination should be performed at least in duplicate.

7.5 DETERMINATION OF SALT CONTENT

1. Principle

The salt is extracted by water from the preweighed sample. After the precipitation of the proteins, the chloride concentration is determined by titration of an aliquot of the solution with a standardized silver nitrate solution (Mohr method) and calculated as sodium chloride.

2. Equipment and chemicals

- Brush
- Sharp knife or saw
- Balance, accurate to 0.01 g
- Calibrated volumetric flasks, 250 ml

- Erlenmeyer flasks
- Electric homoginizer
- Magnetic stirrer
- Folded paper filter, quick running
- Pipettes
- Funnel
- Burette
- Potassium hexacyano ferrate (II), K4Fe(CN)6·3H2O, 15% w/v (aq)
- Zinc sulphate, ZnSO4·6H2O, 30% w/v (aq)
- Sodium hydroxide, NaOH, 0.1 N, 0.41% w/v (aq)
- Silver nitrate, AgNO3, 0.1 N, 1.6987% w/v (aq), standardized
- Potassium chromate, K2CrO4 5% w/v (aq)
- Phenolphthalein, 1% in ethanol
- distilled or deionized water

3. Procedure

(i) Five gram of homoginized subsample is weighted into a 250 ml volumetric flask and vigorously shaken with approximately 100 ml water.

(ii) Five millilitre of potassium hexacyano ferrate solution and 5 ml of zinc sulphate solution are added, the flask is shaken.

(iii) Water is added to the graduation mark.

(iv) After shaking again and allowing to stand for precipitation, the flask content is filtered through a folded paper filter.

(v) An aliquot of the clear filtrate is transferred into an Erlenmeyer flask and two drops of

phenolphthalein are added. Sodium hydroxide is added dropwise until the aliquot takes on a faint red colour. The aliquot then diluted with water to approximately 100 ml.

(vi) After addition of approximately 1 ml potassium chromate solution, the diluted aliquot is titrated under constant stirring, with silver nitrate solution. Endpoint is indicated by a faint, but distinct, change in colour. This faint reddish-brown colour should persist after brisk shaking.

To recognize the colour change, it is advisable to carry out the titration against a white background.

(vii) Blank titration of reagents used should be done.

(viii) Endpoint determination can also be made by using instruments like potentiometer or colorimeter.

4. Calculation of results

In the equation of the calculation of results the following symbols are used:

A= volume of aliquot (ml)

C= concentration of silver nitrate solution in N

V= volume of silver nitrate solution in ml used to reach endpoint and corrected for blank value

W= sample weight (g)

The salt content in the sample is calculated by using the equation:

Salt concentration (%) = (V x C x 58.45 x 250 x 100) / (A x W x 1000)

Results should be reported with one figure after the decimal point.

5. Reference method

As reference method a method should be used which includes the complete ashing of the sample in a muffle furnace at 550°C before chloride determination according to the method described above (leaving out steps (ii) and (iv)).

6. Comments

By using the given equation all chloride determined is calculated as sodium chloride. However it is impossible to estimate sodium by this methodology, because other chlorides of the alkali and earth alkali elements are present which form the counterparts of chlorides.

The presence of natural halogens other than chloride in fish and salt is negligible.

A step, in which proteins are precipitated (ii), is essential to avoid misleading results.

7.6 DETERMINATION OF WATER CONTENT

i) Determination of % salt saturation as required by the standard, should be in accordance to AOAC 950.46.B (Airdrying (a))

ii) Determination of water content in the whole fish, when needed in the commercial trade of klippfish and wet salted fish, the method of sampling the fish should be carried out according to the "Determination of Water Content in Whole Fish by Cross Section Method" defined in "Annex B".

ANNEX B

DETERMINATION OF WATER CONTENT IN WHOLE FISH BY CROSS SECTION METHOD

1 Principle

The fish is cut in sections as described in method. The sections are cut in smaller bits to a collected

sample. The water content of the collected sample is determined by drying. Examinations and experience have shown that the water content of this collected sample is closed to the “true” water content of the fish.

2 Equipment

- Soft brush
- Basins (steel, glass, porcelain)
- Scissors
- Band saw
- Knife
- Weight, 1 g precision
- Oven. 103-105°C
- Desiccator

3 Preparation of sample

Salt particles on the surface of the fish are brushed away.

The weight of the fish is determined to 1 g accuracy.

The length of the fish is measured as the distance between the cleft in the tail and a line drawn between the tips of the earbones.

4 Procedure

(i)

The sampling of the fish is described in the enclosed figure.

A) Wet salted fish is sliced in sections by knife

B) Salted and dried salted fish is sliced in sections by band saw.

1) A section of 20mm measured from a line drawn between the earbones, dotted line on figure, is cut.

2) The next cut is a 40 mm section.

3) A 2 mm section is cut from the front part of the 40 mm section and collected (see 7. Comments).

4) The next cut is a new cut of a 40 mm section.

5) A 2 mm section is cut from the front part of the 40 mm section and collected.

6) The entire fish is cut in 40 mm sections from which are cut 2 mm sections (see enclosed figure).

7) All sections of 2mm, marked II, IV, VI, VIII in the figure, even numbers, are collected to a collected sample.

(ii)

The 2mm sections in the collected sample are cut with scissors in smaller pieces directly in tared basins just after the fish is cut.

(iii)

The basins containing the sample are weighted.

(iv)

The basins containing the samples are put in the oven at 103-105°C for drying to constant weight (18 hours over night).

(v)
The basins are taken from the oven to a desiccator and cooled.

(vi)
The basins are weighted.

5. **Calculation of results**

In the equation of the calculation of results the following symbols are used:

W1 = Weight of fish and basins before drying, g.

W2 = Weight of fish and basins after drying, g.

Ws = Weight of tared basins, g

The water content in the fish is calculated by using the equation:

Water content, g/100g = 100*(W1-W2)

(W1 – Ws)

The result is reported to the nearest gram, together with the length and the weight of the analysed fish.

6. **Control analysis of whole fish**.

The determination of water content in whole fish by cross section method appears to give the closest result compared to water content determined by the drying of the whole fish (ALINORM 03/18, Appendix IX)

7. **Comments**

Each sampled fish should be packed and sealed in a plastic bag before analysis. The samples should be stored under chilled or refrigerated conditions from the time of sampling to the time of analysis.

The analysis must be performed as soon as possible after the fish has been sampled.

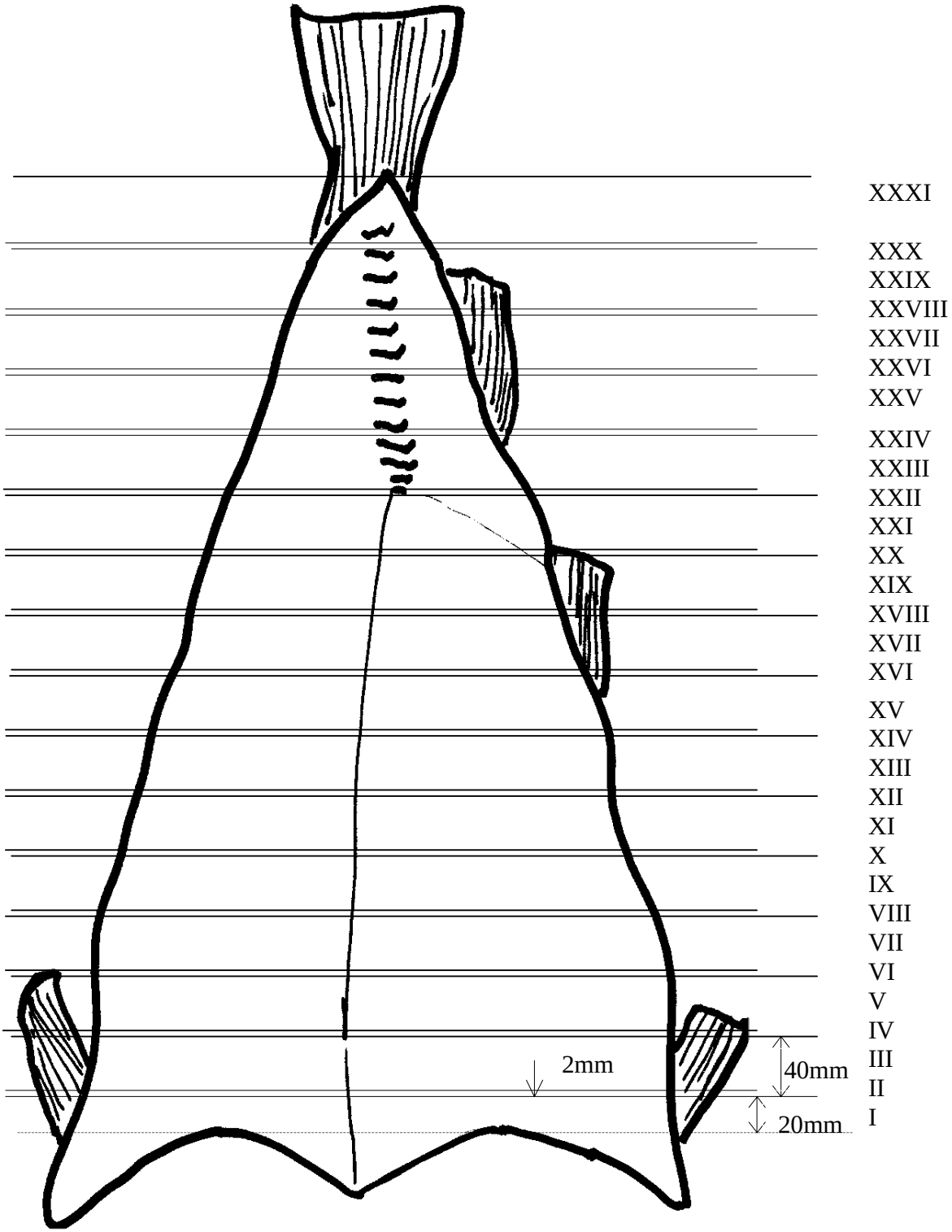
It might be difficult to cut sections of 2 mm when the fish has a water content above 50% but the section must be close to 2 mm.

To minimise the loss of water from the 2mm sections it is important to weight the collected sample immediately after the fish is cut in sections.

Determination should be performed at least in duplicate.

FIGURE

Sampling procedure.



All section labelled by even numbers , II, IV,VI,VIII etc. are collected to constitute one sample.

PROPOSED DRAFT STANDARD FOR READY-TO-EAT SMOKED FISH
(At Step 3 of the Procedure)

1. SCOPE

This standard applies to chilled or frozen, ready-to-eat hot or cold smoked finfish (herein after referred to as "fish"). The standard applies to whole fish, fillets and sliced and similar products thereof either for direct consumption or for addition into specialty or minced products where hot or cold smoked fish constitutes only part of the edible contents. It does not apply to fish treated with carbon monoxide (filtered or 'tasteless' smoke), fish packaged in hermetically sealed containers processed to commercial sterility, speciality or minced products where hot or cold smoked fish constitutes only a part of the edible contents.

2. DESCRIPTION

2.1 Product definition

Smoked fish is prepared from fresh or frozen fish treated with smoke. It should have smoked sensory characteristics.

Countries where the product are to be consumed may allow this product in an uneviscerated state or may require evisceration , either before or after processing, since the margin of error in the control of Clostridium botulinum is small even when good practices are followed and the consequences are severe. The product is either intended for direct human consumption or for further processing.

2.2 Process definition

- Salting – The fish used for smoked fish may be salted before smoking. Salting may be done by dry salting, brining by immersion or brining by injection, or any combination thereof.
- Hot Smoking - Fish are treated with smoke generated from burning and or smouldering wood or any other plant material at a temperature which will cause the complete coagulation of the fish flesh
- Cold Smoking – Fish are treated with smoke generated from smouldering wood or any other plant material at a temperature which will not cause visible coagulation of the flesh.
- Liquid Smoking - Fish are treated with liquid smoke, regenerated from smoke condensates [in a smoking chamber under the same time and temperature conditions as for hot or cold smoking].
- Packaging – Smoked fish may be packed aerobically or under reduced oxygen conditions, including under vacuum or in a modified atmosphere.
- Freezing (see Section 2.2 of the Standard 166-1989, Rev. 1-1995)
- Storage – Smoked fish is typically stored refrigerated (0^oC to 5^oC), super-chilled (-3^oC to 0^oC) or frozen ($\leq -18^oC$).

The selection made for packaging, storage and salt in water phase, can have the effect of preventing some microbiological hazards (see Section 5.6).

2.3 Presentation

Any presentation of the product shall be permitted provided that it meets all requirements of this standard, and it is adequately described on the label to avoid confusing or misleading the consumer.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 The raw material

Smoked fish shall be prepared from sound and wholesome fish, which may be fresh or frozen, and of a quality to be sold for human consumption after appropriate preparation. Fish flesh shall not be obviously infested by parasites.

3.2 Ingredients

All ingredients used shall be of food grade quality and conform with all applicable Codex standards.

3.3 Wood or other plant material for generation of smoke

Wood or other plant material used for generation of smoke must not contain toxic substances either or naturally through contamination or after having been treated with chemicals, paint or impregnating materials. Wood or other plant material should also be free from any visible microbiological or fungal growth.

3.4 Liquid Smoke

Liquid smoke should be generated from wood and other plant material of a quality according to Section 3.3, and should be approved for food use.

3.5 Final product

Products shall meet the requirements of this standard when lots examined in accordance with section 9, comply with the provisions set out in section 8. Products shall be examined by the methods given in section 7.

3.6 Decomposition

The product shall not contain more than 10 mg of histamine per 100g fish flesh based on the average of the sample unit tested. To be further elaborated.

4. FOOD ADDITIVES

[All additives used shall be of food grade quality and conform with all applicable Codex standards. Food additives to be allowed in smoked fish to be elaborated.]

5. HYGIENE AND HANDLING

Codes of Practice

[It is recommended that the] products covered by the provisions of this standard [shall] 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 practice and codes of hygienic practice, as follows;

(i) the Recommended International Code of Practice for Fish and Fishery Products (CAC/RCP XX-2002)

5.2 Microbiological Criteria

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

5.3 Other Substances

The products 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.

5.4 Parasites

Smoked fish products shall not contain living parasites (e.g. larvae of nematodes).

Viability of nematodes shall be examined according to Annex 2. If living nematodes are confirmed, products must not be placed on the market for human consumption before they are treated in conformity with the methods laid down in Annex 3.

5.5 *Listeria monocytogenes*

This section has to be elaborated.

[The issue of *L. monocytogenes* in foods is being addressed by Codex in a separate document titled "Proposed Draft Guidelines on the Application of General Principles of Food Hygiene to the [Management] of *Listeria monocytogenes* in foods" by the CCFH Drafting Group Listeria (CX/FH 04/7).]

5.6 *Clostridium botulinum*

Toxins of *Clostridium botulinum* are not allowed in smoked fish products. The formation of *Clostridium botulinum* toxin can be controlled through an application of science-based options involving packaging type,

storage temperature, and the use of salt in the water phase. The table shown in Annex 1 addresses these control options.

5.7 Histamine

No sample unit shall contain histamine that exceeds 20 mg/100g fish muscle

5.8 Foreign Material

The final product shall be free from any foreign material that poses a threat to human health.

6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Pre-packed Foods CODEX STAN 1-85, Rev. 1-1991) the following specific provisions apply.

6.1 Name of the Food

6.1.1 The name of the product as declared on the label shall contain the word "Smoked" in combination with the name of the fish appropriate to the species of the fish in accordance with the law, custom or practice in use in the country of distribution, and in a manner not to mislead the consumer.

[Where liquid smoke is used, it must be declared on the label.]

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

6.2 Storage Instructions

The label must contain storage instructions for the product.

6.3 Labelling of Retail Packages

[It must be clearly stated on the labelling, if the final product has been kept in storage in frozen condition, but is then thawed prior to sale and sold as a refrigerated product.]

6.4 Labelling of Non-retail Containers

Information on the above mentioned provisions should be given on the container as well as the lot identification and the identification of the manufacturer and the country of origin.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 Sampling

Sampling of lots for examination of the product for quality shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepacked Foods (AQL-6.5) CODEX STAN 233-1969.

A sample unit is the primary container or for individually packed products at least a 1 kg portion of the sample unit.

The sampling of lots for microbial and parasitical analysis will be in accordance with the principles in the guidelines for sampling under development by CCMAS.

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 7.3 through 7.5 and the "Code of Practice for the Sensory Evaluation of Fish and Shellfish."

7.3 Determination of Histamine

AOAC 977.13 (most recent edition) or other scientifically equivalent validated method.

7.4 Determination of Dead Parasites

The entire sample unit is examined non-destructively by the naked eye for the presence of dead parasites and trace of their activity such as gelatinised parts of the flesh (See Annex 4).

7.5 Determination of Net Weight

The net weight is determined as the weight of the product, exclusive of packaging material, interleaving material, etc. The average net weight of all sample units is not less than the declared weight.

7.6 Procedure for Thawing

Frozen smoked fish shall be thawed at < 5°C.

8. DEFINITION OF DEFECTIVES

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

8.1 Microbiological Defects

[The issue of *L. monocytogenes* in foods is being addressed by Codex in a separate document titled "Proposed Draft Guidelines on the Application of General Principles of Food Hygiene to the [Management] of *Listeria monocytogenes* in foods" by the CCFH Drafting Group Listeria (CX/FH 04/7).]

8.2 Foreign matter

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

8.3 Parasites

The presence of any live parasites in a sample of the edible portion (see Annex 2).

8.4 Odour and Flavour

Persistent and distinct objectionable odours or flavours characteristic for decomposition, rancidity, burning sensation or other sensory impressions not characteristic of the product.

9. LOT ACCEPTANCE

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

(i) The total number of defectives as classified according to Section 8 does not exceed the acceptance number (c) of the appropriate sampling plan in the Sampling Plans for Pre-Packed Foods (AQL-6.5) - (CODEX STAN 233-1969);

(ii) The average net contents of all packages examined are not less than the declared weight, and no individual container is less than 95% of the declared weight; and

(iii) The Food Additives, Hygiene and Handling and Labelling requirements of Sections 4, 5 and 6 are met.

ANNEX 1
Control and Prevention of *Clostridium botulinum* Toxin Formation.

Countries where the products are to be consumed can be expected to make their science-based risk management choices within this framework, i.e., select some options and exclude others, based on conditions within the country (e.g., nature and enforcement of refrigeration and shelf life controls; transportation times and conditions; variability in amount of salt in the water phase that could occur despite best efforts to achieve a required percentage, etc.), and the level of protection that the country chooses for itself for this particular risk.

Storage Temp	Packaging	Water Phase Salt*	Comments
[(0°C to 3°C)]	Any	No minimum water phase salt is needed.	Temperature monitoring required on each package
[(>3°C to 5°C)]	Aerobically Packaged	No minimum water phase salt is needed. Nonetheless, where there is a reasonable possibility of severe time/temperature abuse, the country where the product is being consumed might choose a water phase salt barrier of at least 3% to 3.5% as a precautionary measure.	Storage temperature is for the control of pathogens generally and for quality. In air-packaged products, aerobic spoilage organisms provide sensory signs of spoilage before the formation of toxin by *C. botulinum.* However, even in air packaging it is possible for anaerobic micro-environments to exist and toxin may form if the product is subject to severe time/temperature abuse. For that reason, the country where the product is consumed may still require water phase salt as a barrier to growth of non-proteolytic strains of *C. botulinum* if there are concerns about the ability of transporters, retailers or consumers to maintain time/temperature control.
Frozen (< or = -18°C)	Reduced Oxygen (inlcuding vacuum packaging and modified atmosphere Packaging**)	No minimum water phase salt is needed for safety.	*C. botulinum* toxin cannot form when product is frozen. Because toxin production can occur after thawing, labelling information about the need to keep frozen, to thaw under refrigeration, and to use the product immediately after thawing is important.
[(>3°C to 5°C)]	Reduced Oxygen (inlcuding vacuum packaging and modified atmosphere packaging)	Water phase salt at minimum level of between 3% & 3.5% may be selected by the country where the product is to be consumed.	Water phase salt at a minimum level of between 3 and 3.5% (water phase salt) in combination with chilling will significantly delay (or prevent) toxin formation.
[>5°C to 10°C]	Reduced Oxygen	5% Water Phase Salt	Non-proteolytics (*C. botulinum*) are controlled under these conditions.

*As an alternative to water phase salt, time/temperature controls alone may be used. *C botulinum* cannot grow and produce toxin at or below 3ºC. Other time/temperature combinations exist that similarly control the formation of toxin (Skinner,G.E. and Larkin,J.W. (1998) Conservative prediction of time to *Clostridium botulinum* toxin formation for use with time-temperature indicators to ensure the safety of foods. *Journal of Food Protection* **61**, 1154-1160). Where enforcement of shelf life as well as consumer acceptance of shelf life are norms, the country may select a system that relies on the combination of existing storage temperature conditions (i.e. during transport, retail storage, and consumer storage) and shelf life limitations.

However, in countries where consumer acceptance and regulatory enforcement of shelf life are not norms, continuous monitoring, such as that provided by time/temperature integrators on consumer packages, may be selected as a control by the country where the product will be consumed. The necessity for time/temperature integrators exists because, unlike freezing, temperature control through refrigeration is not a visual condition and cannot be determined without an additional monitoring control.

**As new technologies are developed, e.g. modified atmosphere with high oxygen, new controls may be defined.

ANNEX 2

VIABILITY TEST FOR NEMATODES

Principle:
Nematodes are isolated from fish fillets by digestion, transferred into 0.5 % Pepsin digestion solution and inspected visually for viability. Digestion conditions correspond to conditions found in the digestive tracts of mammals and guarantee the survival of nematodes.

Equipment:
- Stacked sieves (diameter: 14 cm or larger, mesh size: 0.5 mm)
- Magnetic stirrer with thermostated heating plate
- normal laboratory equipment

Chemicals:
- Pepsin 2000 FIP-U / g
Hydrochloric acid

Solution:
A: 0.5 % (w/v) Pepsin in 0.063 M HCl

Procedure:
Fillets of approximately 200 g are manually shredded and placed in a 2 l beaker containing 1 l Pepsin solution A. The mixture is heated on a magnet stirrer to 37 °C for 1- 2 h under continuous slow stirring. If the flesh is not dissolved, the solution is poured through a sieve, washed with water and the remaining flesh is quantitatively replaced in the beaker. 700 ml digestion solution A is added and the mixture stirred again under gentle heating (max. 37°C) until there are no large pieces of flesh left.
The digestion solution is decanted through a sieve and the content of the sieve rinsed with water.

Nematodes are carefully transferred by means of small forceps into Petri dishes containing fresh Pepsin solution A. The dishes are placed on a candling dish, and care has to be taken not to exceed 37 °C.

Viable nematodes show visible movements or spontaneous reactions when gently probed with dissecting needles. A single relaxation of coiled nematodes, which sometimes occurs, is not a clear sign of viability.
Nematodes must show spontaneous movement.

Attention:
When checking for viable nematodes in salted or sugar salted products, reanimation time of nematodes can last up to two hours and more.
Remarks:
Several other methods exist for the determination of viability of nematodes (e.g. ref. 2, 3).
The described method has been chosen because it is easy to perform and combines isolation of nematodes and viability test within one step.

References:
1. Anon.: Vorläufiger Probenahmeplan, Untersuchungsgang und Beurteilungsvorschlag für die amtliche Überprüfung der Erfüllung der Vorschriften des § 2 Abs. 5 der Fisch-VO. Bundesgesundheitsblatt 12, 486-487 (1988).

2. Leinemann, M. and Karl, H.: Untersuchungen zur Differenzierung lebender und toter Nematodenlarven (Anisakis sp.) in Heringen und Heringserzeugnissen. Archiv Lebensmittelhygiene 39, 147 – 150 (1988).

3. Priebe, K., Jendrusch, H. and Haustedt, U.: Problematik und Experimentaluntersuchungen zum Erlöschen der Einbohrpotenz von Anisakis Larven des Herings bei der Herstellung von Kaltmarinaden. Archiv Lebensmittelhygiene 24, 217 – 222 (1973).

ANNEX 3

Procedures sufficient to kill nematodes

Where freezing is required as a Critical Control Point to kill parasites the fish must be frozen either before or after the cold smoking to sufficiently kill the living parasites. This process must be performed at a minimum of -20º C for 24 hours or a minimum of -35º C for 15 hours.

ANNEX 4

Determination of the presence of visible parasites

1. The presence of readily visible parasites in a sample unit that is broken into normal bite-size pieces 20 - 30 mm of flesh by the thickness of the fillet. Only the normal edible portion is considered even if other material is included with the fillet. Examination for evidence of parasites should be done in an adequately lighted room (where a newspaper may be read easily), without magnification.

Or

2. The entire sample unit is examined non-destructively by placing appropriate portions of the thawed (if necessary) sample unit on a 5mm thick acryl sheet with 45% translucency and candled with a light source giving 1500 lux 30 cm above the sheet.

PROPOSED DRAFT STANDARD FOR STURGEON CAVIAR
(At Step 5 of the Procedure)

1. SCOPE

This standard applies to sturgeon caviar of the fish of the *Acipenseridae* family only.

2. DESCRIPTION

2.1. DEFINITIONS

The following definitions are used in this standard:

Fish eggs: product obtained from ovocytes separated from the connective tissue of ovary.

Caviar: the product made from fish eggs of the *Acipenseridae* family by treating with salt or mixture of salt with a food additive.

Oocytes maturation stage lV: oocytes coming from ovaries which have reached maximum size, and in which fat deposits are absent, or there are thin layers of fat, and where the grain eggs can be easily separated from the connective tissue.

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).
The product is made with addition of salt and/or with, or without food additives, and is intended for direct human consumption.

2.3 Process Definition

2.3.1 The product shall be prepared by using appropriate preliminary processing of caviar-grain to be salted with food grade salt, with or without food additives, packed in containers, and chilled to the temperatures so as to maintain the quality during storage, transportation and marketing.
The product shall be packed in:

- metal tins coated inside with stable food lacquer or enamel;
- glass jars.
- other suitable containers.

2.3.2 Industrial 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 product shall be packaged so as to minimize the time that the caviar remains unpacked in order to prevent its warming and microbial contamination, as well as physical contamination.

2.4 HANDLING PRACTICE

Caviar is produced from fish oocytes which have reached maturation stage IV extracted from the sturgeon fishes under appropriate sanitary conditions. The fish eggs are separated from the connective tissue of ovary. If appropriate, it is kept until processing in closed containers in refrigerating chamber at a temperature from – 1 ^{0}C to + 2 ^{0}C for no more that 8 hours.

Caviar-grain is sorted by quality, colour and size. Before salting it is washed out in potable cooled water to remove clots of blood and fat, squashed egg and film pieces. Washed roe is immediately directed to be drained.

Then it is treated with food grade salt with/without additives. All the above mentioned technological operations shall be performed without delay to avoid microbial spoiling.

Preparation of caviar shall comply with the International Code of Practice for Caviar (to be elaborated).

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Raw Material

Caviar shall be prepared from ovaries extracted from sturgeons of biological species of the genera described in Section 2.2, which are of a quality acceptable for human consumption.

3.2 Other Ingredients

Potable water should comply with the WHO Guidelines for Drinking Water quality. Salt and other ingredients shall be of food grade quality and conform to all applicable Codex Standards.

3.3 Final Product

3.3.1 By its sensory and chemical characteristics the product shall comply with the requirements prescribed in Table 1

Table 1

Index	Characteristics and norms
Appearance	Eggs of about one size
Color	Even and characteristic of roe from the given biological species: from light gray to black, or from light yellow to yellowish gray. Yellowish and brownish shades are permissible
Consistence and state	Eggs can be easily separated from each other
Taste and odour	Characteristic of fish eggs from the given biological species; without foreign taste and odour
Salt, %	3.5 – 5.0
Foreign matter	Unacceptable

3.3.2 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 The following food additives shall be used:

Boric acid (INS 284): maximum level 4g/kg (expressed in boric acid).

Sodium tetraborate (INS 285): maximum level 4g/kg (expressed in 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).

7. LABELLING

7.1 Labelling of the product and the name of caviar shall be in accordance with the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1-1991).

The labeling requirements of this standard should apply without prejudice of the implementation of CITES recommendations.

The name of the product shown on the label shall be «caviar», or «sturgeon caviar» and shall be in compliance with the laws and traditions of the country where the product is distributed.

7.2 For caviar made from sturgeon species with such common names as beluga, kaluga, sturgeon, starred sturgeon, starlet and barbel sturgeon the name of the fish may be included in the name of the product before or after the word caviar, e.g. « Kaluga caviar».

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 B, e.g. «Sturgeon caviar».

For hybrids the common name shall be supplemented with the word hybrid, and the parent sturgeon species may be shown according to Annex B, e.g. «Hybrid sturgeon caviar» or «Sturgeon HUSXRut hybrid caviar».

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 Source identification

[The data on the source of origin of raw fish shall be shown in the immediate vicinity of the name of the product only in the case of aquaculture produced sturgeon product, e. g. « Product of aquaculture».]

7.5 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).

8.2.1.Sensory and Physical/Chemical Examination.

Samples taken for sensory and physical/chemical examination shall be assessed by experts 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).

8.2.2.Determination of Net Weight

The net weight of each sample unit shall be determined in accordance with the following procedure:

• container filled with the product shall be swept dry and weighed;

• container shall be opened, and freed from caviar;

• empty container with a lid, (and packing material, if available), cleaned of the product, washed and dried, shall be weighed;

• subtract the weight of the empty container with a lid (and packing material, if available) from the weight of the container with the product, and determine the net weight of product.

8.2.3. The weight share of salt shall be determined using the method developed for salted fish.

9. DEFINITION OF DEFECTS

The sample unit shall be considered as defective when it exhibits any of the properties defined in Sections 9.1- 9.3.

9.1 Foreign matter

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

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 sturgeon reared in aquaculture), or contamination by foreign (such as fuel oil).

9.3 Consistency and Condition

Hard cover of caviar grains is not easily chewable, or tenuous, destroyed when the grains are separated from one another.

9.4. Extraneous material

Membranes and fat clusters shall be absent from 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

SENSORY AND PHYSICAL EXAMINATION

The samples used for sensory evaluation should not be same as those used for other examination.
1.Examine the sample unit for foreign matter.

2. Assess the odour in the uncooked sample in accordance with the guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

3. Assess the flavour in sample in accordance with the Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

ANNEX B

IDENTIFICATION CODES OF STURGEON SPECIES
Table B.1

Denomination of sturgeon fishes Scientific names	Code
Huso huso	HUS
Huso dauricus	DAU
Acipenser naccari	NAC
Acipenser transmontanus	TRA
Acipenser schrenkii	SCH
Acipenser sturio	STU
Acipenser baerii baikalensis	BAI
Acipenser sinensis	SIN
Acipenser dabryanus	DAB
Acipenser persicus	PER
Acipenser brevirostrum	BVI
Acipenser fulvescens	FUL
Acipenser oxyrhynchus	OXY
Acipenser oxyrhynchus desotoi	DES
Acipenser gueldenstaedtii	GUE
Acipenser medirostris	MED
Acipenser baerii	BAE
Acipenser micadoi	MIK
Acipenser stellatus	STE
Acipenser ruthenus	RUT
Acipenser nudiventris	NUD
Pseudoscaphirhynchus fedtschenkoi	FED
Pseudoscaphirhynchus hermanni	HER
Pseudoscaphirhynchus kaufmanni	KAU
Scaphirhynchus platorhynchus	PLA
Scaphirhynchus albus suttkusi	ALB
Scaphirhynchus suttkus	SUS
Hybrids: female species code x *male species code code*	YYY x XXX

PROPOSED DRAFT STANDARD FOR QUICK FROZEN SCALLOP ADDUCTOR MUSCLE MEAT (At Step 3 of the Procedure)

1. SCOPE

This standard applies to quick frozen raw scallop adductor muscle meat[1] in which the shell, viscera and roe have been removed and which are intended for direct human consumption or for further processing. This standard does not cover scallop meat bound by fibrinogen or other binders.

Live scallops and scallop meat in which the shell, viscera and roe are attached shall meet the requirements that apply to live and processed bivalve molluscs in the Proposed Draft Standard for Live and Processed Bivalve Mollusc (*under elaboration*).

2. DESCRIPTION

2.1 Product definition

Quick frozen scallop meat is prepared by completely removing the adductor muscle from the shell and completely detaching the viscera and/or roe from the adductor muscle of live scallops belonging to the Pectinidae family.

2.2 Process definition

The product after any suitable preparation shall be subjected to a freezing process and shall comply with the conditions laid down hereafter. The freezing process shall be carried out in appropriate equipment in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18°C or colder at the thermal centre after thermal stabilization. The product shall be kept deep frozen so as to maintain the quality during transportation, storage and distribution.

The recognized practice of repacking quick frozen products under controlled conditions which will maintain quality of the product, followed by the reapplication of the quick freezing process as defined, is permitted.

These products shall be processed and packaged so as to minimize dehydration and oxidation.

2.3 Presentation

2. 3.1 Any presentation of the product shall be permitted provided that:

- It meets all requirements of this standard, and it is adequately described on the label to avoid confusing or misleading the consumer, and;
- The scallop meat may be packed by count per unit weight or, as “pieces”or terms to that effect if the scallop meat pack exhibits the presence of broken pieces that is > 5% of the sample weight.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Scallop Meat

The product shall be prepared from sound and wholesome scallops of the *Pectinidae* family which are of a quality suitable to be sold fresh for human consumption.

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[1] Hereafter referred to as scallop meat

3.2 Glazing

If glazed, the water used for glazing or preparing glazing solutions shall be of potable quality. 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." Sea water used for glazing must meet the same microbiological standards as potable water and is free from objectionable substances.

3.3 Final Product

3.3.1 Products shall meet the requirements of this standard when lots examined in accordance with Section 9 comply with the provisions set out in Section 8. Products shall be examined by the methods given in Section 7.

3.3.2

EXAMPLE # 1

["It is a legitimate objective for a country to establish a moisture limit such as moisture content, moisture protein ratio, in scallop meat to prevent economic fraud and unfair trade practices.

It is not an acceptable practice to process and/or store scallop meat in such a manner that would result in the uptake of water.

In order to meet this objective, harvesting, storage and processing of scallop meat must be adequately controlled in accordance with good manufacturing practices."]

["A country may establish a scientifically supported and technically feasible moisture limit for their domestic requirements based on the above principles. Where an exporting country has relevant scientific information on the moisture standard of their scallops, they may approach an importing country to discuss the standard on a species by species basis."]

EXAMPLE # 2

["It is not an acceptable practice to process and/or store scallop meat in such a manner that would result in the uptake of water.(*)

In order to prevent economic fraud and unfair trade practices, harvesting, storage and processing must be conducted in accordance with good manufacturing practices.

(*) In order to check the conformity with this provision, a country may establish a scientifically supported criterion. Where a country has relevant scientific information on the characteristics of the scallop species it exports, it may approach an importing country to discuss the implementation of this criterion on a species by species basis."]

4. FOOD ADDITIVES

[No food additives are permitted in these products**]**.

5. HYGIENE AND HANDLING

5.1 The final product shall be free from any foreign material that poses a threat to human health.

5.2 **[**For scallops that have been determined to accumulate marine biotoxins in the adductor muscle meat at levels that poses a threat to human health**]**, their meat must comply with the biotoxin provisions set out in Section 5 and as sampled and analyzed by methods given in Section 7 of the "Proposed Draft Standard for Live and Processed Bivalve Molluscs (*under elaboration*)"

5.3 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. 3, 1997) and other relevant Codex texts such as:

(i) the Revised Code of Practice for Fish and Fishery Products (*under elaboration*);

(ii) the Recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976).

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

5.5 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. 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:

6.1 Name of the Food

6.1.1 The name of the product as declared on the label shall be the common or usual name of the species of scallops according to the law, custom and practice in the country in which the product is to be distributed in a manner not to mislead the consumer.

6.1.2 There shall appear on the label, reference to the form of presentation described in Section 2.3.3, in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation to avoid misleading or confusing the consumer.

6.2 Net Contents (Glazed Products)

Where the food has been glazed the declaration of net contents shall be exclusive of the glaze.

6.3 Storage Instructions

The label should include terms to indicate that the product shall be stored at a temperature of -18°C or colder for describing the product processed in accordance with subsection 2.2 of this standard.

6.4 Labelling of Non-Retail Containers

Information specified above shall be given either on the container or in accompanying documents, except the name of the food, lot identification, and the name and address as well as storage instructions shall always appear on the container.

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.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 Sampling

1 Sampling of lots for examination of the product shall be in accordance with the General Guidelines on Sampling (CAC/GL 50-2004). The sample unit is the primary container, or for individually quick frozen products or bulk packaged, is at least a 1 kg portion of the sample unit.

(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.

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 Section 7.3 through 7.7 and Annexes, and in accordance with the Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

7.3 Determination of Count and Pieces

When declared on the label, the count of the scallop meat shall be determined by counting the numbers of scallop meat in the container or representative sample thereof and dividing the count of scallop meat by the actual de-glazed weight to determine the count per unit weight.

A scallop meat shall be considered a scallop piece when the weight of that scallop meat is less than 50% of the average weight of 10 unbroken scallop meats contained in the pack. The percentage of scallop pieces in the sample unit can be determined by using the following equation:

$$\%\,\text{Scallop Pieces} = \frac{\Sigma\ \text{weight of scallop pieces in a sample unit x } 100}{\text{weight of sample unit}}$$

7.4 Determination of Net Weight of Products Covered by Glaze

Remove surface glaze from the scallop meat under running water until no ice can be felt by the finger tips on the surface of the scallop meat but it is evident that the ice crystals remain within the product (i.e. the interior of the product remains frozen). Block frozen product should be gently separated to individual scallop meat or scallop pieces and ice within the block should be removed until the surface of the product is free of ice (from slippery to rough). Place the scallop meat on a sieve of appropriate size and drain for 1 to 1½ minutes. Weigh the product in a tared pan.

7.5 Determination of Moisture

Deglaze the scallop meat using procedures elaborated in Section 7.4 and obtain a total of approximately 100 g of scallop meat from the five sample units. Comminute the 100 g sample until a homogenous blend is attained. Collect the homogenized sample into a clean, sealable plastic cup or glass bottle. Store the sample in a refrigerator or freezer until required. Ensure that the prepared sample is still homogeneous prior to weighing. If liquid separates from the sample, reblend before use.

Accurately weigh a moisture dish of appropriate size. Add approximately 10 g of the comminuted sample and reweigh. Place the container in a vacuum oven at 100°C and less than 100 mm Hg for approximately 5 hours. Remove dish from the oven, cover, cool in desiccator, and weigh. Redry 1 hr and repeat process until constant weight has been achieved, i.e., change in weight between successive dryings at 1 hour intervals is < 5 mg. The moisture content can be determined by using the following equation:

$$\%\,\text{Moisture} = \frac{\text{weight of sample} - \text{weight of dried sample}}{\text{total weight}}\,\text{x}\,100$$

7.6 Procedures for Thawing

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 scallop meat until no hard core or ice crystals are left.

7.7 Cooking Methods

The following procedures are based on heating the product to an internal temperature of 65 - 70 °C. The product must not be overcooked. Cooking times vary according to the size of the product and the temperature used. The exact times and conditions of cooking for the product should be determined prior to experimentation.

Baking Procedure: Wrap the product in aluminium foil and place it evenly on a flat cookie sheet or shallow flat pan.

Steaming Procedure: Wrap the product in aluminium foil and place it on a wire rack suspended over boiling water in a covered container.

Boil-in-Bag Procedure: Place the product into a boilable film-type pouch and seal. Immerse the pouch in boiling water and cook.

Microwave Procedure: Enclose the product in a container suitable for microwave cooking. If plastic bags are used, check to ensure that no odour is imparted from the plastic bags. Cook according to equipment instructions.

8. DEFINITION OF DEFECTIVES

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

8.1 Deep Dehydration

Greater than 10% of the weight of the scallop meat or greater than 10% of the surface area of the block exhibits excessive loss of moisture clearly shown as white or yellow abnormality 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 a sharp instrument without unduly affecting the appearance of the product.

8.2 Foreign matter

The presence in the sample unit of any matter which has not been derived from scallops, 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.

8.3 Odour/Flavour

Scallop meat affected by persistent and distinct objectionable odours or flavours indicative of decomposition and/or rancidity.

[8.4 Parasites

(To be elaborated)]

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 8 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004) ;

(ii) where appropriate, the total number of sample units not meeting the count designation or presentation as defined in section 2.3.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the Guidelines on Sampling (CAC/GL 50-2004);

(iii) the moisture content of the scallop meat requirement of Section 3.3.2 is met;

(iv) 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; and

(v) the Food Additives, Hygiene and Handling and Labelling requirements of Sections 4, 5.1, 5.2, 5.4, 5.5 and 6 are met.

ANNEX A

SENSORY AND PHYSICAL EXAMINATION

Complete net weight determination, according to defined procedures in Section 7.4.

Examine the frozen scallop meat in the sample unit or the surface of the block for the presence of dehydration. Determine the percentage of scallop meat or surface area affected.

Thaw using the procedure described in Section 7.6 and individually examine each scallop meat in the sample unit for the presence of foreign matter and presentation defects. Determine the weight of scallop meat affected by presentation defects.

Examine product for count declarations in accordance with procedures in Section 7.3.

Assess the scallop meat for odour and **[**parasites**]** as required.

In cases where a final decision regarding the odour cannot be made in the thawed state, a small portion of the sample unit (100g to 200g) is prepared without delay for cooking and the odour/flavour confirmed by using one of the cooking methods defined in Section 7.7.

PROPOSED DRAFT STANDARD FOR LIVE AND NON-VIABLE BIVALVE MOLLUSCS PROCESSED FOR DIRECT CONSUMPTION OR FOR FURTHER PROCESSING[1]

(At Step 3 of the Procedure)

1. SCOPE

This standard applies to live bivalve molluscs and non-viable, bivalve molluscs that have been shucked and/or frozen, and/or processed to eliminate target organisms while essentially retaining the sensory characteristics of live products. These bivalve molluscs may be intended for direct consumption or further processing. In the case of scallops, adductor muscle is excluded.

Part I below applies to live bivalve molluscs. Part II applies to non-viable bivalve molluscs that have been shucked and/or frozen, and/or processed to eliminate target organisms.

PART I

I-2. DESCRIPTION OF LIVE BIVALVE MOLLUSCS

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 shall be organisms which are harvested alive for direct human consumption from an approved growing area and/or from an another appropriately classified area followed by an approved purification process such as natural container (raft, float or tank) relaying or depuration or from an approved purification centre. The approval mentioned in this subsection must be given 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 Live Bivalve Molluscs

Bivalve molluscs shall be of a quality fit for human consumption.

I-3.2 Other Ingredients

Ice, if used for packing, shall be made from water of acceptable quality.

I-3.3 Final Product

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

I-4. FOOD ADDITIVES

Food additives are not permitted in live bivalve molluscs.

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[1] This document was elaborated during the 27th Session of the CCFFP at the initiative of several delegations and agreement was reached on the principle of separating it into two parts. Nevetherless, a number of technical details still need to be explored.

I-5. HYGIENE AND HANDLING

I-5.1 The final product shall be free from any foreign material that poses a threat to human health.

I-5.2 Live bivalve molluscs should possess visual characteristics associated with freshness and viability, including shells free of dirt, an adequate response to percussion, and normal amounts of intravalvular liquid as determined by product specialists familiar with the species."

I-5.3 When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission (CAC), the following requirements shall be met:

(i) Bivalve molluscs shall be free from micro-organisms or substances originating from micro-organisms in amounts which may present a hazard to health in accordance with standards established by the CAC.

(ii) [Bivalve molluscs must not contain more than 300 faecal coliforms or more than 230 E.coli per 100 g of mollusc flesh and intravalvular liquid. Determination by the 5 tube, 3 dilution MPN testing method or any other method equivalent.]

AND/OR – for discussion

[Bivalve molluscs must not contain more than 330 fecal coliforms. In an analysis involving five (5) samples, none may contain more than 330 fecal coliforms; and if two (2) or more of the five (5) contain between 230 and 330 fecal 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.]

(iii) [Bivalve molluscs must not contain Salmonella in 25 g flesh.]

[(iv) [In the edible parts of bivalve molluscs (the whole part or any part intended to be eaten separately.) the total Paralytic Shellfish Poison (PSP) content must not exceed 80 microgrammes of saxitoxin equivalent per 100 g of mollusc flesh

(v) [In the edible parts of the bivalve molluscs (the whole part or any part intended to be eaten separately) the Diarrhetic Shellfish Poison (DSP), using the customary biological testing methods (on rats or mice) there must not be a positive result.

In the edible parts of the bivalve molluscs (the whole part or any part intended to be eaten separately) the maximum level of Okadaic acid, Dynophysistoxins and Pectenotoxins together, must not exceed 160 microgrammes of Okadaic equivalents per kg.

(vi) [In the edible parts of bivalve molluscs (the whole part or any part intended to be eaten separately)the content of Amnesic Shellfish Poisoning (ASP) must not exceed 20 microgrammes domoic acid per g of mollusc flesh.

(vii) [In the edible parts of bivalve molluscs (the whole or any part intended to be eaten separately) the total Neurotoxic Shellfish Poison (NSP) content must not exceed 20 mouse units.

(viii) In the edible parts of bivalve molluscs (the whole or any part intended to be eaten separately) the level of Azaspiracid (AZP) must not exceed16 microgrammes per 100g.

(ix) In the edible parts of bivalve molluscs (the whole or any part intended to be eaten separately) the level of Yessotoxins must not exceed 100 microgrammes per 100g.]

(*Note – comments on methodology is transferred to Section 7.)*

(x) The product must not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the CAC.

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 product as declared on the label shall be [the name of the species of bivalve molluscs [the common or usual name of the species of bivalve molluscs] according to the law, custom or practice in the country in which the product is to be distributed.]

I-6.1.1 There shall appear on the label, reference to the presentation provided for in Section 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

Bivalve molluscs in the shell 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 (for bulk transport)

Information shall specify on the container and in accompanying documents,

- the name of the food,
- lot identification,
- harvesting location,
- date of harvest and/or
- date of processing and
- the name and address and authorisation or registration number of packer or manufacturer, and
- [storage instructions, as appropriate].

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-6.5 Other Labelling Requirements

I-6.5.1 For live bivalve molluscs this product shall declare the date of minimum durability, harvest date or packing date or a statement to this effect.

I-6.5.2 For bivalve molluscs, identification of the establishment approved by the official agency with the jurisdiction, for the production of the product.

I-6.5.3 [Every package containing purified bivalve molluscs must be provided with a label certifying that all molluscs have been purified.]

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 Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CODEX STAN 233-1969).

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 7.3 through 7.6, 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 Sample Preparation

I-7.6 MPN Method For Analyses of E.Coli/Faecal Coliforms

(to be elaborated)

Method for E. coli proposed by Germany:

Donavan et al. (1998): Modification of the standard UK method for the enumeration of *Eschericia coli* in live bivalve molluscs. Communicable Disease and Public Health 1. 188-196.

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.

This indicator may be amended or replaced in the future by more suitable indicators like bacteriophage.

I-7.7 Determination of Biotoxins

(to be elaborated)

PSP - biological testing method in association if necessary with a chemical method for detection of Saxitoxin.

DSP - customary biological testing methods (on rats or mice).

Okadaic acid, Dynophysistoxins and Pectenotoxins – measurement of Okadaic acid equivalent. – biological methods (mouse bioassay, rat bioassay), authorised alternative chemical methods ELISA, HPLC, LCMS.

ASP - HPLC testing method.

NSP - current American Public Health Association Inc. method or other method approved by the official agency having jurisdiction.

AZP – HPLC or other method approved by the official agency having jurisdiction.

Yessotoxin – biological method or other method approved by the official agency having jurisdiction.

The above methods may be replaced by other acceptable chemical methods as they become available and approved for use.

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 Odour/Flavour

Bivalve molluscs affected by persistent and distinct objectionable odours or flavours indicative of decomposition or rancidity.

I-8.3 Texture

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

I-8.4 Dead or Damaged Product

For bivalve molluscs sold live, the presence of dead or damaged product. Dead product is characterised by no response to percussion. Damaged product includes product that is damaged to the extent that they can no longer function biologically. Sample shall be rejected if dead or damaged product 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 8 does not exceed the acceptance number (c) of the appropriate sampling plan in the Sampling Plans for Prepackaged Foods (AQL-6.5) (CODEX STAN 233-1969);

(ii) the total number of sample units not meeting the count designation as defined in section 2.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the Sampling Plans for Prepackaged Foods (AQL - 6.5) (CODEX STAN 233-1969);

(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 4, 5.1, 5.2, 5.3 and 6 are met.

PART II

II-2. DESCRIPTION OF NON-VIABLE BIVALVE MOLLUSCS

II-2.1 Product Definition

Non-viable bivalve molluscs processed for direct consumption or further processing are products that are no longer alive immediately prior to consumption but were alive immediately prior to the commencement of shucking, freezing or processing to eliminate target organisms. Presentation may or may not include the shell.

II-2.2 Process Definition

Non-viable bivalve molluscs processed for direct consumption or further processing are ones that meet the process definition for live bivalve molluscs and in addition have been shucked and/or frozen and/or processed to eliminate target organisms. When frozen, the freezing process shall be carried out in appropriate equipment in such a way that the range of temperature of maximum crystallization is passed quickly. The freezing process shall not be regarded as complete unless and until the product temperature has reached -18ºC or colder at the thermal centre after thermal stabilization. The product shall be kept deep frozen so as to maintain the quality during transportation, storage and distribution. Frozen bivalve molluscs shall be processed and packaged so as to minimize dehydration and oxidation.

Bivalve molluscs that have been processed to eliminate target organisms are ones that have been processed to assure elimination, reduction or limitation of the target organisms to the satisfaction of the official agency having jurisdiction.

II-2.3 PRESENTATION

Refer to I-2.3

II-3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

II-3.1 Non-viable Bivalve Molluscs

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 clean water.

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

Refer to I-3.3 Final Product

II-4. FOOD ADDITIVES

Only the use of the following additives is permitted in non-viable bivalve molluscs.

Antioxidants

For fresh 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) at levels not to exceed good manufacturing practices (GMP).

For fresh non-viable 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) at levels not to exceed good manufacturing practices (GMP).

II-5. HYGIENE AND HANDLING

II-5.1 The final product shall be free from any foreign material that poses a threat to human health.

II-5.2 Bivalve molluscs should possess visual characteristics associated with freshness, including, where relevant, shells free of dirt and normal amounts of intravalvular liquid as determined by product specialists familiar with the species.

II-5.3 Refer to I-5.3.

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

Refer to I-6.1 The Name of the Food

II-6.2 Content Declaration

Refer to I-6.2 Content Declaration

II-6.3 Storage Instructions

Refer to I-6.3 Storage Instructions

II-6.4 Labelling of Non-Retail Containers (for bulk transport)

Refer to I-6.4 Labelling of Non-Retail Containers (for bulk transport)

II-6.5 Other Labelling Requirements

Refer to I-6.5 Other Labelling Requirements

II-6.5.1 Safety claims for bivalve molluscs processed to eliminate target organisms should be specific to the target organisms that have been eliminated, reduced, or limited.

II-6.5.2 [Every package containing purified bivalve molluscs must be provided with a label certifying that all molluscs have been purified.]

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 Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CODEX STAN 233-1969).

(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

Refer to I-7.2 Sensory and Physical Examination

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 7.3.1, 7.3.2, 7.3.3 and 7.3.4..

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

II-7.4 Determination of Count per Unit Weight or Volume

Refer to I-7.4 Determination of 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 ºC). 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-7.5.2 Cooking Methods

The following procedures are based on heating the product to an internal temperature of 65-70 ºC.

The product must not be overcooked. Cooking times vary according to the size of the product and the temperature used. The exact times and conditions of cooking for the product should be determined by prior experimentation.

Baking Procedure: Wrap the product in aluminium foil and place it evenly on a shallow flat pan.

Steaming Procedure: Wrap the product in aluminium foil and place it on a wire rack suspended over boiling water in a covered container.

Boil-in-Bag Procedure: Place the product into a boilable film-type pouch and seal. Immerse the pouch into boiling water and cook.

Microwave Procedure: Enclose the product in a container suitable for microwave cooking. If plastic bags are used, check to ensure that no odour is imparted from the plastic bags. Cook according to equipment instructions.

II-7.6 MPN Method For Analyses of E.Coli/Faecal Coliforms

Refer to I-7.6 MPN Method For Analyses of E.Coli/Faecal Coliforms

II-7.7 Determination of Biotoxins

Refer to I-7.7 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

Refer to I-8.1 Foreign Matter

II-8.3 Odour/Flavour

Refer to I-8.2 Odour/Flavour

II-8.4 Texture

Refer to I-8.3 Texture

II-9. LOT ACCEPTANCE

Refer to I-9. LOT ACCEPTANCE

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS
(Sections at Step 3)

TABLE OF CONTENTS

APPENDICES

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;
Growing Areas	means all brackish and marine areas approved for the production or harvesting of bivalve mollusks 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 purification 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.
[Post Harvest Treated Bivalve Molluscs]	[are products prepared from live bivalve mollusc that have been treated after harvest to eliminate, reduce or limit specified target organisms within the product and to retain the sensory qualities of a live bivalve mollusc. As with all raw bivalve molluscs, post harvest treated bivalve molluscs must meet all microbiological criteria associated with traditional harvest water controls designed to prevent faecal contamination and resulting introduction of enteric pathogens. However, these traditional controls are not designed for control of such pathogens as Vibrios which are independent from faecal contamination.]
Purification	(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.

2.7 SALTED FISH

Barrel	a cylindrical container made from wood or plastic 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 salt and stacking the fish in such a manner that the resulting brine drains away;
Dun	a discoloration and a development of the mould *Sporendonema epizoum* 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;
Heavily Salted Fish	the salt content of the fish muscle is above 20 g/100 g water phase; **NOTE: NOT USED IN TEXT**
Medium Salted Fish	the salt content of the fish muscle is above 10 g/100 g water phase or is lower or equal to 20 g salt/100 g water phase; NOTE**: NOT USED IN TEXT**
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)]
Lightly Salted Fish	the salt content of the fish muscle is above 4 g/100 g water phase or is lower or equal to 10 g salt/100 g water phase; NOTE: **NOT USED IN TEXT?**
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 Cured Fish	means fish that is preserved with salt; NOTE **NOT USED IN TEXT**
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
Very Lightly Salted Fish	the salt content of the fish muscle is 4g/100g or less in the water phase Note**: NOT USED IN TEXT**

Wet-Salting is the process whereby primary lean fish is mixed with suitable 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.

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.

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;

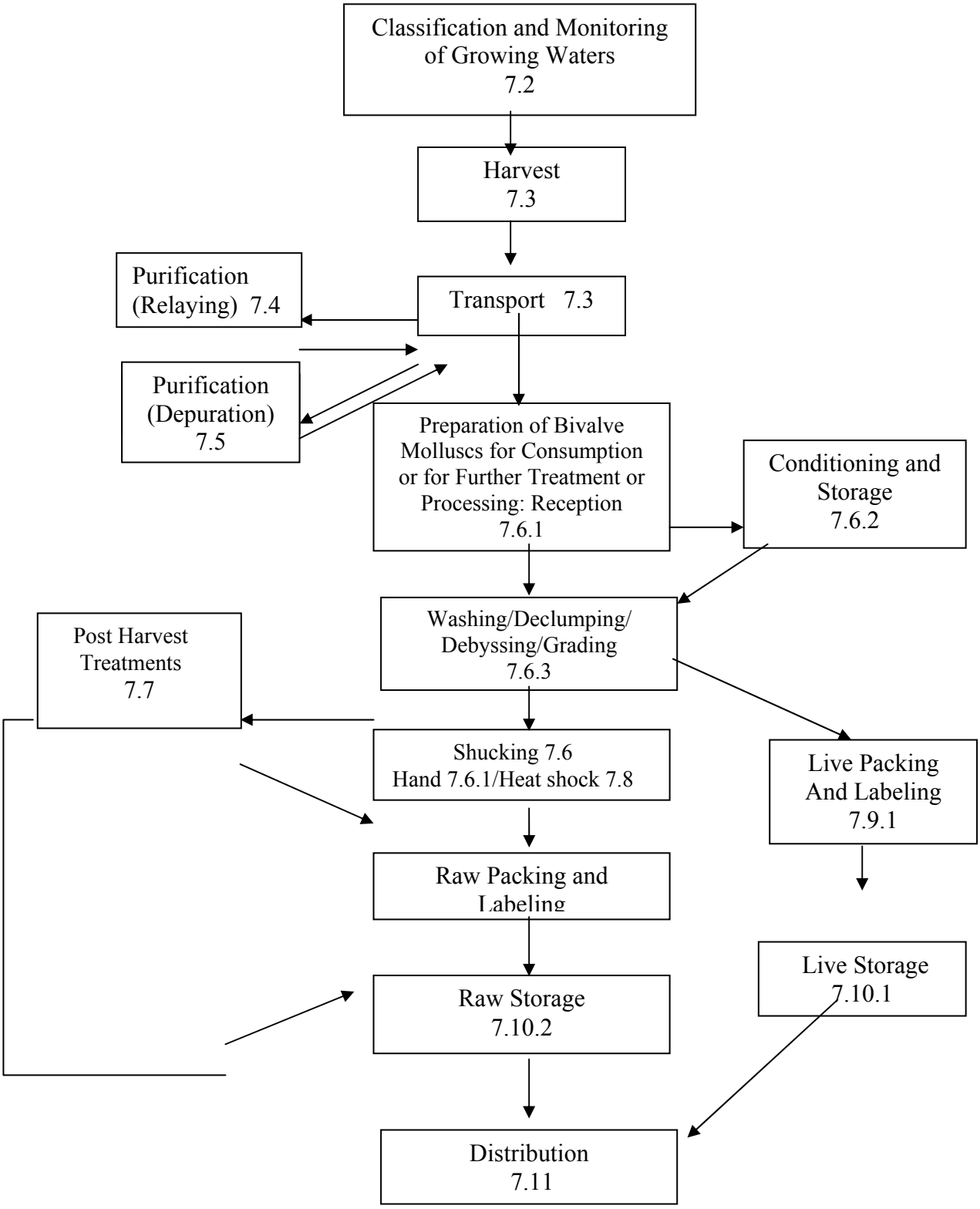
Droptail	Is a condition observed in cooked lobsters which have died or deteriorated before processing. The tail does not curl under the lobster and there is a gap between the tail and cephalothorax; **NOTE: NOT USED IN TEXT**
Enzymatic activity	Is the catalytic action of enzymes on biochemical reactions;
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..



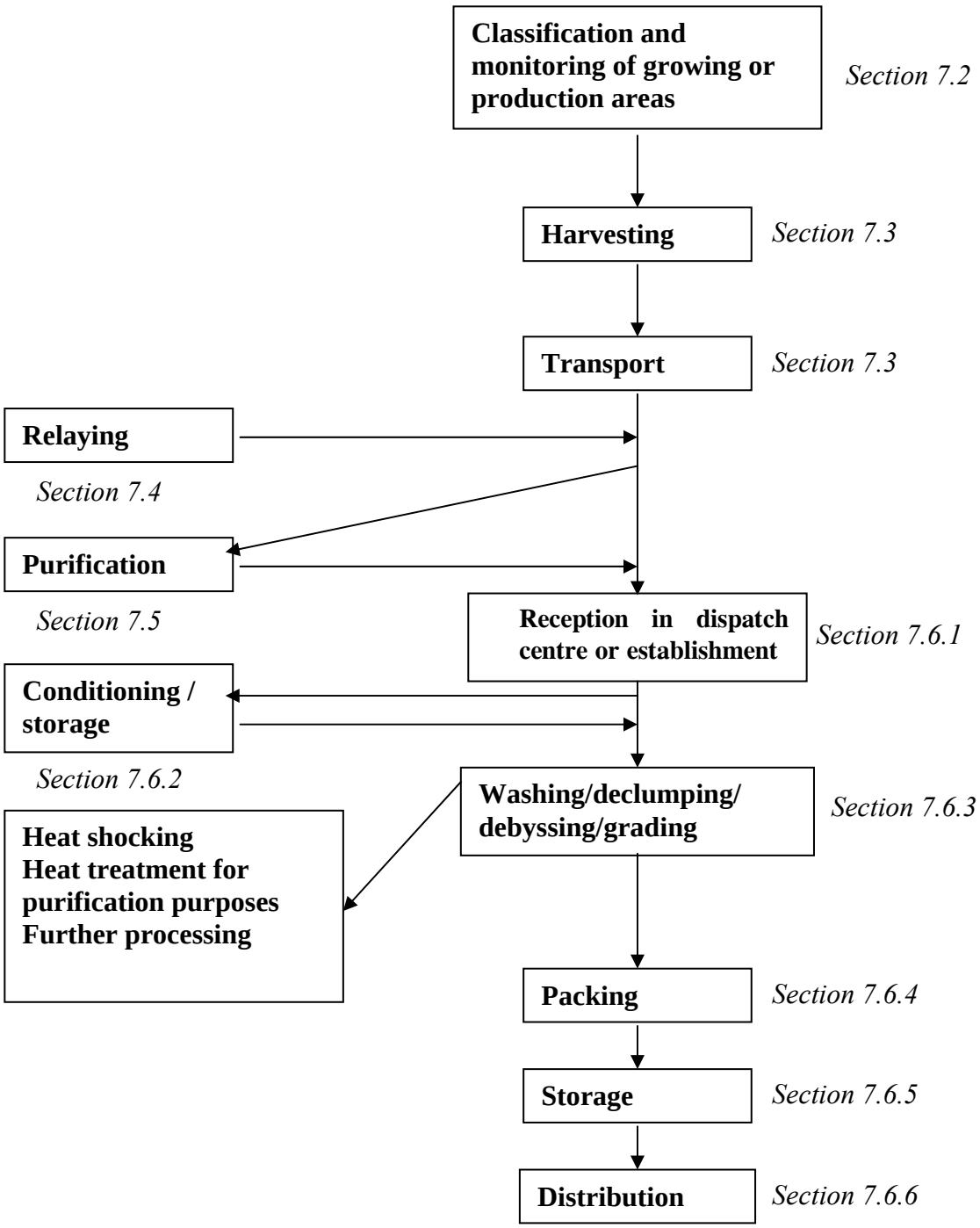


Figure 7.1 Example of a simplified flow diagram for the production of live [and raw] Bivalve Molluscs

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"), 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 (Norwalk like viruses, 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. Until better methods are available, *E. coli*/faecal coliforms or total coliforms may be used as an indicator for the possibility of bacterial and viral pathogens. 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 low levels of microbiological contamination, as determined by the authority having jurisdiction, can be made safe by relaying in a suitable area or a purification process to reduce the level of bacteria and of viruses if the process is continued long enough, or by a heat treatment to destroy the pathogens. Purification 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 purification 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 purification, relaying or conditioning.

Many, but not all, species of bivalve molluscs are considered suitable for purification.

7.2 CLASSIFICATION AND MONITORING OF GROWING AREAS

Potential Hazards: *Microbiological pathogens, 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. Norwalk like viruses, viruses causing hepatitis);
- naturally occurring bacterial pathogens (e.g. Vibrio spp.);
- biotoxins (e.g. DSP toxins, PSP toxins, NSP toxins, ASP toxins);
- 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 purification 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 suitable for harvesting for either:

- direct human consumption;
- relaying in acceptable water or purification in an approved purification centre or other forms of approved treatment e.g. heat treatment, radiation;
- non-suitable for growing or harvesting bivalve molluscs.

The presence of pathogenic Vibrio or viruses do not correlate with the bacterial organisms used as indicators of faecal contamination.

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, frequent monitoring of *E. coli*/faecal coliforms or total coliforms, and other sanitary control measures as applicable.
- Classification/reclassification of growing areas by frequent monitoring of pathogens 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.
- 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.

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 frequently monitored on the presence of E. Coli/faecal coliforms or total coliforms

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 purification 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 enteric bacterial pathogens, enteric viral pathogens and some naturally occurring bacterial pathogens.

[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

All growing areas should be monitored for the presence of algae with potential for producing marine biotoxins/and marine biotoxins as appropriate. 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.

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 purification and distribution centres.

7.2.2.4 Chemical contaminants

Growing areas should be monitored on regular basis for chemical contaminants.

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, further processing, relaying or purification.

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

Potential Hazards: *Microbiological pathogens, 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.
- Wash-down pumps should draw water only from non-contaminated seawater.
- Bivalve molluscs should be harvested from and stored in an 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 purification 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.

Potential Hazards: *Microbiological pathogens, 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.
- 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.
- Bivalve molluscs should be laid out at a density which will permit them to open and undergo natural purification.
- Appropriate documentation should be maintained for relaying operations.

7.5 PURIFICATION OF BIVALVE MOLLUSCS IN TANKS, FLOATS AND RAFTS

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

Purification 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. Purification 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 purification should only be harvested from areas that that so designated/classified by the official agency having jurisdiction.

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

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

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

Potential Hazards: *Microbiological pathogens*

Potential Defects: *physical damage*

Technical Guidance:

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

- Bivalve molluscs subjected to the purification 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, tanks, float, rafts used for purification should be acceptable to the official agency having jurisdiction.
- Dead or damaged bivalve molluscs should be removed before the purification 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 purification process.
- The length of the period of purification 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 purification and the bivalve molluscs species. Microbiological investigation of process water and of bivalve molluscs meat should be used to assess purification parameters. It should be taken into account that viruses and Vibrio spp. are more persistent during purification than the indicator bacteria mostly used for microbiological monitoring (E. coli and faecal coliforms).
- Water used in purification 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 purification 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 purification.
- During the process of purification, 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 purification 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 purification processing.
- To avoid recontamination of bivalve molluscs undergoing purification, unpurified bivalve molluscs should not be placed in the same tank as bivalve molluscs which are already undergoing purification.
- On removal from the purification 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 form 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 purification the bivalve molluscs should meet the end product specification.
- Appropriate documentation should be maintained for purification.

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

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

7.6.1 Reception

Potential Hazards: *Microbiological pathogens, chemical and physical contamination, viable parasites*

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

Technical Guidance:

- Bivalve molluscs dispatched by a distribution centre must leave the distribution centre alive. Therefore stress and excessive shocks of the bivalve molluscs must be avoided.
- Distribution centres 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 purification in an approved purification centre or tank .

7.6.2 Conditioning and storage of bivalve molluscs in sea water tanks, basins etc.

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Microbiological pathogens, 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.
- 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 pathogens, 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

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

Potential Hazards: *Microbiological pathogens, physical 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 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.
- 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 mention 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.

7.6.5 Storage

Potential Hazards: *Microbiological pathogens*

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 except in the case of retail sale at the distribution centre.

7.6.6 Distribution

Refer also to Section 3.6

Potential Hazards: *unlikely*

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 leave the distribution centre 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.

[7.7. POST HARVEST TREATMENT

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

Post harvest treated bivalve molluscs are products prepared from live bivalve molluscs that have been treated after harvest to eliminate, reduce or limit specified target organisms within the product to levels that are satisfactory to the official agency having jurisdiction. Post harvest treatment is intended to retain the sensory qualities of a live bivalve mollusk. As with all live and raw bivalve molluscs, post harvest treated 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. These treatments may include the application of low heat, hydrostatic pressure, (e.g., 60K lb/6 min.) irradiation, and individual quick freezing.

Potential Hazards: *Failure to eliminate or reduce microbiological contamination by target organisms*

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 eliminate pathogens should be approved by the appropriate official having jurisdiction.]

In this section only heat treatment/ heat shocking of bivalve molluscs is covered which is specific for this code of hygienic practice.

Most requirements for reception of bivalve molluscs, conditioning, storage, washing/ declumping/ debyssing/ grading, packaging, storage and distribution would also apply for bivalve molluscs intended for heat treatment or heat shocking.

Stress and excessive shocks of the bivalve molluscs to be heat treated are somewhat less critical than bivalve molluscs which are intended to be distributed.

7.7.1 Heat treatment for purification purposes

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Microbiological pathogens*

Potential Defects: *unlikely*

Technical Guidance:

Instead of relaying/ purification it is possible in certain circumstances to eliminate microbiological contamination with a heat treatment. This can be either a sterilisation or pasteurisation process. The time/ temperature control is important (F >= 15), and pressure where applicable. The heat treatment is very critical and must be approved by the official agency having jurisdiction. The establishments must carry out frequent own checks to ensure that the heat treatment is satisfying.

Also important is documentation of the lots of bivalve molluscs. Polluted bivalve molluscs should not come in contact/ be mixed with bivalve molluscs which meet the end product specification.

- The bivalve molluscs must come from growing areas designated as acceptable by the official agency having jurisdiction.
- Bivalve molluscs designated for heat treatment should not accede the acceptable chemical or biotoxin levels.
- 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.
- The heat treatment process must be approved by the official agency having jurisdiction.
- 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.
- Polluted bivalve molluscs should not come in contact with bivalve molluscs which meet the end product specification.
- After the heat treatment the bivalve molluscs must meet the end product specification of the Codes Standard.

7.7.2 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 purification in an approved purification 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 if 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.
- After heat shocking the bivalve molluscs must meet the end product specification of the Codex Standard.

7.8 DOCUMENTATION

- The transport of live bivalve molluscs from a growing area to a distribution centre, purification 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 purification should be kept concerning each lot. These records should be retained for a period of minimal one year.
- Purification 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 purification of each lot should be maintained by the distribution centre or establishment for a period designated by the official agency having jurisdiction.

7.9 LOT IDENTIFICATION AND RECALL PROCEDURES

Refer also to Section 3.7

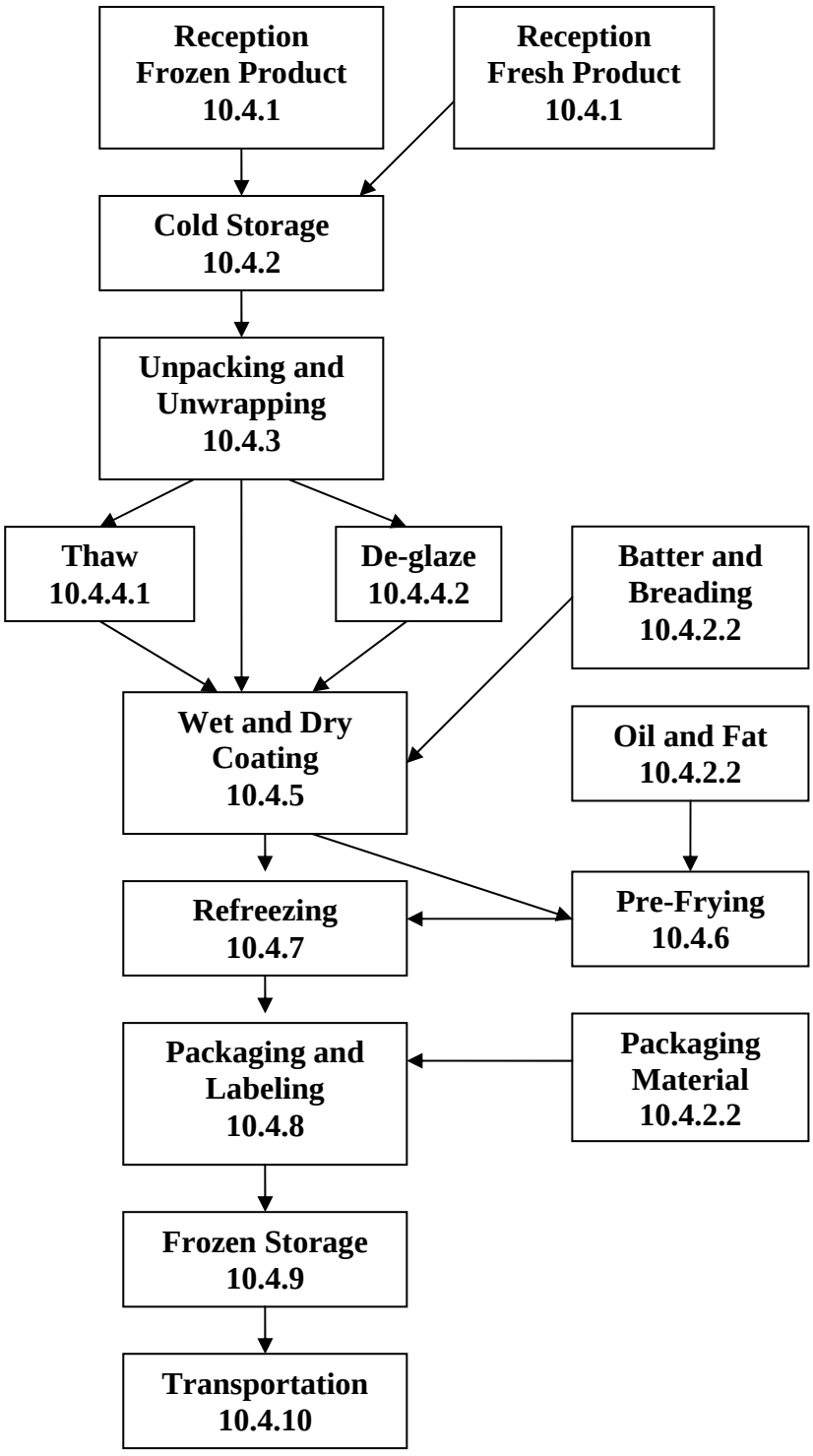
- Each product leaving the distribution centre or establishment should have an easy identifiable lot number. This lot number must include an identification code, the number of the distribution centre or establishment, the country of origin and day and month of packing, in order to facilitate the trace-back of the product. The distribution centres should establish a record-keeping system 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 whether the management of the distribution centre has taken certain preparatory steps 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 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)

Figure 10.2
Coated Molluscan Shellfish Flow Diagram



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 shells;*

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

See Section 10.3.2.2

10.4.3 Unwrapping, Unpacking

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: *none likely*

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

See Section 10.3.9

10.4.8 Packing and Labelling

See Section 10.3.10

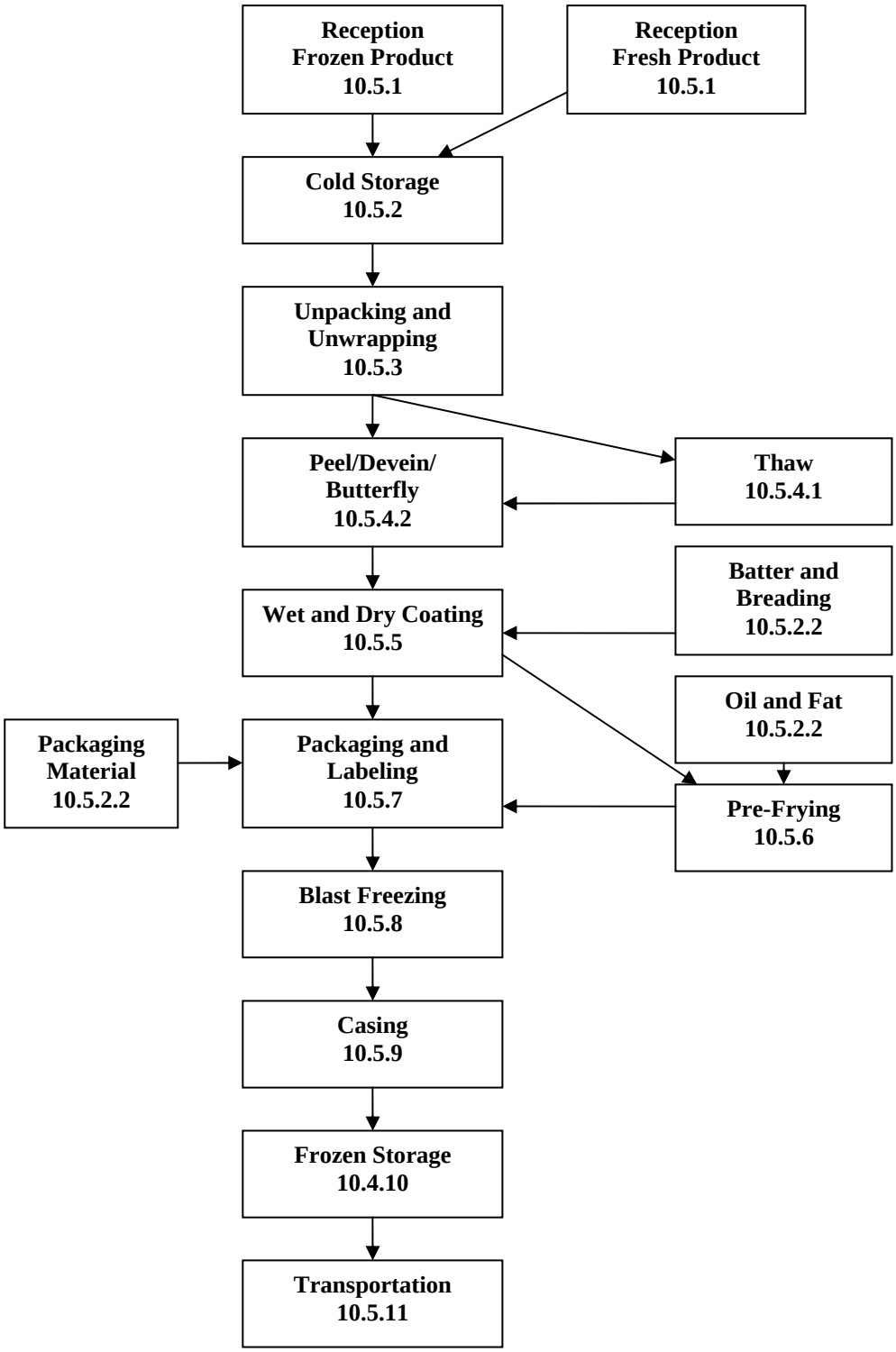
10.4.9 Storage of End Products

See Section 10.3.11

10.4.10 Transportation

See Section 10.3.12

Figure 10.3
Coated Shrimp Flow Diagram



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.

10.5.1.1Shrimp

Potential Hazards: sulfites

Potential Defects :black spot, soft flesh, inadequate head and viscera 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;
- 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 Section 10.3.2.1

10.5.2.2 Other Ingredients and Packaging Material

See Section 10.3.2.2

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 0º C 4° C.;
- fresh shrimp should be properly protected from contamination;

See Section 10.3.2.1

10.5.3 Unwrapping, Unpacking

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*

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 XX of the Codex Fish Code of Practice 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 for sharpness so that the cut does not result in damaged shrimp;

10.5.5 Coating

See Section 10.3.7

10.5.5.1 Wet Coating

Potential Hazards: *microbiological growth in rehydrated batter*

Potential Defects: *improper batter viscosity, foreign material*

Technical Guidance:

- liquid batter preparations should be properly refrigerated or discarded at regular intervals to prevent microbiological growth;
- 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;
- 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.

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:

- 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

10.5.7 Packaging and Labeling

See Section 10.3.10

10.5.8 Blast 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

See Section 10.3.11

10.5.11 Transportation

See Section 10.3.12

SECTION 11 - PROCESSING OF 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 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.

This section does not cover dried salted fish (i.e. klippfish) or dried salted fish products.

11.1 GENERAL

Refer also to Section 8.1 for general handling prior to processing and figure 11.1 for and example flow chart of a 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.

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

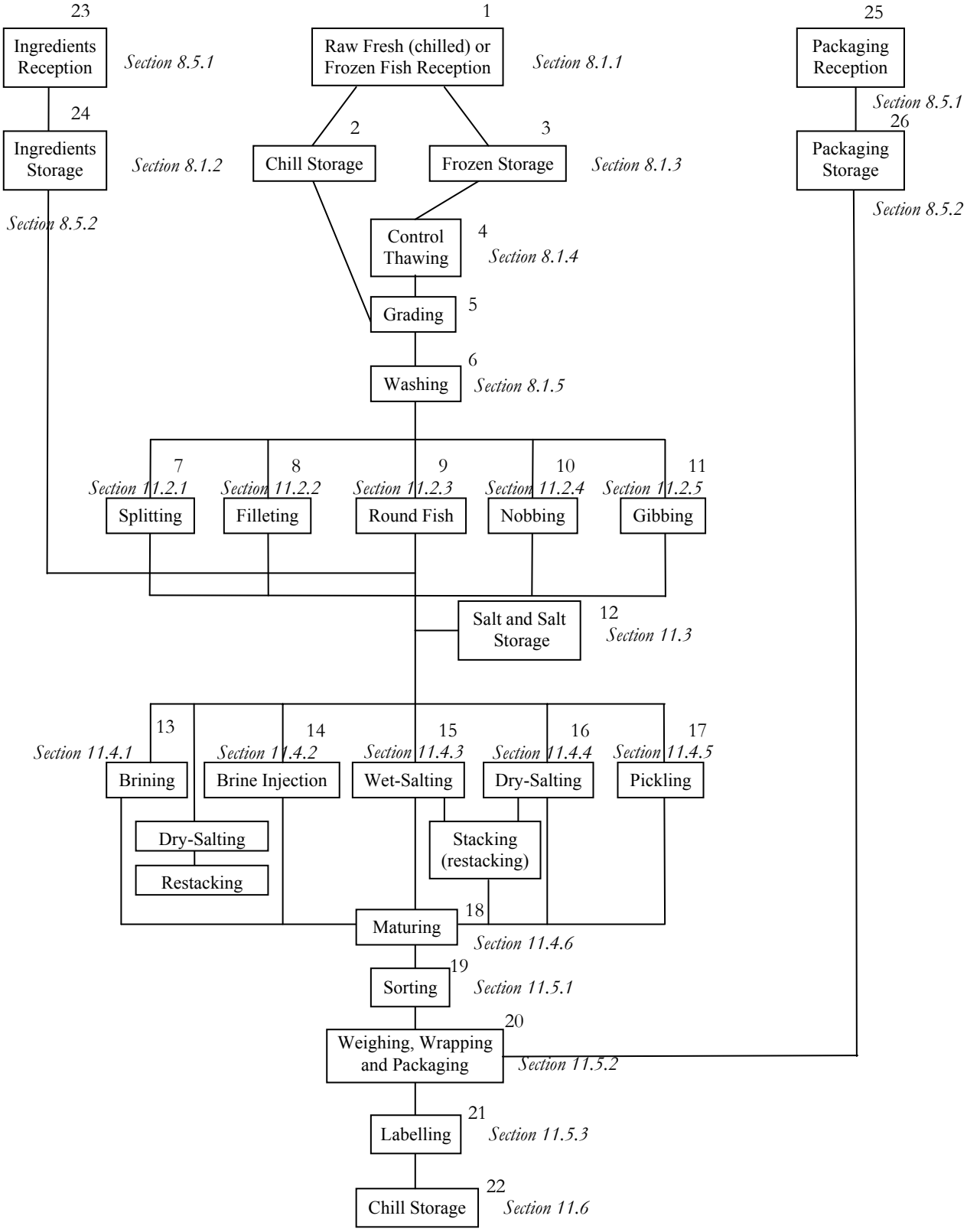


Figure 11.1 Example of flow chart of a salted fish processing line.

11.2 PREPARING FOR SALTING

11.2.1 Splitting, Washing and Rinsing (Processing Steps 7)

Potential Hazards: *Parasites, microbiological, chemical and physical contamination*

Potential Defects: *Parasites, decomposition*

Technical Guidance:

- the design of the splitting line should be continuous and sequential to permit the uniform flow without stops or slow-downs**;**
- 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 than 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: *Parasites, microbiological, chemical and physical contamination, histamine*

Potential Defects: *Remaining gut content (bait) 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;
- 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 histamine or a defect, 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: *Parasites, microbiological, chemical and physical contamination, histamine*

Potential Defects: *Remaining gut content (bait), 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;

- 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 histamine or a defect, 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 (PROCESSING STEPS 12)

11.3.1 Handling

Potential Hazards: *Biological, chemical and physical contamination*

Potential Defects: *Biological, chemical and physical contamination*

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 infections of salted fish the re-use of salt should be avoided;

11.3.2 Salt Requirements

Potential Hazards: *Biological, chemical and physical contamination*

Potential Defects: *Biological, chemical and physical contamination, 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 should meet the following requirements:
  - content of iron not more than 10 mg/kg;
  - content of copper not more than 0.1 mg/kg ;
  - free from micro-organisms, which adversely affect the quality of final products;

- salt used for salted fish of family Gadidae should meet the following requirements:
  - levels of calcium salts between 0.15% and 0.35% have been found satisfactorily;
  - levels of magnesium salts if present, not more than 0.15%;
  - if the salt is not free from micro-organisms, further developing of micro-organisms would be delayed if the processes and products are kept at low temperature;
- Codex Standard for food grade salt (Codex Stan. 150-1985, Rev. 1-1997, Amend. 1-1999) applies to salt used as an ingredient of food, both for direct sale to the consumer and for food manufacture.

11.4 SALTING AND MATURING

Salted fish should be salt-matured, sound and wholesome. The fish should be free of remains of the guts, liver and other entrails.

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.

Two particular conditions that can adversely affect the quality of salted fish are the occurrence of "*pink*" and "*dun*", 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 infections 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 13)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, histamine, incorrect composition of brine*

Potential Defects: *Parasites, microbiological, chemical and physical contamination, decomposition, histamine*

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;

11.4.2 Brine Injection (Processing Steps 14)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, injection needle fragment, histamine, incorrect composition of brine*

Potential Defects: *Parasites, biological, chemical and physical contamination, decomposition, histamine*

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;

11.4.3 Wet-Salting (Processing Steps 15)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, histamine*

Potential Defects: *Parasites, biological, chemical and physical contamination, decomposition, histamine*

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 16)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, histamine*

Potential Defects: *Parasites, biological, chemical and physical contamination, decomposition, histamine*

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 of the Scombridae and Clupeidae families should be stored or maintained below 9° C to prevent possible scombrotoxin/histamine formation;

11.4.5 Pickling (Processing Steps 17)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, histamine*

Potential Defects: *Parasites, biological, chemical and physical contamination, decomposition, histamine*

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 18)

Potential Hazards: *Microbiological pathogens, parasites, chemical and physical contamination, histamine*

Potential Defects: *Parasites, biological, chemical and physical contamination, decomposition, histamine, rancidity and discolouring of the flesh or surface*

Technical Guidance:

- maturing time depends on the fish (species, size and quality), temperature and the amount of salt absorbed by the fish tissues;
- wet-salted fish of the Gadidae family is regarded as mature after 10 to 12 days in the brine and following stacking and 7 to 10 days in piles, and for dry-salted fish after 20 to 28 days including at least one restacking, with temperature between 5°C to 8°C;
- 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 month depending of the specific products. If the containers are to be held at lower temperatures, the maturing period will increase;
- the first part of curing period for fish of the Clupeidae and Scombridae families should be done at temperatures between 0°C and 5°C to prevent development of histamine;
- when salting fish of Scombridae and Clupeidae families, regular checks should be made of histamine content of the end product;

11.5 SORTING, WEIGHING, PACKAGING, WRAPPING AND LABELLING

Refer also to Sections 6.4.4 and 6.5.

11.5.1 Sorting (Processing Steps 19)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect sorting (**quality, weight, size, species, etc.**)*

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 Weighing, Wrapping and Packaging (Processing Steps 20)

Potential Hazards: *Microbiological pathogen, biotoxins, chemical and physical contamination*

Potential Defects: *Subsequent dehydration, decomposition*

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;

11.5.3 Labelling (Processing Steps 21)

Refer to Section 8.2.3 and 8.5.

11.6 CHILL STORAGE (PROCESSING STEPS 22)

Potential Hazards: *Microbiological pathogens, chemical contamination, histamine*

Potential Defects: *Biological, chemical and physical contamination, decomposition, histamine, development of "pink" and "dun"*

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 23, 24, 25 & 26)

Refer to Section 8.5.

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 Fish[1].

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

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.

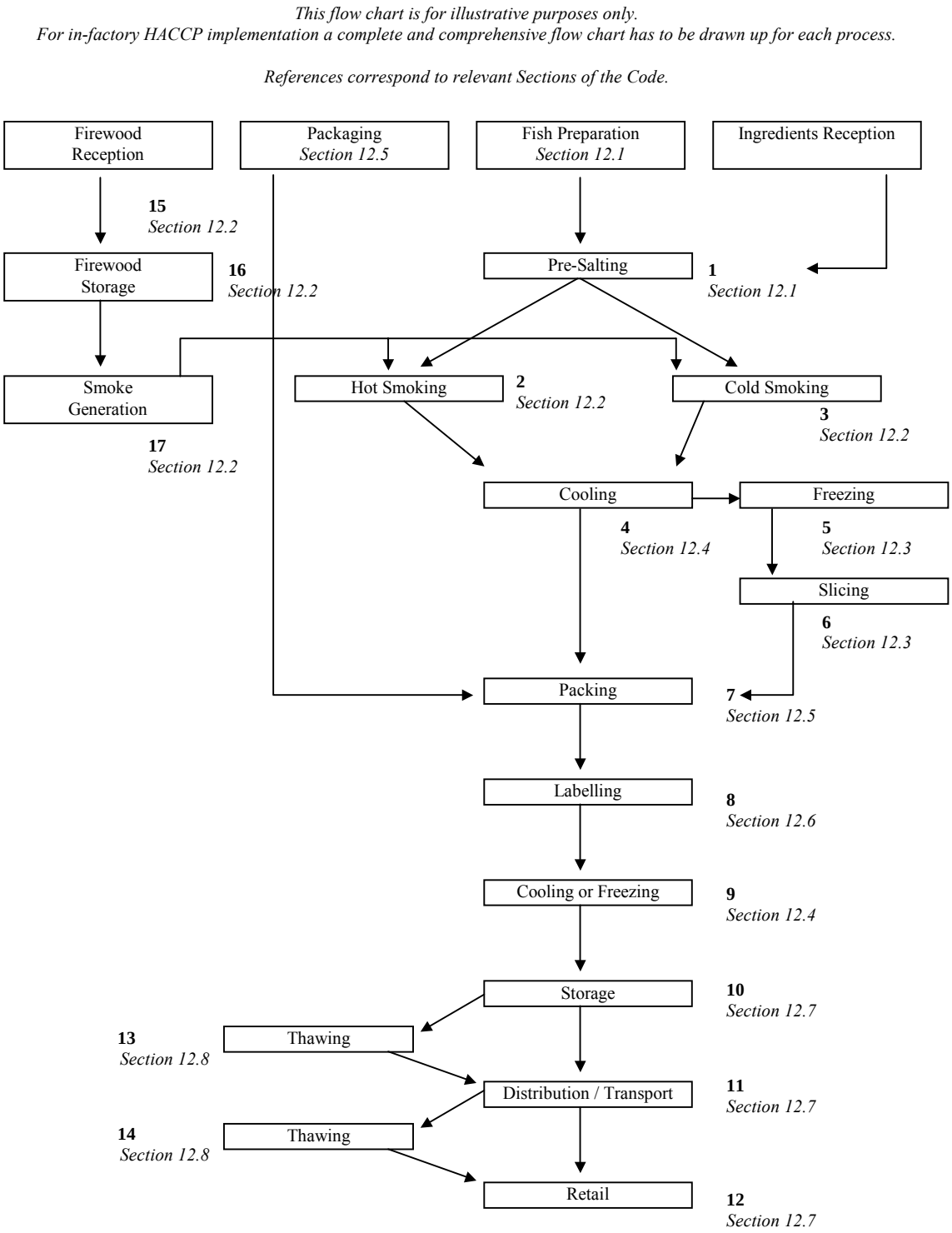


Figure 12.1 Example of a flow chart of a Hot Smoking and Cold Smoking preparation Line, including possible slicing operation at the Cold Smoking line.

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.

SECTION 13 - PROCESSING OF LOBSTERS AND 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 to lobsters, rock lobsters, spiny lobsters, slipper lobsters from the genus *Homarus* of the family Nephropidae and from the families Palinuridae and Scyllaridae and other similar species but does not apply to *Nephrops*.

This also 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 (*Chionoectes*) as well as other species of crabs which are similar in physical structure to the above mentioned.

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 is 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:

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 crabs 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.
- [Chlorinating system should not be relied upon to solve all hygiene problems].
- water, which has been in contact with crustaceans, should not be re-used to avoid taint problems;
- if it is unavoidable for the same workers to handle the raw as well as the cooked, stringent precautions should be taken to prevent contamination of the cooked product by micro-organisms from raw material;

13.2 General Considerations for the Handling of Lobsters and Crabs

Refer to Section 4 – General Considerations for the Handling of Fresh Fish and Shellfish of the Proposed Draft Code of Practice for Fish and Fishery Product (ALINORM 01/18 – APPENDIX V)

13.2.1. Potential Hazards and Defects Associated with Lobsters and 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

13.2.1.1. Biological Hazards

Parasites

A trematode belonging to the genus Paragonimus is the very common oriental lung fluke. Humans are infected by eating raw or inadequately cooked crabs or crayfish. The adult parasite lives in cysts in the lungs, but it also has a tendency to migrate to other sites such as liver, spleen and brain. A chronic pulmonary disease ensues when the worms develop in the lungs.

Bacteria

Staphylococcus aureus in 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.

Although the data are limited, surveys suggest that cooked fish and other seafood may also be contaminated with Lysteria monocytogenes.

Chemical Hazards

Biotoxins

The US reports PSP and ASP toxin in dungeness crabs, tanner crabs and red rock crabs. PSP toxin has also been identified in lobster (Homarus spp.).

Defects

Blue discoloration in crab meat **[NOTE: insert short description and move rest of text to relevant Appendix]**

The problem of the blue discoloration in canned crab meat has caused trouble until recent times. The blue meat often appears not only on the surface of crab meat in the cans, but also, though rarely, on crab meat several hours after boiling and cooling of the carcasses. The blue meat appears more often on the surface of joint of shoulder meat, claw meat and other leg joints. It appears in canned horse hair crab meat ("kegani") more often than in king crab. The appearance of the blue meat is undoubtedly due to the cooper contained in haemocyanin which is a component of the blood of molluscs or arthropods.

Inoue and Motohiro have investigated on a cause and mechanism of blue discoloration. Cooper contents in blue and normal meats of king crabs were 2.80mg/100g and 0.49mg/100g (wet weight) in average, respectively. Higher copper contents were found in the shoulder meat, surface of first leg, and meats nearer a joint and claw meat than those in other parts. The limit of copper above which blueing occurs appears to be about 2.0mg/100g. The haemocyanin contained in crab haemolymph can react with hydrogen sulphide to produce a blue coloured pigment by heating (100ºC, 15 minutes). Heat coagulated haemocyanin may also react hydrogen sulphide to give a blue colour by heating. Reflectance spectrum of haemocyanin-sulphide complex closely resembles that of the blue meat. The chemical composition of a blue substance that the blue meat of canned crab was digested by protease was in accord with that of king crab haemocyanin-sulphide complex, apart from the sulphide content. And they concluded that the causative substance of the blue discoloration of canned crab meat is haemocyanin-sulphide complex.

Osakabe has succeeded in preventing the appearance of the blue meat of the canned crab by "Low-temperature and fractional heating" of the carcasses from which shell had been removed. According to his experiments, the coagulating temperature of blood protein of crabs is from 69ºC to 70ºC, and that of meat protein of crabs is from 59ºC to 60ºC. Thus, if the carcasses are heated at 59ºC~60ºC the meat coagulates, but the uncoagulated blood will run out. After removing the meat from the shell in a half-heated condition, the blood will run out leaving the meat alone. When the meat from which the blood has been removed is boiled for a few minutes and packed in can as the usual manner, the blue meat will not appear in the finished product. In addition, when the "low-temperature and fractional heating" method is used, canned tendonless (boneless) crab meat be prepared. In Japan the introduction of Osakabe's method made an epoch in the procedure of canning crab meat.

Black discoloration **[NOTE: insert short description and move rest of text to relevant Appendix]**

Black discoloration (melanosis), is caused by melanin formation in the ventral tail segments of lobsters owing to oxidative enzymatic reaction (polyphenol oxidase), followed by auto-oxidation and polymerisation. It is thought that live individuals have an underlying defense mechanism that sets off enzymatic processes which develop melanosis, depending only on certain abnormal conditions such as the degree of injuries and probably stress under agonizing circumstances.

Histochemical enzymatic tests done with lobster specimens subjected to two different treatments showed negative test results for those which were anaesthetised in ice-cold water for 30 min, while those which were injured showed positive results. This suggests that the even distribution of enzymes and substrates is changed in the integumentary tissues, and that the accumulation of fluids (haemolymph) in affected parts results in greater concentrations of these substances. Thus, the phenomenon which occurs is probably a host defense mechanism similar to that in insects, where humoral and/or cellular defense reactions help them recover from injuries.

The growth of lobster is cyclical, periods of comparative rest alternate with periods of metabolic changes in the epidermis, subepidermal tissues and hepatopancreas. Blackening appears more frequently when lobsters go through stage C (intermoult) and stage D (pre-moult). After ecdysis, in stage A and early B, live lobsters would harden their carapace (sclerotisation) than form melanin, as this gives them more protection against predators, and so being rarely appeared black spots.

Melanosis was found to be inevitable for lobsters once traumatised alive during the process of storing and thawing, while lobsters which suffered no injuries before dying showed no signs of blackening whatsoever.

Since traumatism occurs in lobsters normally due to unavoidable circumstances, they should be submitted to quick freezing as soon as possible and stored at as low a temperature as possible so as not to advance the melanisation. Quick thawing using running water is recommend to wash out the water-soluble melanin forming substances. However, affected lobsters are not always of low quality, but because of rough handling, losses in quality will take place in a short time. Blackening develops only in the integumentary tissues and muscle surfaces, not reaching the internal muscles.

Other defects

Northern crab often have infestation of marine leeches that are ecto-parasites and black shell which is a fungal infection. Both are common defects.

13.2.2 Minimise the Deterioration of Crustaceans - Handling

Refer also to Section 4.3 – Minimise the Deterioration of Fish – Handling of the Proposed Draft Code of Practice for Fish and Fishery Product (ALINORM 01/18 – APPENDIX V)

- 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 method 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, lobsters should be killed and crabs butchered. Tails and sections, respectively, 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 and Crabs

Once a processing facility has establish 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 three examples of products derived from lobsters and 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: Frozen Raw Lobster Tails (Fig. 13.3.1), Chilled Cooked Whole Lobster/Chilled Cooked Lobster Meat (Fig. 13.3.2)

and Chilled Pasteurized Crab Meat (Fig. 13.3.3). To provide an appreciation for other products of lobsters and crabs, a reference has been included in Appendix A and B.

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.

References correspond to relevant Sections of the Code

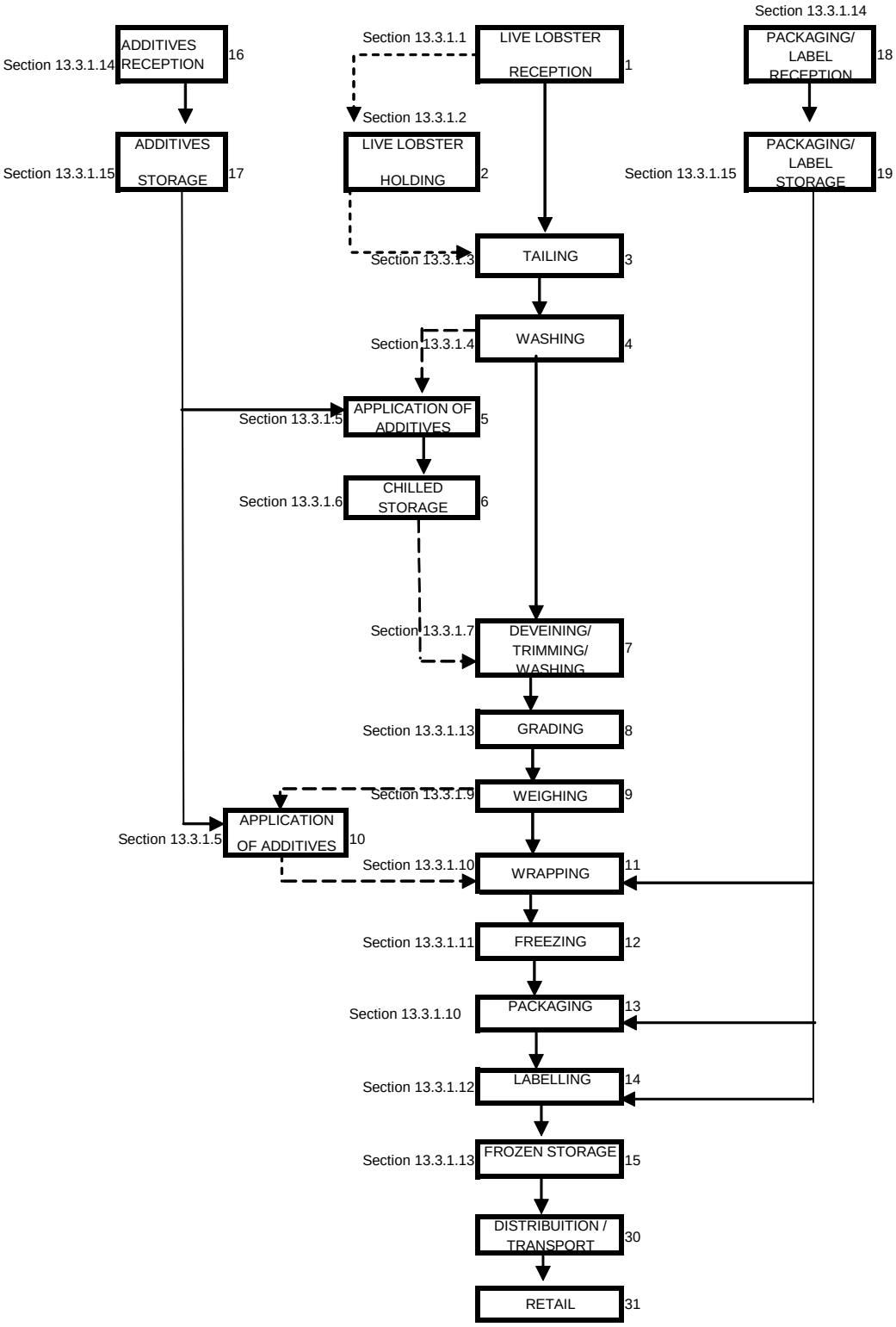


Figure 13.1 Example of a flow chart for a frozen raw lobster tail processing line.

13.3.1 Frozen Raw Lobster Tail

13.3.1.1 Live Lobster Reception (Processing Step 1)

Potential Hazards: *Phycotoxins (PSP).*

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 light by underneath the body when the lobster is picked up;
- lobsters which are dead or may pose a hazard to human 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 PSP toxin;
- 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").

Potential Hazards: *Unlikely*

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 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 should be supplied with running sea water;
- dead 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.

13.3.1.3 Tailing (Processing Step 3)

Potential Hazards: *Microbiological contamination*

Potential Defects *Unlikely*

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: *Unlikely*

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 Steps 5 & 10)

Potential Hazards: *The use of non-approved additives; incorrect application of Sulphites[2].*

Potential Defects: *Physical contamination, black spots due to inadequate application of Sulphites[7], incorrect application of Phosphates[7].*

Technical Guidance:

- Mixing and application of appropriate additives should be carried out by trained operators;
- Regular checks of the levels of additives applied.

13.3.1.6 Chilled Storage (Processing Step 6)

Refer to sections 4.2 – Time and Temperature Control and 8.1.2 - Chilled Storage.

Potential Hazards: *Unlikely.*

Potential Defects: *Unlikely*

Technical Guidance:

- for lobster tails, storage 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;

13.3.1.7 De-veining/Trimming/Washing (Processing Step 7)

Refer to Section 8.1.5 – Washing and Gutting of the Proposed Draft Code of Practice for Fish and Fishery Product (ALINORM 01/18 – APPENDIX V)

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 butt end of the tail;
- 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;
- 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 the development persistent and distinct objectionable odours or flavours indicative of decomposition, 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;

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[2] 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)

13.3.1.8 Grading (Processing Step 8)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect grading*

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.

13.3.1.9 Weighing (Processing Step 9)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect net weight*

Technical Guidance:

- balances should be calibrated periodically with a standardized mass to ensure accuracy.

13.3.1.10 Wrapping and Packaging (Processing Steps 11 & 13)

Potential Hazards: *Unlikely*

Potential Defects: *Subsequent dehydration*

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 the butt end of tail is completely wrapped to protect against dehydration.

13.3.1.11 Freezing (Processing Step 12)

Refer to section 8..3.1 – Freezing Process

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

- air blast and liquid nitrogen freezing should be used to produce high quality tails;
- the freezing and storage of whole uncooked lobsters is not recommended.

13.3.1.12 Labelling (Processing Steps 14)

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: *Absence of labelling of allergenic additives*

Potential Defects: *Incorrect labelling*

Technical Guidance:

- where sulphites were used in the process, care should be taken to ensure that this additive is properly declared on the label.

13.3.1.13 Frozen Storage (Processing Step 15)

Refer to Section 8.1.3 – Frozen Storage

Potential Hazards: *Unlikely*
Potential Defects: *Unlikely*
Technical Guidance:

13.3.1.14 Additives, Packaging and Label Reception (Processing Steps 16 & 18)

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

Potential Hazards: *Biological, chemical and physical contamination*
Potential Defects: *Misdescription*
Technical Guidance:

13.3.1.15 Additives, Packaging and Label Storage (Processing Steps 17 & 19)

Refer to section 8.5.2 – Storage – Packaging, Labels & Ingredients

Potential Hazards: *Biological and chemical contamination*
Potential Defects: *Unlikely*
Technical Guidance:

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.

References correspond to relevant Sections of the Code

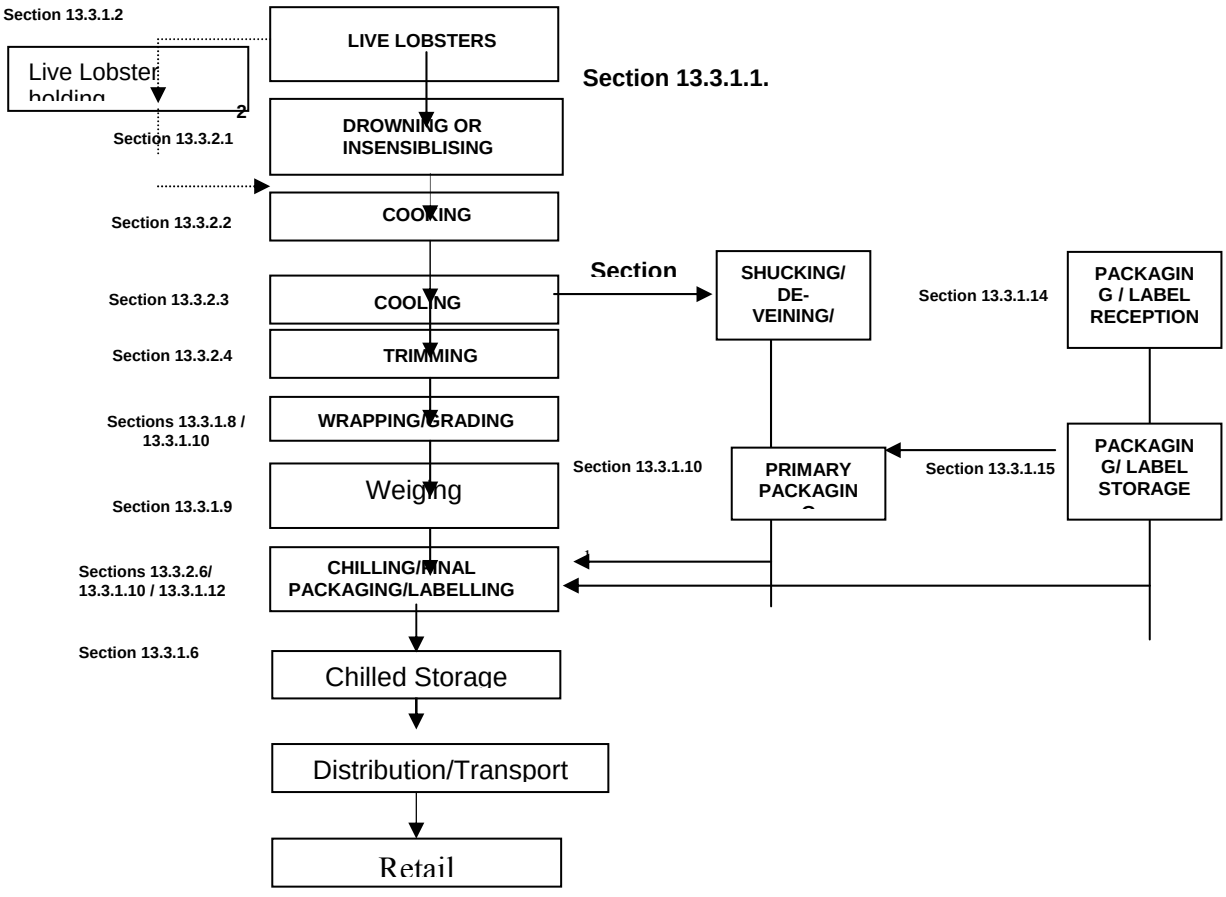

FIGURE 13.2 Example of a flow chart for chilled cooked whole lobster and chilled cooked lobster meat processing lines.*

13.3.2 Chilled Cooked Whole Lobster and Chilled Cooked Lobster Meat

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

13.3.2.1 Drowning or Insensibilising (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.

13.3.2.2 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 has 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;

13.3.2.3 Cooling (Processing Step 5)

Potential Hazards: *Unlikely*

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;

13.3.2.4 Trimming (Processing Step 6)

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;

13.3.2.5 Shucking, De-veining and Washing (Processing Step 9)

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

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 and 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];

13.3.2.6 Chilling, Final Packaging, Labelling (Processing Step 11)

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect labelling*

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- for sale in the fresh cooked form, whole lobsters or lobster meat should be immediately chilled and maintained at melting ice temperature;
- where ice is used for chilling, it should be manufactured using potable water, clean sea water or [chlorinated water];

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.

References correspond to relevant Sections of the Code

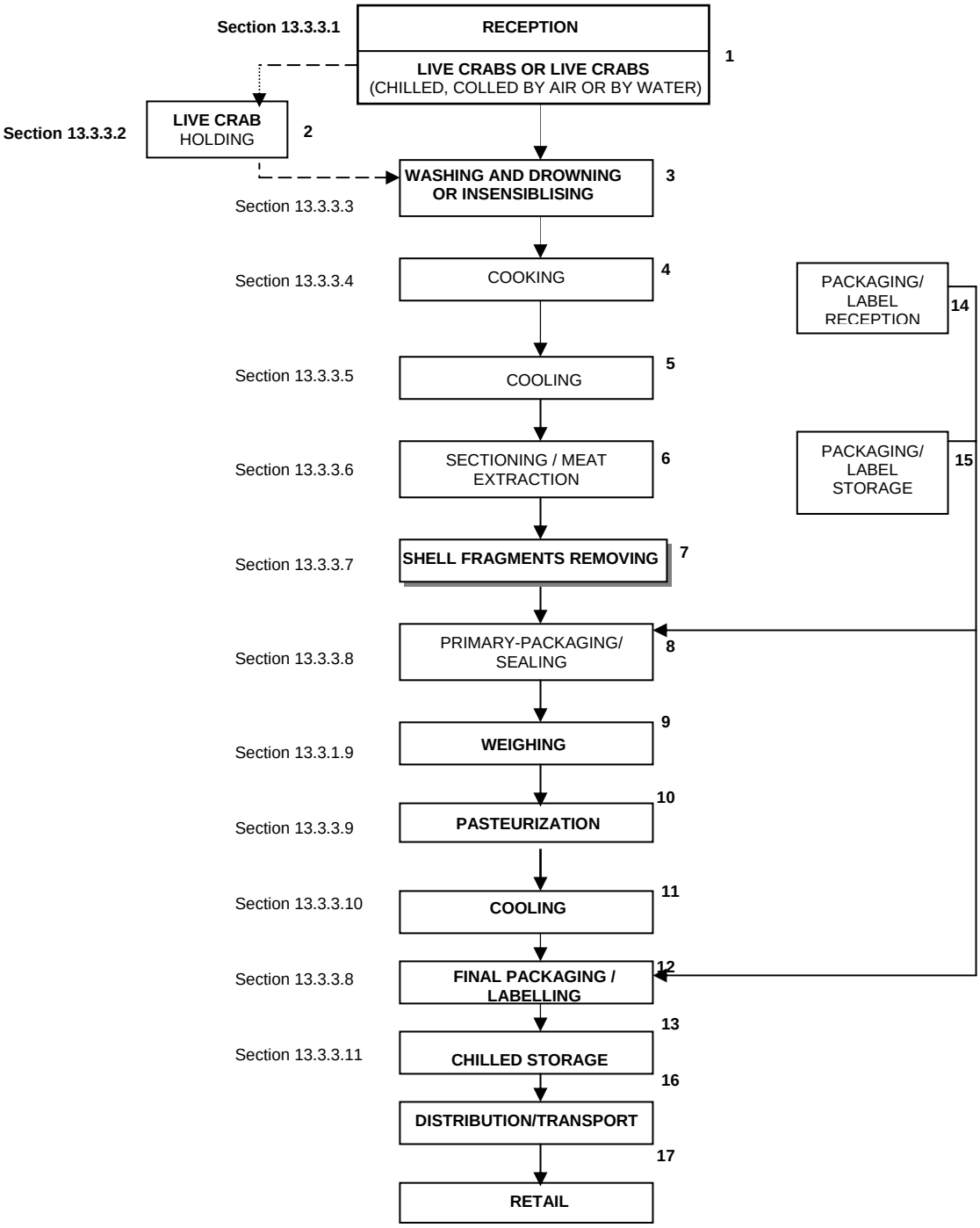

FIGURE 13.3 Example of a flow chart for a chilled pasteurised crab meat processing line[10].

[10] - The operation descriptions already mentioned in this document will not be repeated.

13.3.3 Chilled Pasteurized Crab Meat

13.3.3.1 Live Crab Reception (Processing Step 1)

Refer also to section 13.3.1.1 of this document.

Potential Hazards: *Phycotoxins (PSP and ASP), parasite (Paragonimus westermani).*

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.

13.3.3.2 – 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.

13.3.3.3 Washing and Drowning or Insensibilising (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 rendered insensible 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 0ºC or lower, depending of the specie;
- immersion of the crabs in potable water or clean sea water which is approximately 10-15ºC 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;

13.3.3.4 Cooking (Processing Step 4)

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

Potential Defects: *Over/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 that of melting ice 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. Continuous conveyorised cooking 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 and lower yields, and too little cooking makes it difficult to remove the meat from the shell;
- 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 93ºC (180 to 200ºF) 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 121ºC retort temperature and
  - boiling or steaming for a minimum of 15 min at 100ºC.

  King crab section:
  - one-stage cook - 22-25 min in seawater at 100ºC;
  - two-stage cook - 10 min at 71-75ºC followed by meat removal and a second cook for about 10 min at 100ºC in brine and
  - "green cook or partial cook" for canning where sections are blanched for 10-15 min at 100ºC.

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

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

13.3.3.5 Cooling (Processing Step 5)

Potential Hazards: *Microbiological contamination*

Potential Defects: *unlikely*

Technical Guidance:

- cooling should be done in cold circulated air, running potable water 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;
- 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;

13.3.3.6 Sectioning/Meat Extraction (Processing Step 6)

Potential Hazards: *Recontamination with pathogenic micro-organisms, microbiological growth, microbial toxin development, presence of shell fragments.*

Potential Defects: *Unlikely*

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 4.5ºC/40ºF 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;

13.3.3.7 Shell Fragments Removing (Processing Step 7)

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

Potential Defects: *Unlikely*

Technical Guidance:

- particular care should be taken to ensure that shell fragments 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;

13.3.3.8 Primary-Packaging/Sealing/Final Packaging/Labelling (Processing Steps 8 and 12)

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 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;

13.3.3.9 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 has 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 18ºC (64.4ºF) when the container 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 85ºC (185ºF) of at least 1 min at the geometric centre of the container;
- the water bath should be preheated to a temperature of 90ºC (194ºF) 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;

13.3.3.10 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 8ºC (46.4ºF) 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 3.0ºC (38ºF) 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.

13.3.3.11 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 3ºC (38ºF), 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;

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% CO_2, 25-35% O_2 and 25-35% N_2 are recommended. Gas mixtures containing up to 60% CO_2 in combination solely with N_2 are recommended for oily fish. The inclusion of CO_2 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 CO_2 in the gas mixture can induce pack collapse, excessive drip and may cause bleaching. Other gases, N_2 and O_2, are included as diluents to prevent these effects. O_2 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 O_2 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 CO_2 absorption takes place rapidly.

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

APPENDIX III

OPTIONAL FINAL PRODUCT REQUIREMENTS[3] - 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

Defect	Recommended Defect Description
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.
Gill and body cavity cuts	Misplaced cuts made during gutting. Incomplete removal of the viscera.
Remains of viscera	Inadequate removal of slime, blood and bits of viscera from the surface of the fish and from the body cavity. 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 Fillets[4]

Defect	Recommended Defect Description
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

Pack Size	Defect Area
a) <200 g units	>25cm^2
b) 201-500 g units	>50cm^2
c) 501- 5000 g units	>150cm^2
d) 5001-8000 g units	>300cm^2
e) 8000 g units	>500 cm^2

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

[4] 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.

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

Defect	Recommended Defect Description
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

Pack Size	Defect Area
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.
Critical Bone	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.
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.

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

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 x (torque units); Strain = ln $[1+(g^2/2) + g(1+g^2/4)^{0.5}]$, where g = 0.150 x (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.

Sugar(%)=2.04 x 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)
W_0 : Weight of receptacle(g)
W_1 : 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 Section1 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/cm^2) 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.

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

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 than1cm^2 (each instance). Air pockets with a surface area of greater than1cm^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	*Gadus morhua*
Pacific cod	*Gadus macrocephalus*
Polar cod	*Boreogadus saida*
Greenland cod	*Gadus ogac*
Saithe	*Pollachius virens*
Ling	*Molva molva*
Blue ling	*Molva dypterygia*
Tusk	*Brosmius brosme*
Haddock	*Gadus aeglefinus* / *Melanogrammus aeglefinus*

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.

1. Quick Frozen Lobsters

Defect	Recommended Defect Description
a) Appearance	(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.
	The raw meat is not characteristically translucent.
	(% affected by weight)
d) Opacity	The meat of lobster, rock lobsters, spiny
e) Texture	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% From 5.1% to 10% More than 10% More than 15%	0 3 6 11
Thaw State	Black spot only in shell	Absence Up to 5% Each 4% additional or less	0 1.5 2
	Black spot in meat	Absence Up to 3% From 3.1% to 5% Each 5% additional or less	0 1 2 2
	Broken, damaged and pieces	Up to 1% From 1.1% to 3% Each 3% additional or less	1 2.5 2.5
	Dehydration	Absence Up to 2% From 2.1 to 5% More than 5%	0 3 6 11
	Dehydration in meat	Absence Slight Moderate Excessive	0 3 6 11
	Heads and unacceptable shrimps or prawns	Up to 1% Each 1% additional or less	2 3
	Extraneous material, not dangerous	1 piece 2 pieces More than 2 pieces Sand	1 2 4 21
	Uniformity of size	Slightly larger or smaller. Each 3% or fraction. Larger or smaller. Each 3% or fraction.	1 2
	Odour	Characteristic. Slightly different to characteristic. Moderately different to characteristic. Excessively different to characteristic.	0 6 12 21
	Inappropriate peel and de-vein	Absence Over 1%; not over 6% Over 6.1%; not over 10% More than 10%	0 1 2 4
	Shells	Up to 3% Each 1% additional or less	0 2
Cooked State	Texture	Firm, but tender and moist Slight Moderate Excessive	0 2 4 21
	Odour	Characteristic Slight Unpleasant	 0 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 ¾ 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 Slight Moderate Excessive	0 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

Defects	**Recommended Defect Description**
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 : (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). (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 (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. Excessive amount of viscera (one or more fish not eviscerated). Non characteristic pieces (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 Parts of head, tail, viscera or scutes each instance. Skin (fillets labelled skinless) - Each instance greater than 3 cm^2 Black Membrane - Each instance greater than 5 cm^2 Non characteristic pieces (fillets and pieces only) Flake or further disintegrated fish flesh clearly separated from fillets or pieces of fillets (expressed as % of drained fish solids material)
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

Defects	Recommended Defect Description
a) Appearance	The fish in the container : (i) are not reasonably uniform in size ; (ii) are not of an appearance or colour characteristic of the species processed or packed in the manner indicated ; (iii) are not neatly cut to remove the head ; (iv) have excessive ventral breaks (unsightly rupture of the ventral area), or breaks and cracks in the flesh. (v) More than 40% of fish in a can having ventral breaks of half the length or more of the abdominal cavity (vi) The packing medium is not of normal colour and consistency for the type. (vii) The can is not well filled with fish.
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

Defect	**Recommended Defect Description**
a) Appearance	(i) The can is not well filled with fish.
(i) Cross fill (ii) Ragged appearance	(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. 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

Defect	**Recommended Defect Description**
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..

APPENDIX XII

CODEX CODES AND STANDARDS CONCERNING FISH AND FISHERY PRODUCTS AND RELATED DOCUMENTS

Recommended International Code of Practice for the Processing and Handling of Quick-Frozen Foods	CAC/RCP 8-1976
Method of Checking Product Temperature of Quick-Frozen Foods	Addendum 1, 1978 to CAC/RCP 8-1976
Recommended International Code of Practice for Fresh Fish	CAC/RCP 9-1976
Recommended International Code of Practice for Canned Fish	CAC/RCP 10-1976
Recommended International Code of Practice for Frozen Fish	CAC/RCP 16-1978
Recommended International Code of Hygienic Practice for Shrimp or Prawns	CAC/RCP 17-1978
Recommended International Code of Hygienic Practice for Molluscan Shellfish	CAC/RCP 18-1978
Recommended International Code of Practice for Lobsters	CAC/RCP 24-1979
Recommended International Code of Practice for Smoked Fish	CAC/RCP 25-1979
Recommended International Code of Practice for Salted Fish	CAC/RCP 26-1979
Recommended International Code of Practice for Minced Fish Prepared by Mechanical Separation	CAC/RCP 27-1983
Recommended International Code of Practice for Crabs	CAC/RCP 28-1983
Standard for Quick Frozen Raw Squid	CODEX STAN 191-1995
Standard for Salted Fish and Dried Salted Fish of the Gadidae Family	CODEX STAN 167-1989, Rev. 1-1995
Standard for Canned Salmon	CODEX STAN 3-1981, Rev. 1-1995
Standard for Quick Frozen Finfish	CODEX STAN 36-1981, Rev. 1-1995
Standard for Canned Shrimp or Prawns	CODEX STAN 37-1981, Rev. 1-1995
Standard for Quick Frozen Fish Fillets	CODEX STAN 190-1995
Standard for Canned Tuna and Bonito	CODEX STAN 70-1981, Rev. 1-1995
Standard for Canned Crab Meat	CODEX STAN 90-1981, Rev. 1-1995
Standard for Quick Frozen Shrimp or Prawns	CODEX STAN 92-1981, Rev. 1-1995
Standard for Canned Sardines and Sardine-type Products	CODEX STAN 94-1981, Rev. 1-1995
Standard for Quick Frozen Lobster	CODEX STAN 95-1981, Rev. 1-1995
Standard for Canned Finfish	CODEX STAN 119-1981, Rev. 1-1995
Standard for Quick Frozen Blocks of Fish Fillets, Minced Fish Flesh and Mixtures of Fish Fillets and Minced Fish Flesh	CODEX STAN 165-1989, Rev. 1-1995
Standard for Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets-Breaded or in Batter	CODEX STAN 166-1989, Rev. 1-1995
Guide to Shellfish Hygiene by P.C. Wood	WHO Offset Publication No. 31 (1976)
Recommended International Code of Practice - General Principles of Food Hygiene (including an Annex on the HACCP System and Guidelines for its Application:	CAC/VOL. A - Ed. 1
Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories	CAC - GL 31 - 1999
WHO Guidelines for Drinking Water Quality	2nd edition, 1993