

# codex alimentarius commission



FOOD AND AGRICULTURE  
ORGANIZATION  
OF THE UNITED NATIONS

WORLD  
HEALTH  
ORGANIZATION



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**ALINORM 08/31/18**

## **JOINT FAO/WHO FOOD STANDARDS PROGRAMME**

### **CODEX ALIMENTARIUS COMMISSION**

*Thirty-first Session*  
*Geneva, Switzerland, 30 June – 4 July 2008*

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

*Trondheim, Norway*  
*18 – 23 February 2008*



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CX 5/35

CL 2008/5-FFP  
February 2008

**TO:** Codex Contact Points  
Interested International Organizations

**FROM:** Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme,  
FAO, 00153 Rome, Italy

**SUBJECT:** **Distribution of the Report of the 29<sup>th</sup> Session of the Codex Committee on Fish and Fishery Products (ALINORM 08/31/18)**

**A. MATTERS FOR ADOPTION BY THE 31<sup>st</sup> SESSION OF THE CODEX ALIMENTARIUS COMMISSION**

**Proposed Standards and Related Texts at Step 8 of the Procedure**

1. Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs and Lobsters and relevant Definitions) (para. 62, Appendix II); and
2. Draft Standard for Raw and Live Bivalve Molluscs (para. 112, Appendix III)

Governments wishing to propose amendments or comments on the above document should do so in writing in conformity with the Guide to the Consideration of Standards at Step 8 (see Procedural Manual of the Codex Alimentarius Commission) to the above address **before 30 April 2008**.

**B. REQUEST FOR COMMENTS**

**Draft Standards and Related Texts at Step 6 of the Procedure**

3. Code of Practice for Fish and Fishery Products (Crabs and relevant Definitions) (para. 62, Appendix IV);
4. Draft Standard for Sturgeon Caviar (para. 122, Appendix V); and
5. Proposed Draft List of Methods for the Determination of Biotoxins in the Draft Standard for Raw and Live Bivalve Molluscs (para 112, Appendix XI)

Governments wishing to submit comments should do so in writing to the above address **before 30 September 2008**.

**Proposed Draft Standards and Related Texts at Step 3 of the Procedure**

6. Proposed Draft Code of Practice for Fish and Fishery Products (other sections including smoked fish) (para. 124, Appendix VI);
7. Proposed Draft Standard for Smoked Fish, Smoked-Flavoured Fish and Smoked-Dried Fish (para. 150, Appendix VII);
8. Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat (para. 132, Appendix VIII);
9. Proposed Draft Code of Practice on the Processing of Scallop Meat (para. 135, Appendix IX); and

10. Proposed Draft Revision of the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products (para.156, Appendix X).

Governments wishing to submit comments should do so in writing to the above address **before 30 September 2008.**

## SUMMARY AND CONCLUSIONS

The summary and conclusions of the 29<sup>th</sup> 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 (Live and Raw Bivalve Molluscs and Lobsters and relevant Definitions) (para. 62, Appendix II); and the Draft Standard for Live and Raw Bivalve Molluscs (para. 112, Appendix III).

### **Other matters of interest to the Commission:**

The Committee agreed to

return to Step 6:

- Proposed Draft Code of Practice for Fish and Fishery Products (Crabs and relevant Definitions) (para. 62 Appendix IV);
- Draft Standard for Sturgeon Caviar (para. 122, Appendix V); and
- Proposed Draft List of Methods for the Determination of Biotoxins in the Draft Standard for Raw and Live Bivalve Molluscs (para. 112, Appendix XI);

agreed to return to Step 3

- Proposed Draft Code of Practice for Fish and Fishery Products (other sections including smoked fish) (para. 124, Appendix VI);
- Proposed Draft Standard for Smoked Fish (para. 150, Appendix VII);
- Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat (para 132, Appendix VIII);
- Proposed Draft Code of Practice on the Processing of Scallop Meat (para.135, Appendix IX); and
- Proposed Draft Revision of the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products (para. 156, Appendix X).

agreed to return to Step 2 for redrafting, circulation at Step 3 and further discussion at the next Session of the Committee:

- Proposed Draft Standard for Fish Sauce (para. 164);
- Proposed Draft Standard for Fresh/Live and Frozen Abalone (para. 171).

agreed to defer discussion on the Proposed Draft Amendment to the Standard for Quick Frozen Fish Sticks (para. 165).

### **Matters of interest to Other Committees and Task Forces**

#### **Codex Committee on Food Additives (CCFA)**

The Committee:

- was unable to provide clarification on the type of annatto extracts and the basis (bixin or norbixin) and agreed to consider this matter further at its next Session (para. 9).

#### **Codex Committee on Food Hygiene (CCFH)**

The Committee:

- provided the following clarification to questions posed by the 38<sup>th</sup> Session of the CCFH on the hygiene provisions in this Standard (paras 66-76 and paras 89-93, Appendix III):
- The Committee agreed to refer only to the limit for *E.coli* irrespective of the type of

indicator bacteria used in growing-area monitoring programmes;

- The Committee explained that *E.coli* as an indicator has been used for a long time and was effective to monitor the safety of end products and that its inclusion in the standard should not be delayed with the understanding that it could always be reviewed when further scientific advice became available;
- The Committee included action to be taken when microbiological criteria were not met, including detention, recall and further processing.
- The Committee explained that the use of a three-class sampling plan for *E.coli* was consistent with the General Guidelines on Sampling (CAC/GL 50-2004) and with the recommendations by the ICMSF.
- The Committee agreed to defer consideration of a criterion for *Vibrio parahaemolyticus* pending completion of the work undertaken by the Committee on Food Hygiene.
- The Committee provided an analytical method for *Salmonella* in Section I-7.

#### **Matters of Interest to FAO/WHO**

The Committee agreed to ask scientific advice from FAO and WHO on the following question:

“In the context of harvesting area monitoring for faecal contamination and lot contamination, estimate the risk mitigation for *Salmonella* in bivalve molluscs when different sampling plans and microbiological criteria are applied.” (paras 89-93)

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## INTRODUCTION

1. The Codex Committee on Fish and Fishery Products held its 29th Session in Trondheim, Norway from 18 to 23 February 2008, at the kind invitation of the Government of Norway. The Session was chaired by Dr Bjørn Røthe Knudsen, Regional Director of Norwegian Food Safety Authority. The Session was attended by 148 delegates representing 50 Member States, one Member Organization (EC) and 1 international organization. The complete list of participants is attached to this report as Appendix I.

## OPENING OF THE SESSION

2. Mr Jørn Krog, Secretary General of the Ministry of Fisheries and Coastal Affairs of Norway, welcomed participants and stated that the work done by the Committee was of uppermost importance for Norway and highlighted that the recent creation of the Norwegian Food Safety Authority was in order to reflect the food chain approach. He noted that work of the Committee was relevant to all regions of the world and emphasized that the basis for the work of the Committee was consumer health protection, trade and economic development worldwide. In concluding, he highlighted the key elements to achieve the aims of the Committee, namely through consensus, compromise and the understanding of other countries' points of view and wished the Committee good progress.

## ADOPTION OF THE AGENDA (Agenda Item 1)<sup>1</sup>

3. The Committee accepted the proposal of the Delegation of Canada to include under agenda item 14, consideration for the need for a standard for cadmium content in shrimps and prawns and to the proposal of Delegation of Thailand to postpone discussion on agenda item 12 until the next session since research on interim nitrogen factors had not been completed. The Delegation of Thailand further encouraged other countries in the Asia region to contribute to the current research. With these changes, it adopted the Provisional Agenda as proposed.

4. The Committee noted that the division of competence between the European Community and its Member States, according to paragraph 5, Rule II of the Procedure of the Codex Alimentarius Commission, as presented in CRD 1.

## MATTERS REFERRED TO THE COMMITTEE BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER CODEX COMMITTEES (Agenda Item 2)<sup>2</sup>

5. The Committee noted the information presented in CX/FFP 08/29/2 including the need to prepare project documents according to the format set out in the Procedural Manual; the additional guidance by the Executive Committee with regard to the application of the Criteria for the Establishment of Work Priorities Applicable to Commodities; the information provided by the OIE on the status of work on aquatic animal feed; and that some matters would be discussed in detail under relevant Agenda items. The Committee further noted that ISO had established a technical committee, ISO/TC234, on fisheries and aquaculture in which Codex and FAO had liaison status.

6. In particular, the Committee commented and/or made decisions as follows:

### Food Additives

7. The Committee noted the decision of the 30<sup>th</sup> Session of the Commission that no consequential changes should be made to commodity standards at this stage when adopting food additive provisions in the GSFA, recognizing that inconsistencies would exist between the GSFA and commodity standards until the GSFA would be finalised. The Committee considered that since one of its functions was to revise standards when necessary, it could proceed to revise current standards to bring in line its food additive provisions with those of the GSFA or that it could retain the inconsistencies until such time as the GSFA had been completed. In addition it was noted that there were several inconsistencies in the way in which the Committee approached general statements relating to food additive provisions. The Committee therefore agreed to consider work on aligning food additive provisions across the different standards for fish and fishery products and to ensure consistency with GSFA,

<sup>1</sup> CX/FFP 08/29/1; CRD 1 (Division of competence between the European Community and its Member States).

<sup>2</sup> CX/FFP 08/29/2

where necessary, at the next session. In view of this decision, the Committee further agreed that the list of food additives in the Annex to CX/FFP 08/29/2, which indicated recently adopted additives for food categories relating to fish and fishery products for inclusion in the GSFA, but which were not allowed in certain standards relating to fish and fishery products, would be circulated for comments and discussion by the next session of the Committee.

8. The Committee agreed that this question would be discussed further under Agenda item 14 Other Business and Future Work

#### **Annatto extracts**

9. The Committee recalled that, following the establishment of two new ADIs for annatto extracts by the 67<sup>th</sup> JECFA, the Committee on Food Additives had asked clarification on the type of annatto extracts and the basis (bixin or norbixin) for the acceptable maximum use levels for annatto extracts in the Standard for Quick-Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets – Breaded or in Batter (CODEX STAN 166-1989). The Committee was unable to provide clarification on this matter and it was agreed that it would be considered by the next session of the Committee.

#### **Strategic Plan 2008-2013 of the Codex Alimentarius Commission**

10. The Committee noted the Activities 1.1, 1.2, 2.5, 3.3, 4.1, 5.5 and 5.6 of the Strategic Plan 2008-2013, and in particular noted that the assignments given in relation to the implementation of the Strategic Plan such as the review and development of Codex standards and related texts for food safety and for food quality were ongoing work.

11. The Committee had a brief discussion on the need to develop committee-specific decision-making and priority-setting criteria and noted that its current consideration of proposals for new work were based on the Criteria for the Establishment of Work Priorities and were adequate for this Committee.

#### **DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS (LIVE AND RAW BIVALVE MOLLUSCS, LOBSTERS AND CRABS AND RELEVANT DEFINITIONS) (Agenda item 3)<sup>3</sup>**

12. The Committee recalled that the Draft Code had been adopted at Step 5 by the Commission and circulated at Step 6 for comments. The Committee considered the Draft Code section by section and made the following amendments and comments, in addition to editorial changes.

13. The Committee took into account all relevant food safety issues considered under the Draft Standard for Live and Raw Bivalve Molluscs in order to ensure consistency between the Standard and Section 7 of the Code.

#### **Section 2.3 Definitions – Live and Raw Bivalve Molluscs**

14. The Committee agreed to add a definition for “Depuration Centre”, as this term was used in the Code.

#### **SECTION 7 LIVE AND RAW BIVALVE MOLLUSCS**

15. The Committee agreed to retain the most recent flow chart and to update the reference to the corresponding sections of the Code, and agreed that the title of section 7.11 should be Distribution and Transport.

16. Under Section 7.1 General Remarks, the Committee made some limited amendments for clarification purposes. Throughout the document several amendments were made for clarification purposes, or to ensure consistency throughout the text or with other Codex texts, or to insert additional references. These changes appear in the Appendix but are not described in detail in the report.

#### **7.2 Classification and Monitoring of Growing Areas**

17. The Committee agreed to add some examples of bacterial pathogens and chemical contaminants as similar examples were provided for the other hazards listed.

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<sup>3</sup> CX/FFP 08/29/3 (Brazil, Kenya and New Zealand), CX/FFP 08/29/3-Add.1 (comments of the EC), CRD 2 (comments of Japan), CRD 3 (comments of Canada), CRD 9 (comments of the United States), CRD 12 (comments of Indonesia)

18. In section 7.2.1, a reference to sampling for classification purposes was added in the 5<sup>th</sup> paragraph. In the 6<sup>th</sup> paragraph, the Committee agreed that there was no need to refer to any specific examples of “approved processing to reduce of limit target organisms” as it was clear that only treatments approved at the national level could be allowed.

19. The Delegation of Japan proposed to refer to “microbiological pathogen” throughout the document in order to avoid any confusion, or alternatively to specify that in some cases “microbiological growth” or “survival of pathogens” was a better description of the hazard than “microbiological contamination”. Other delegations pointed out that whether pathogens were present as a result of initial contamination, survival or growth, the hazard was always microbiological contamination. The Committee also recalled that as a result of earlier discussion it had been agreed to retain this terminology.

### **7.2.2. Monitoring of Growing Areas**

20. The Delegation of the United States pointed out that there were different possibilities for monitoring waters and that the use of faecal coliforms and total coliforms as indicators should be retained in addition to *E.coli*, as they allowed effective control of contamination in order to ensure the safety of bivalves. Other delegations supported this view and recalled that the recommendations of the Committee on Food Hygiene concerning the need for a single indicator in the Draft Standard had been taken into account under Agenda Item 4, while a more flexible approach could be taken in the Code for the purposes of monitoring. These delegations pointed out that the important objective was to ensure the safety of bivalves and that this could be achieved through different monitoring systems at the national level.

21. In section 7.2.2.3 Marine Biotxin Control, the Committee agreed to add a new sentence in the fifth paragraph in order to clarify the relationship between testing for a particular biotoxin and the occurrence of that biotoxin in bivalve molluscs.

22. The Committee also added a new section on Marine Biotxin Test Methods referring to the methods used in the Draft Standard and clarifying that “any methods may be used for screening purposes provided they have been approved by the competent authority”.

### **7.3 Harvesting and Transportation of Live Bivalve Molluscs**

23. Some delegations pointed out that re-circulated water was used for washing bivalves and the Committee agreed that re-circulated water could be used if it met the definition of clean water.

### **7.4 Relaying**

24. Under Technical Guidance it was agreed that suitable control systems should be in place (first indent) and it was clarified that the purpose of relaying was to ensure that contamination levels have been adequately reduced (second indent).

### **7.5 Depuration**

25. It was agreed to include chemical contamination as a potential hazard since it was recognized that such contamination originating from depuration tanks could occur at this stage. Some delegations indicated that although at the present time depuration could not reduce contamination with viruses and *Vibrio* spp, the provisions in the Code should not limit the use of new control measures that might be developed in the future. The Committee agreed that the text should reflect the current application of depuration and noted that the section could always be reviewed in the light of new scientific evidence or technological innovation. The relationship between bacteria indicators and contamination by viruses and *Vibrio* was clarified in the 5<sup>th</sup> indent.

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

26. In section 7.6.5.2, chemical and physical contamination were added under Potential Hazards and physical damage under Potential Defects, and in section 7.6.6 a new indent was added concerning the need to maintain temperature.

### **7.7 Processing to Reduce or Limit Target Organisms**

27. It was agreed to delete the last sentence of the first paragraph on the examples of processing applied to reduce or limit target microorganisms and to add a reference to the Proposed Draft Guidelines for the Validation of Food Safety Control Measures forwarded to the Commission for adoption.

### **7.9 Documentation**

28. The Committee discussed the additional requirements proposed by the Delegation of the EC for inclusion in the document that should accompany the consignments sent to a distribution centre.

29. Several delegations supported the use of the scientific name in addition to the common names in order to identify clearly the bivalve molluscs, especially as common names may vary. Other delegations indicated that this was not common practice in all countries and may not be always necessary. It was also proposed to leave the decision on this requirement to the competent authority. After some discussion, the Committee agreed that the documentation would refer to common and/or scientific names. The delegations of the European Community and Egypt expressed their reservation on this decision.

30. As regards the destination of the batch, several delegations pointed out that the destination would be known when the consignment arrived in the distribution centre, but not in the depuration centre, and it was agreed to separate the requirements accordingly. In the case of distribution centres and establishments, the following information was required: the date and duration of depuration; the date, duration and location of relaying; and the responsible's identity and signature. The Committee agreed that storage and transport temperatures should be indicated in the documentation and that the status of the growing areas should be indicated in addition to its location.

### **7.10 Lot Identification and Recall Procedures**

31. The Committee agreed that to retain only the first paragraph of the section as it provided clear guidance and to refer to "traceability/product tracing" instead of "trace back" in order to ensure consistency with Codex terminology.

32. The Committee recognized that substantial progress had been made and therefore agreed to advance the section on live and raw bivalve molluscs to Step 8 for adoption by the 31<sup>st</sup> Session of the Commission.

## **SECTION 13 PROCESSING OF LOBSTERS**

33. The Committee first considered the definitions relating to this section (section 2.9) and agreed to delete all those proposed definitions which were not used in the text.

34. The Committee considered the text section by section and made the following amendments and comments, in addition to editorial changes.

35. The Committee had a lengthy discussion on the use of water chlorination in section 13.1.2 Hygiene Control Programme. The Delegation of the European Community reiterated its opposition to allow the use of chlorinated water in the Code and proposed to delete the first two bullet points and to replace with text which would allow for an establishment to use chlorine for water treatment provided that the residual chlorine did not exceed levels for potable water. The Delegation of Brazil proposed to maintain the first two bullet points and reminded the Committee that a discussion paper previously presented to the Committee by the WHO<sup>4</sup> had shown that residual levels of chlorine of up to 10mg/l did not pose a risk to human health. The Delegation further noted that further scientific advice on chlorination would be forthcoming from FAO/WHO.

36. Several other delegations that spoke, while recognising that current data indicated that levels of use of chlorine posed no risk to human health, supported the proposal since it provided some form of flexibility. These delegations further recognized that in future the advice of the FAO/WHO should be considered once it became available.

37. In view of the discussion, the Committee agreed to replace the two bullet points with the amended text as proposed and noted the reservation of the Delegation of Brazil to this decision for the reasons mentioned above.

<sup>4</sup> CX/FFP 00/13 Document prepared by WHO with cooperation of FAO.

38. In the flow chart for frozen raw lobster processing (Figure 13.1), it was agreed to align title boxes with those in the text and to connect the box on “chilling” to the box on “freezing” to reflect that the chilling process occurred prior to freezing. The Committee further noted that the flow chart was for illustrative purposes only and did not necessarily include all processes in the production of these products.
39. The Committee agreed to delete the potential hazard, marine biotoxins (saxitoxins) and the fifth bullet point on technical guidance in section 13.3.1.1 since this hazard did not apply to the tail portion of lobsters.
40. In section 13.3.1.2, the potential defect “lobster mortality” was replaced by “lobster decomposition” to more accurately describe the defect and to also apply this change to section 13.3.1.3.
41. In the first bullet point on technical guidance in section 13.3.1.4, it was agreed to include water as outlined in section 13.1.2 for consistency with earlier decision to amend section 13.1.2 and to make this change throughout the document, wherever applicable.
42. The title of section 13.3.1.7 was changed to include grading and as a consequence to include “incorrect grading” as a potential defect.
43. In section 13.3.1.8 it was agreed to add “microbial contamination” as a potential hazard to reflect the possibility of such contamination occurring during chilling.
44. It was agreed to delete the second bullet point on technical guidance in section 13.3.1.9 since whole lobster was outside the scope of this section. It was noted that the general provisions of this section outlined processing of whole lobsters.
45. The first three bullet points on technical guidance in section 13.3.1.10 were deleted since these were already covered by section 8.3.2. The potential hazard was changed to microbiological contamination with the understanding that microbiological growth resulted in contamination and to apply this change throughout the document where appropriate.
46. The technical guidance on sulphites in section 13.3.1.11 was moved to 13.3.1.5 Application of additives to lobster tails as more appropriate.
47. The fifth bullet point on technical guidance in section 13.3.2.5 was deleted since it was covered by the first bullet point in this section.
48. It was agreed to include as a potential hazard, microbial contamination and as a defect, incorrect net weight in section 13.3.2.8 to better clarify the hazards and defects resulting from weighing, grading and wrapping.
49. The potential hazards and defects in section 13.3.2.9 were changed to include microbiological contamination and deterioration, respectively.
50. In view of the progress made on the Code, the Committee agreed to advance the Code to Step 8 for adoption by the 31<sup>st</sup> Session of the Commission. The Delegation of Brazil expressed its reservation to this decision in view of its earlier reservations.

## **SECTION 13 PROCESSING OF CRABS**

51. The Committee first considered the definitions relating to this section and agreed to delete all those proposed definitions which were not used in the text; to delete the definition for “viscera”; to change the definition for “pasteurisation” to clarify that the aim of pasteurisation was to inactivate spoilage and pathogenic microorganisms; and to include a definition for “brown meat”.
52. The Committee considered the text section by section and made the following amendments and comments, in addition to editorial changes.
53. Parasites such as the foodborne trematode, *Paragonimus* in certain species of fresh-water crabs, were added as additional potential hazards and the scientific names were provided for the types of crabs indicated for biotoxin hazards for purposes of clarity in Section xx.2.1.1.

54. The Committee had a lengthy discussion on whether to include biotoxins for certain species of crabs as potential hazards in section xx.3.1.1. Several delegations questioned whether species associated with biotoxins posed a risk to human health and whether these species were implicated in outbreaks of shellfish poisoning. It was clarified that certain species of crabs could accumulate biotoxins in the brown meat, in particular those associated with DSP and ASP, and had been implicated in outbreaks. The Committee therefore agreed to include biotoxins for certain species in addition to parasites as potential hazards at this stage of the process and in subsequent sections as appropriate. In addition it was agreed to add a new second bullet point to illustrate that it was important at this point in the processing to determine whether these species were suitable for consumption.
55. In section xx.3.1.2 storage in fresh water was included under technical guidance to accurately reflect common practice.
56. It was agreed to align the use of water for the cleaning of crab with an earlier decision to allow for the use of water chlorination (see Agenda Item 3) and to delete the text in square brackets in section xx.3.1.3 since it was unnecessary to stipulate specific times for cooling.
57. It was agreed to delete “survival of pathogens microorganisms” as a potential hazard in section xx.3.1.4 since it was recognised that the cooking process was not intended to reduce or eliminate pathogens, but rather to aid the removal of the crab flesh. As a consequence to this decision, it was agreed to delete reference to pathogenic bacteria in the 4<sup>th</sup> bullet point and to move the 5<sup>th</sup> bullet point referring to the time and temperature for killing of trematodes to section xx.3.1.10. It was further agreed to delete bullet point 7 since stipulation of temperatures for cooking was considered too prescriptive.
58. Section xx.3.1.7 was renamed to also include viscera fragment removal and viscera and shell fragments were included as potential defects.
59. The seventh bullet on technical guidance in section xx.3.1.10 was amended to clarify that products that undergo pasteurisation were not shelf-stable by indicating that products should be exposed to procedures that would specifically address non-proteolytic *Clostridium botulinum* risk and that time and temperatures should inactivate microorganisms that could grow during storage. Similarly, in line with an earlier decision not to be too prescriptive with regard to temperatures for cooking, the text in square brackets (bullet point 8) was deleted.
60. The Committee had a discussion on the use of chlorinated water in section xx.3.1.11. The Committee could not reach consensus on this matter and agreed to retain the text unchanged for further consideration by the next session while noting that the use of chlorinated water was in line with Section 16.4.5 of the Code.
61. The Committee did not consider the section on chilled and frozen cooked crab due to time constraints and therefore agreed to return the draft Code to Step 6 for further comments and discussion at the next session with a view to its finalisation at that session. The Committee agreed to establish a working group led by Brazil that would meet immediately prior to the next Session to consider comments received at Step 6 and to prepare proposals for consideration by the Committee.

**Status of the Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs, Lobsters and Crabs and relevant Definitions)**

62. The Committee agreed to advance the Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs and Lobsters and relevant related definitions) to Step 8 for adoption by the 31<sup>st</sup> Session of the Commission and sections relating to hygiene and labelling to the relevant Committees for their endorsement (see Appendix II) and to return the Section on Crabs to Step 6 for comments and further consideration by the next session (see Appendix IV).

**DRAFT STANDARD FOR LIVE AND RAW BIVALVE MOLLUSCS (Agenda item 4)<sup>5</sup>**

63. The Committee recalled that the Draft Standard had been adopted at Step 5 by the Commission and circulated at Step 6 for comments. As the Committee on Food Hygiene had not endorsed the provisions on food

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<sup>5</sup> CX/FFP 08/29/3-Add.1 (comments of the EC), CRD 2 (comments of Japan), CRD 3 (comments of Canada), CRD 9 (comments of the United States), CRD 11 (comments of Norway), CRD 12 (comments of Indonesia), CRD 17 (comments of France)

hygiene, the Commission had recommended that the CCFFP consider the questions from the CCFH in the development of the standard and consider the need for further scientific advice on biotoxins.

64. The Committee considered the Draft Standard section by section and made the following amendments and comments.

## **PART I LIVE BIVALVE MOLLUSCS**

### **I-3. Essential Composition and Quality Factors**

65. The Committee agreed to delete section I-3-2 on Ice for Packing as this was not relevant for live molluscs and the general definitions and requirements concerning water were covered in the Code of Practice.

### **I-5 Hygiene and Handling**

66. The Committee recalled that the Committee on Food Hygiene had not endorsed the provisions of this section and had recommended the following:

a) microbiological criteria be revised to address the requirements of the *Principles for the Establishment and Application on Microbiological Criteria for Foods*; scientific basis for these criteria; sampling plans; actions to be taken;

b) review the manner in which the two sets of microbiological criteria for *E.coli* and the one for faecal coliforms were presented;

c) clarify why a 3-class sampling plan was proposed;

d) include analytical methods for *Salmonella* and *V.parahaemolyticus*

e) clarify why a method dating back to 1970 was proposed for faecal coliforms, and whether more recent methods, were not considered.

f) In the case of indicators for faecal contamination, the Committee requested scientific justification for providing two options and further recommended that only one microbiological criterion be set as an indicator of faecal contamination.

g) with regard to the proposed criterion for *Vibrio parahaemolyticus*, clarification is necessary on whether this level was for pathogenic strains or for the most probable number of all strains of *V.parahaemolyticus*.

67. The Committee considered the questions and provided the following replies or comments to these questions.

68. As regards the indicators of faecal contamination, it was agreed to refer only to the limit for *E.coli*, irrespective of the type of indicator bacteria used in growing-area monitoring programmes which addressed questions b) e) and f). In reply to question b), the Committee agreed to clarify the presentation of the limit according to the presentation used for other similar criteria.

#### **Question a)**

69. The Delegation of Japan pointed out that the criteria proposed either for *E.coli* or for *Salmonella* were not based on a risk assessment as required in the *Principles for the Establishment and Application on Microbiological Criteria for Foods* and general requirements for Codex food safety standards, and therefore proposed either to ask for a specific risk assessment in order to justify the use of these criteria, or to transfer the provisions for *E.coli* to the Code of Practice as they related to monitoring of the growing areas.

70. Several delegations expressed the view that *E.coli* as an indicator had been used for a long time and was effective to monitor the safety of the end product, and its inclusion in the standard should not be delayed, with the understanding that it could always be reviewed when further scientific advice became available.

71. The Representative of FAO stressed the importance of scientific advice as well as effective control measures to control contamination and indicated that these approaches could be followed concurrently, and that if necessary FAO/WHO would be ready to consider further questions put forward by the Committee.

72. The Committee agreed to add a new section I-5-5 considering the action to be taken by the competent authority when microbiological criteria were not met, including detention, recall and further processing.

Question c)

73. The Committee indicated that the use of a three class sampling plan was consistent with the General Guidelines on Sampling (CAC/GL 50-2004) and with the recommendations by the International Commission on Microbiological Specifications for Foods in Microorganisms in Foods 2: Sampling for Microbiological Analysis: Principles and Specific Applications. It was also noted that the Scientific Committee of the European Food Safety Authority (EFSA) recommended using *E.coli* as an indicator for faecal contamination, determined by method ISO/TS 16649-3.

74. The Delegation of the United States questioned the use of the methodology recommended by EFSA for the purpose of testing bivalves according to the limit specified in the standard as all references indicated that it was used for testing the water in growing area, and pointed out that provisions intended for monitoring, as opposed to testing of the end product, should be included in the Code of Practice. The Delegation also recalled that the Committee on Food Hygiene had not questioned the limit for *Salmonella* as it clearly applied to the end product, whereas there was a need for further clarification as to the purpose of the limit for *E.coli*. Some delegations expressed the view that this question should not be considered at this stage as this was not directly relevant to the questions put forward by CCFH.

Question d)

75. The Representative of FAO informed the Committee that, according to the FAO/WHO risk assessment on *Vibrio parahaemolyticus*, the impact of regulations based on numbers of *V. parahaemolyticus* on public health would be highly variable depending on geographical location and a limit of 100 *V. parahaemolyticus*/g would result in up to 67% oysters in some areas being unfit for live consumption.

76. The Committee agreed to defer consideration of a criterion for *Vibrio parahaemolyticus* pending completion of the work undertaken by Committee on Food Hygiene on a Code of Hygienic Practice for *Vibrio* spp. in seafood and therefore did not need to discuss related questions d) and g). The methods for *Salmonella* were considered under section I-7.

### **Marine Biotoxins**

77. The Representative of FAO recalled that the levels of biotoxins proposed for inclusion in the standard were based on an FAO/ IOC/WHO Expert Consultation which had taken into account all available scientific information and that the results of the Consultation had been extensively discussed in the two previous sessions of the Committee.

78. The Committee was informed that the EFSA was in the process of developing scientific advice for biotoxins and that the first opinion on okadaic acid and analogues was issued in November 2007, as the first opinion in a series of nine opinions on the various biotoxins.

79. The Committee agreed that at this stage it was not necessary to ask for additional scientific advice from FAO/WHO and that this issue would be kept under review and may be reconsidered when further scientific advice became available.

80. The Committee agreed on all the levels proposed for biotoxins with some editorial amendments to the presentation of the section.

81. The Committee agreed to transfer marine biotoxins to a new section I-5 Contaminants, as proposed by several delegations and following the recommendation of the Committee on Food Hygiene, and to insert the general statement on contaminants in the Format of Commodity Standards. As a result, following sections were renumbered and the initial and new number are listed in the following sections.

### **I-6 (I-7) Labelling**

82. The Committee had an extensive discussion on the labelling provisions under section I-6.4, several delegations proposed amendments referring to the traceability requirements. The Representative of FAO pointed out that confusion should be avoided between traceability and labelling requirements, as traceability and recall



were addressed through adequate procedures in the establishment, whereas labelling was for the purpose of information. The Secretariat indicated that according to the format of the General Labelling Standard, the labelling section referred to specific information that should appear in the label, not to a list of examples, while traceability and recall were addressed in relevant codes and guidelines.

83. As regards the first indent (i) on the identification of the product, the Delegation of the EC expressed the view that the reference to scientific name of the product was essential in addition to the common names in order to identify clearly the bivalve molluscs, especially as common names may vary according to the country or region and the language used. Other delegations indicated that this was not common practice in all countries and should not be a general requirement in the standard.

84. After some discussion, the Committee agreed to some rewording of the section to follow the usual format of labelling sections. In indent (i) it was agreed that the labelling of non retail containers should include the identification of the product by its common and/or scientific name, as determined by the competent authority, while leaving the possibility to the country where the product is sold to require the scientific name.

85. The second indent was reworded in order to clarify the information required and in the third indent it was agreed that date of minimum durability may be replaced by the statement “bivalve molluscs must be alive when sold”.

#### **I-7 (I-8) Sampling, Examination and Analysis**

86. The Committee agreed to delete the reference to the General Guidelines on Sampling as the Guidelines did not provide specific sampling plans. A new indent (ii) was inserted to clarify the representativity of the sample.

#### **I-7.4 (I-8.4) Methods of Analysis of *E.coli***

87. The first sentence referring to faecal coliforms was deleted in view of the earlier decision that this indicator would not be used in Hygiene section and the updated method of analysis for *E.coli* was included. It was also agreed to delete the second paragraph on viruses as there was no specific provisions for virus and it was noted that guidance could be included in the Code if required.

#### **I-7.5 Sampling**

88. The first sentence referring to faecal coliforms was deleted in view of the earlier decision that this indicator would not be used in the Hygiene section.

#### ***Salmonella***

89. The Committee discussed the use of methods of analysis and sampling plans for *Salmonella*. The Committee considered the text proposed by the Delegation of South Africa proposing that “in five 25g samples of the edible parts (the whole part or any part intended to be eaten separately), no sample may indicate the presence of *Salmonella* when tested using a method validated against the reference method ISO 6579.”

90. Some delegations pointed out that when testing for *Salmonella* in the areas where the occurrence was known to be high, the number of samples should be much higher (50 or 60) but that for routine testing five samples could be used. The Delegation of the United States proposed to prepare a table with the different sampling levels that could be used according to the prevalence of *Salmonella*. The Committee agreed that the number of samples would depend on the incidence of *Salmonella* but recognized that it was not possible to develop such a table at this stage.

91. The Committee noted that a useful guidance was provided in Table 8 Classification of Sampling Plans according to the nature and concern of hazard of the General Guidelines on Sampling.

92. After some further discussion, the Committee agreed to retain the text referring to 5 samples, as mentioned above, and to ask for scientific advice from FAO and WHO on the following question:

“In the context of harvesting area monitoring for faecal contamination and lot contamination, estimate the risk mitigation for *Salmonella* in bivalve molluscs when different sampling plans and microbiological criteria are applied”

93. The Representative of FAO indicated that FAO and WHO would consider the different sampling plans used according to the level of prevalence and concentration of *Salmonella* in the bivalve molluscs and the criteria applied, and invited countries to provide relevant information on their experience and data in this area.

#### **I-7.6 Determination of Biotoxins**

94. The Committee recalled that the Committee on Methods of analysis and Sampling had endorsed only the method for the saxitoxin group as the other methods listed in the standard were not validated, and agreed to include only that method in the section at this stage.

95. As regards the suggestion of the CCMAS to consider method AOAC 2006:2 for the determination of domoic acid, the Delegation of the EC expressed view that this method could be used for screening purposes but that the HPLC method should be used for confirmation.

96. Some delegations, while recognizing that only validated methods could be included in the standard, expressed the view that the list proposed at the last session included methods that were currently used and provided useful guidance for governments, and that it should be kept under review.

97. As proposed by the Delegation of New Zealand, the Committee recommended that any method proposed for inclusion must first be validated and approved by a suitably qualified body, for example AOAC or CEN and then be submitted by a member country to CCFFP for inclusion into the Table. Applications for inclusion of any method will need to be accompanied by supporting documentation and be ratified by CCMAS.

98. The Committee agreed to return the Table of methods for determination of biotoxins to Step 6 for further comments and consideration at the next session (see Appendix XI)

#### **I-8 Definition of Defectives**

99. The Committee agreed to amend the terminology in section 8.2 in order to ensure consistency with similar section in the standards for fish and fishery products.

### **PART II RAW BIVALVE MOLLUSCS**

100. The Committee aligned the provisions in Part II with those of the corresponding section in Part I where necessary.

#### **II.3. Essential Composition and Quality Factors**

101. The Committee agreed to delete section II-3.2 Glazing as this was not an essential factor for the product itself, packing medium was covered under section 3.3, and provisions on glazing and the use of ice were addressed in the Code of Practice.

#### **II-4 Food Additives**

102. The Committee agreed that the only additives allowed in this product were antioxidants listed in the relevant food categories (09.1.2 and 09.2.1) in the General Standard for Food Additives. The Committee noted that several colours were currently included in the GSFA but confirmed its earlier decision that colours should not be allowed in bivalve molluscs.

#### **New section**

103. The Committee agreed to add a new section II-5 Contaminants referring to section I-5, following its earlier decision under Section I and the rest of the standard was renumbered accordingly. The numbering of the working document is included in the present document together with the new numbering in parenthesis.

#### **II-5 (II-6) Hygiene and Handling**

104. The Committee agreed to insert a reference to the corresponding section in Part I to avoid duplication. The Committee discussed whether the product should comply with the provisions applying to live bivalves prior to shucking, freezing, or processing to reduce target organisms. Some delegations pointed out that if the live bivalves did not meet the criteria, they could be processed to reduce target organisms, and therefore proposed to retain only shucking and freezing. After some discussion, it was agreed that the important issue was to ensure

compliance with the requirement of the corresponding section under Part I and the text was amended accordingly.

105. The Committee inserted a new section referring to action to be taken when the criteria was not met for consistency with Part I.

## **II-6 (II-7) Labelling**

106. Under Storage Instructions, the Committee agreed to delete the reference to quality and replace it with “safety characteristics” and to require the date of durability or date of shucking, to take into account current practice in different countries.

107. The Committee discussed the need for validation of safety claims and it was noted that this validation study was not generally carried out by the competent authority. As it was noted that the question of validation was addressed in the Code, the text was amended accordingly with a reference to the Code.

## **II-7 (II-8) Sampling, Examination and Analysis**

108. The Delegation of New Zealand proposed to include a specific definition of the lot referring to product from no more than one day’s processing. The Delegation of the United Kingdom stressed the importance of ensuring traceability to the harvesting area and therefore proposed that the definition refer to one day’s harvest. Other delegations pointed out that in processing establishments, bivalves came from various harvesting areas and that the lot should be based on the production from the establishment rather than the harvesting area.

109. After some discussion, the Committee agreed that as the general definition of a lot included in the General Guidelines on Sampling (CAC/GL 50-2004)<sup>6</sup>, was adequate for the purpose of the section, no specific definition was necessary either for raw or for live bivalves.

110. In section II-7.5.1 (II-8.5.1), the Committee clarified that this procedure for thawing would be used for determination of net weight of other quality characteristics, but would not be applied when the sample was intended for microbiological analysis.

111. The Committee recognized that substantial progress had been made on all pending issues and that the finalisation of the standard was very important to address complex food safety issues affecting consumers’ health.

## **Status of the Draft Standard for Raw and Live Bivalve Molluscs**

112. The Committee agreed to advance the Draft Standard to Step 8 for adoption by the 31<sup>st</sup> Session of the Codex Alimentarius Commission (see Appendix III) and to return to Step 6 the Additional List of Methods for the determination of biotoxins for further comments and consideration at the next session (see Appendix XI).

## **DRAFT STANDARD FOR STURGEON CAVIAR (Agenda Item 5)<sup>7</sup>**

113. The Committee recalled that its last session had agreed to return the draft Standard to Step 6 for further comments and consideration by this session.

114. The Committee discussed the text section by section and made the following amendments and comments, in addition to editorial changes.

### **1. Scope**

115. The Committee agreed to limit the scope of the draft Standard to sturgeon caviar and to reflect this throughout the text as appropriate.

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<sup>6</sup> A lot is a definite quantity of some commodity manufactured or produced under conditions, which are presumed uniform for the purpose of these Guidelines (section 2.2.1)

<sup>7</sup> ALINORM 07/30/18, Appendix VII, CL 2006/45-FFP, CX/FFP 08/29/5 (comments of Canada, European Community, New Zealand), CX/FFP 08/29/5-Add.1 (comments of Russia), CRD 9 (comments of USA) ; CRD 11 (comments of Norway)

## 2.1 Definitions

116. The Committee had a lengthy discussion on the definition for fish eggs. Several delegations supported the use of non-ovulated eggs, while other delegations proposed the use of ovulated eggs. It was noted that there were differences in quality between the use of non-ovulated and ovulated eggs, but that matters related to quality could be better reflected in the section on labelling. It was further noted that difference between use of ovulated and non-ovulated eggs related to the use of wild or aquaculture sturgeon and that if the production of caviar was restricted to non-ovulated eggs, the Standard would exclude some products produced from aquaculture sturgeon. In view of the discussion, the Committee agreed to amend the definition of fish eggs to refer to non-ovulated eggs and also to indicate that for aquaculture sturgeon, ovulated eggs could be used in order to reflect different production methods. The definition for caviar was amended to give reference to the *Acipenseridae* family and to indicate that the salt used for treating has to be of food grade quality.

## 2.2 Product Definition

117. The Committee agreed to delete the square brackets and to retain the text in the last sentence of the 2<sup>nd</sup> paragraph and to indicate that the salt content indicated was for the end product.

## 2.3 Process Definition

118. The 2<sup>nd</sup> paragraph was amended to differentiate between product temperatures required during packaging, storage and retail and wholesale. The text was further amended to allow for freezing and frozen storage of caviar provided that deterioration of quality is avoided.

119. Section 2.3.2 was amended to indicate that the quality and safety of the product needed to be maintained during re-packaging.

## Section 4 Food Additives

120. The Committee noted the reply from the Committee on Food Additives that the use of boric acid was not allowed since JECFA had not established an ADI for boric acid and that further scientific evidence was needed for its re-evaluation and agreed to their deletion from the section. While noting that the General Standard for Food Additives allowed for the use of colours in Food Category 09.3.3 which includes caviar, it was agreed that these additives were not appropriate for the products covered by the Standard and should not be allowed. Some Delegations expressed the view that no additives should be allowed in caviar. In view of the proposal by several delegations to allow for the use of other additives such as preservatives, it was agreed that the section would be completed at the next session.

121. In view of time constraints the Committee did not consider the rest of the document and agreed to return the draft standard as amended to Step 6 for further comments and consideration by the next Session of the Committee. It was agreed that consideration of the draft standard would focus the food additives section and those sections not considered by this session of the Committee.

### Status of the Draft Standard for Sturgeon Caviar

122. The Committee agreed to return the amended draft Standard for Sturgeon Caviar to Step 6 for comments and consideration by the next Session of the Committee (see Appendix V).

### **PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS (Agenda Item 6)<sup>8</sup>**

123. Due to time constraints the Committee did not consider the proposed Draft Code of Practice for Fish and Fishery Products (section on smoked fish) at the session and agreed to postpone discussion to the next session of the Committee.

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

124. The Committee agreed to return the Proposed Draft Code of Practice to Step 3 for further comment and consideration by the next session of the Committee (Appendix VI). The Committee also agreed that a physical

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<sup>8</sup> ALINORM 07/30/18, Appendix VI, CL 2006/45-FFP, CX/FFP 08/29/6 (comments of Kenya and New Zealand), CX/FFP 08/29/6 Add.1 (comments of European Community), CRD 10 (comments of the United States of America)

working group led by the Netherlands which would meet immediately prior to the next session of the Committee would consider this Draft Code together with the proposed Draft Standard for Smoked Fish and the comments received at Step 3 (see Agenda Item 9).

### **PROPOSED DRAFT STANDARD FOR QUICK FROZEN SCALLOP ADDUCTOR MUSCLE MEAT (Agenda item 7)<sup>9</sup>**

125. The Committee recalled that the Proposed Draft Standard had not been discussed at its last session due to time constraints and that the main issues were the moisture limit, the use of phosphates and the application of good manufacturing practices. It was also noted that the development of the Proposed Draft Code of Practice was considered in conjunction with the standard.

126. Some delegations indicated that they produced quick frozen scallops with added water in their countries, and that the characteristics of these processed scallop products were very different from the products covered by the present standard. The Delegation of the United States proposed to consider new work on the development of a specific standard for quick frozen scallops with added water at the next session. The Committee agreed that these products should not be included in the present standard but that the development of a separate standard might be considered at a later date.

#### **Section 3.3.2**

127. The Committee discussed the two alternative statements concerning the final product, agreed that practices resulting in a significant uptake of water were not acceptable and therefore agreed to retain only the second Example with some amendments, including the reference to good manufacturing practices (second paragraph) and the establishment of a scientifically supported criterion (third paragraph).

128. Some delegations pointed out that the uptake of water might be allowed in another type of product that might be covered by another standard in the future.

#### **Food Additives**

129. The Delegation of the United States proposed to include an explanatory text clarifying the conditions of use of phosphates in order to ensure compliance with the provisions of section 3.3.2 and good manufacturing practice, taking into account that the use of phosphates in scallops is not allowed in all countries. Some delegations expressed the view that this was not necessary and that it was sufficient to list the levels of use as in other standards allowing the use of phosphates. The Delegation also proposed to include the list of phosphates allowed in the General Standard for Food Additives as water retention agents, with a level of 10 g/kg including natural phosphates, as currently used for other products such as quick frozen lobsters or shrimps and prawns. Several other delegations also supported the use of phosphates as they were allowed in other standards for fish and fishery products.

130. The Committee agreed that phosphates could be used in the products covered by the standard but could not propose a level of use at this stage and agreed that the text proposed by the United States, the list of phosphates and the level of 10 g/kg would be included in the section for further comments and consideration at the next session.

131. The Committee recognized that the main issues in the development of the standard had been solved since agreement had been reached on the scope, the general approach to uptake of water and the use of additives. However, as several sections required further consideration, and as the text had not been considered or sent for comments at the last session, it was premature to advance it to Step 5. The Committee therefore agreed that the revised version of the text would be circulated for comments and that an electronic working group coordinated by Canada, working in English, would have the mandate of preparing a revised version of the standard in the light of the comments received, for consideration at the next session.

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<sup>9</sup> ALINORM 05/28/18, CX/FFP 06/28/7 (comments of EC, United States), CRD 9 (comments of United States), CRD 11 (comments of Norway), CRD 12 (comments of Indonesia)

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

132. The Committee agreed to return the Proposed Draft Standard to Step 3 for comments, redrafting by an electronic working group chaired by the Delegation of Canada and consideration by the next session (see Appendix VIII).

**PROPOSED DRAFT CODE OF PRACTICE ON THE PROCESSING OF SCALLOP MEAT (Agenda Item 8)<sup>10</sup>**

133. Due to time constraints the Committee had a brief discussion on the scope of the proposed draft Code only. The general view of the Committee was that the Code should be restricted to quick frozen product in line with the corresponding Standard.

134. The Committee agreed that the electronic working group established earlier (see Agenda Item 7) would revise the Proposed Draft Code based on comments received at Step 3.

**Status of the Proposed Draft Code of Practice on the Processing of Scallop Meat**

135. The Committee agreed to return the Proposed Draft Code of Practice on Processing of Scallop Meat to Step 3 for further comment, revision by an electronic working group led by Canada and consideration by the next session of the Committee (see Appendix IX).

**PROPOSED DRAFT STANDARD FOR SMOKED FISH (Agenda Item 9)<sup>11</sup>**

136. The Committee recalled that its last session had agreed to establish an electronic working group led by the Netherlands to revise the proposed draft standard taking into account all comments submitted and discussion at the session for circulation for comments at Step 3 and consideration by this Session. In addition, the electronic working group would collect and collate data on all other types of products and make recommendations for consideration by the Committee on whether other products should be included in the current proposed draft standard or whether there was a need for the development of a new standard to cover products other than those already covered in the proposed draft.

137. The Delegation of the Netherlands introduced the item and informed the Committee that the proposed draft Standard had not been separated into three different sections for smoked fish, smoke-flavoured fish and smoked-dried fish as had been proposed since the larger part of the content for each of these sections were similar, but that the distinction between the different products was made in the definition section.

138. The Committee generally agreed with the scope. Egypt expressed its reservation on the use of smoke condensates and the inclusion of smoke flavoured fish in the Scope. The Delegation of the United States of America however proposed to replace “smoke-dried” with “dried smoked” and questioned whether this category of fish was a shelf-stable product which would place it in a different category to the other products in the Standard. The Delegation of Germany, speaking on behalf of the European Community Member States present at the session, proposed to retain “dried-smoked”.

139. The Committee noted that several matters required considerable discussion and agreed to convene an in-session working group led by the Netherlands to concentrate on sections 2.1, 2.2, 2.3 and 6 to facilitate discussion in the plenary.

140. The Committee discussed the proposed draft Standard section by section, taking into account proposals of the in-session working group, and made the following amendments and comments, in addition to editorial changes.

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<sup>10</sup> CX/FFP 06/28/9, CX/FFP 06/28/9 Add.1 (comments of United States of America and IFAC), CRD 10 (comments of the United States of America), CRD 2 (comments of Japan)

<sup>11</sup> CX/FFP 08/29/7, CX/FFP 08/29/7-Add.1 (comments of France), CX/FFP 08/29/7-Add.2 (comments Brazil, European Community and United States of America) CRD 5 (comments Canada and New Zealand), CRD 11 (comments of Norway), CRD 12 (comments of Indonesia), CRD 13 (comments of Malaysia), CRD 16 (Report of the Working Group on Smoked Fish, Part 1), CRD 18 (Report of the Working Group on Smoked Fish, Part 2)

## Scope

141. In view of the earlier discussion on whether to rename “smoke-dried” as “dried-smoked”, it was clarified that these products were generally produced through simultaneous smoking and drying and the Committee therefore agreed to retain the category as “smoke-dried”.

142. The Committee did not support a proposal to delete reference to carbon monoxide in the 2<sup>nd</sup> paragraph as it was agreed that the Standard needed to clearly stipulate that carbon monoxide treated fish was not considered smoked fish.

## Section 2.1 Smoked Fish, 2.2 Smoke Flavoured Fish and 2.3 Smoked-Dried Fish

143. The Committee agreed with the proposals for section 2.1, 2.2 and 2.3 of the in-session working group as presented in CRD 16 with an amendment to the definition for hot-smoking to indicate that it was also a process to injure spore-formers of human health concern.

## Section 3 Essential Composition and Quality Factors

144. In section 3.3, “smoke concentrates” was replaced by “smoke condensates” for consistency with other sections of the document and the last sentence was amended to indicate that wood material needed to be handled in a way to avoid contamination.

145. The Committee had a discussion on whether to include the species to which the histamine level stipulated in the section on decomposition was applicable for consistency with other similar standards. Several delegations however pointed out that several other species in addition to those agreed upon also produced high histamine during spoilage. In view of the discussion, the Committee agreed to retain the current text without reference to specific species, and noted that further elaboration of species could be considered in the code of practice for smoked fish.

146. Sections 3.4 Final Product and 3.5 Decomposition were reordered to avoid the implication that decomposition applied only to the final product.

## Section 6 Labelling

147. The Committee agreed with the proposals of the in-session working group for section 6 as presented in CRD 18.

148. Due to time constraints, the Committee did not consider sections 4, 5, 7, 8 and 9 and agreed to return the proposed draft Standard as amended to Step 3 for comments and further consideration by the next session.

149. In order to facilitate discussion and finalisation of the proposed draft Standard at the next session, the Committee agreed to establish a physical working group led by the Netherlands, to meet immediately prior to the next session to consider comments and prepare proposals for consideration by the 30<sup>th</sup> Session of the Committee. It was further agreed that this working group would also revise the section on smoked fish in the proposed Draft Code of Practice taking into account the proposed draft Standard and written comments submitted. The Committee was informed that an effort would be made to provide for interpretation services for the working group.

## **Status of the Proposed Draft Standard for Smoked Fish, Smoked-Flavoured Fish and Smoked-Dried Fish**

150. The Committee agreed to return the proposed Draft Standard to Step 3 for further comment and consideration by the next session of the Committee (see Appendix VII).

## **PROPOSED DRAFT REVISION OF THE PROCEDURE FOR THE INCLUSION OF ADDITIONAL SPECIES IN STANDARDS FOR FISH AND FISHERY PRODUCTS (Agenda Item 10)<sup>12</sup>**

151. The Committee recalled that at its last session it had discussed the procedure for inclusion of additional species together with the matter relating to the inclusion of *Clupea bentincki* in the Standard for Canned Sardines and Sardine-like Products. In view of the agreement reached on that standard, the Committee had

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<sup>12</sup> CX/FFP 08/29/8, CX/FFP 08/29/8-Add. 1 (comments of Morocco and New Zealand), CRD 7 (comments of Canada)

agreed to undertake new work on the revision of the procedure for the inclusion of additional species in standards for fish and fishery products which was approved by the 30<sup>th</sup> Session of the Commission with the recommendation that after its finalisation the Committee should consider whether to include it in the Procedural Manual.

152. The Committee had a short discussion on how to proceed with document. The Delegation of Canada was of the opinion that the procedure for inclusion of additional species needed to be simplified and that clarity was needed on how it would fit into current Codex procedures. The Delegation proposed that a physical working group should be established to look at these questions. Several delegations supported this proposal.

153. The Delegation of France while supporting the establishment of a working group reminded the Committee that the procedure for the inclusion of species was to become part of normal Codex procedures and that Appendix II of document CX/FFP 08/29/8 was the supporting document for this inclusion procedure.

154. In view of the importance of having a revised procedure for the inclusion of additional species in fish and fishery product standards and the need to continue this work, the Committee agreed to establish a physical working group under the leadership of France to meet immediately prior to the next Session of the Committee. It was agreed that the working group would further revise the inclusion procedure with a view to its inclusion in the Procedural Manual and that the group would focus on discussion of the practical implementation of the procedure and will clarify the decision-making process on the basis of the text of Appendix II of the Proposed Draft Procedure<sup>13</sup> and the comments received prior to this Session and the next.

155. The Committee also agreed to circulate the Proposed Draft Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products at Step 3 for comments, further revision by the physical working group and consideration by the next Session of the Committee.

#### **Status of the Proposed Draft Revision of the Procedure for the Inclusion of Additional Species in Standard for Fish and Fishery Products**

156. The Committee agreed to return the proposed draft revision to Step 3 for comments, revision by the physical working group and consideration by the next Session of the Committee (Appendix X).

#### **PROPOSED DRAFT STANDARD FOR FISH SAUCE (Agenda item 11)<sup>14</sup>**

157. The Committee recalled that its last session had agreed to undertake new work on a standard for fish sauce and that this proposal had been approved by the 30<sup>th</sup> Session of the Commission. The Delegation of Thailand, while introducing the Proposed Draft Standard, pointed out that the scope covered fish sauce produced by natural fermentation of fish with salt and that the most important quality factors of the product were the flavour and aroma resulting from the fermentation process.

158. The Committee expressed its appreciation to the Delegation of Thailand and the other delegations that had contributed to the preparation of the document. The Chair invited the Committee to consider the scope in the light of the comments received, in order to decide how to proceed with further work on the standard.

159. Several delegations expressed the view that the current scope of the standard should be retained, as defined at the last session, in order to ensure the quality of the traditional fish sauce produced by natural fermentation.

160. The Delegation of Japan informed the Committee that squid or molluscan shellfish were also used to prepare this type of sauce, in addition to fish, as well as other ingredients such as yeasts, and that other technologies involving higher temperatures could be applied in order to accelerate the fermentation process. The Delegation therefore proposed to extend the scope to cover all relevant types of sauce.

161. Some delegations pointed out that if the scope was extended to cover sauce prepared with other species than fish species, especially molluscan shellfish, hazards such as cadmium or biotoxins would have to be

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<sup>13</sup> CX/FFP 08/29/8

<sup>14</sup> CX/FFP 08/29/9, CX/FFP 08/29/9 (comments of France), CRD 7 (comments of European Community), CRD 9 (comments of United States)



considered, which was not the case with fish sauce, and therefore it was preferable to proceed with the current scope at this stage.

162. Some delegations expressed the view that the scope should include other technologies currently used in the preparation of fish sauce in order to ensure that the standard was as inclusive as possible and applicable worldwide. The Delegation of Thailand pointed out that trade volume of fish sauce produced by technologies other than natural fermentation should be considered prior to extending the scope.

163. After some discussion, the Committee agreed that the scope would cover only products prepared with fish but would include fish sauce prepared with other technologies than traditional fermentation and invited interested delegations to provide their input in the further development of the standard on the basis of this new scope. The Delegations of United States, Cambodia, Japan and Germany indicated that they were ready to assist the Delegation of Thailand in further work.

#### **Status of the Proposed Draft Standard for Fish Sauce**

164. The Committee agreed to return the Proposed Draft Standard to Step 2/3 for redrafting by the Delegation of Thailand and other interested delegations, further comments and consideration at the next session.

#### **PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR QUICK FROZEN FISH STICKS**

##### **(Agenda Item 12)**

165. In view of the need for further research on nitrogen factors as explained by the Delegation of Thailand, it was agreed to defer discussion on this item to the next Session of the Committee (see Agenda Item 1). It was confirmed that the Delegation of Thailand with assistance of other interested countries would prepare a proposed draft standard for circulating at Step 3 for comments and consideration by the next Session.

#### **PROPOSED DRAFT STANDARD FOR FRESH/LIVE AND FROZEN ABALONE (*Haliotis spp.*)**

##### **(Agenda Item 13)<sup>15</sup>**

166. The Committee recalled that its last session had agreed to undertake new work on a standard for abalone and that this proposal had been approved by the 30<sup>th</sup> Session of the Commission.

167. The Delegation of South Africa introduced the item and reminded the Committee of the reasons for the need to elaborate this Proposed Draft Standard. The Delegation also noted the recommendation of the 30<sup>th</sup> Session of the Commission to broaden the scope to include other gastropods, but reiterated its position that there was a need for a specific standard for abalone since inclusion of other gastropods posed different health risks and required different control measures, and would not be in line with criteria for the establishment for work priorities as set out in the Procedural Manual which states that amenability of the commodity to standardisation was essential.

168. The Committee agreed to have a general discussion on the scope of the document in view of the recommendation by the 30<sup>th</sup> Session of the Commission to consider broadening the scope to include other gastropods.

169. All Delegations that spoke expressed their support to restrict the scope to abalone. The Delegation of the United States of America informed the Committee that several other species other than *Haliotis spp.* posed similar risks and should be included in the standard. The Delegation of Germany speaking on behalf of the European Community Member States present at the session requested that the standard should also include raw chilled abalone in addition to fresh/live and frozen abalone. The Committee therefore agreed that the Proposed Draft Standard would cover fresh/live, frozen and raw chilled abalone of the species *Haliotis* and other relevant species.

170. In light of the discussion, the Committee agreed to return the proposed draft Standard to Step 2/3 for redrafting by South Africa, circulation for comments and consideration by the next session of the Committee

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<sup>15</sup> CX/FFP 08/29./11, CX/FFP 08/29/11-Add.1 (comments of Mexico, New Zealand and FAO), CRD 11 (comments of the United States of America)

**Status of the Proposed Draft Standard for Fresh/Live and Frozen Abalone (*Haliotis* spp.)**

171. The Committee agreed to return the Proposed Draft Standard to Step 2 for redrafting by South Africa taking into account the discussion at this Session for circulation for comments at Step 3 and consideration by the next Session of the Committee.

**OTHER BUSINESS AND FUTURE WORK (Agenda item 14)<sup>16</sup>****Need for a Cadmium level in the Standard for Shrimps and Prawns**

172. The Delegation of Canada drew the attention of the Committee to the increase of standards on contaminants in several countries worldwide and in particular maximum limits for cadmium in shrimps.

173. The Delegation recalled the principles in the Codex General Standard for Contaminants and Toxins in Foods for the establishment of maximum levels in foods and feeds and the conclusion of the 55<sup>th</sup> JECFA meeting (2000) that crustaceans were not among the main contributors to cadmium exposure and the decision of the 34<sup>th</sup> Session of the Committee on Food Additives and Contaminants (2002) to discontinue work on the establishment of maximum levels for cadmium following the advice from JECFA. The Delegation asked the views of the Committee on the need to amend the Standard on Shrimps and Prawns to include a maximum level for cadmium.

174. Several delegations expressed the view that there was no need for a maximum level for cadmium in shrimps in view of the results of the JECFA evaluation and that there was no public health requirement for regulatory cadmium levels in crustaceans and that further risk assessment on cadmium could be proposed only if new scientific data became available.

175. The Committee agreed that there was no need to establish maximum levels for cadmium in shrimps in view of the risk assessment carried out by JECFA and the decision of the then Committee on Food Additives and Contaminants not to establish maximum levels for crustaceans.

**Food Additives**

176. Further to its earlier discussion under Agenda Item 2, the Committee discussed whether to review the additives in current standards for fish and fishery products with a view to update the levels, harmonise the presentation of the sections and ensure consistency with the General Standard for Food Additives, as required. The Committee recalled that it was also currently developing some new sections on additives in the standards under development.

177. The Committee agreed that it would discuss at its next session the need to update additive provisions in the standards for fish and fishery products. In order to facilitate the discussion, the Committee agreed that the Secretariat would prepare a circular letter including current additive levels in the standards and the relevant provisions in the General Standard for Additives, asking for comments on the need for amendments to the additive sections.

**DATE AND PLACE OF NEXT SESSION (Agenda Item 15)**

178. The Committee noted that the next Session was tentatively scheduled to be held in Morocco in October 2009 subject to confirmation by the host Government and the Codex Secretariat. With regard to the duration and interval of meetings (see Agenda Item 2), the Committee confirmed that the interval between meetings was suitable and that the next session would take place over 5 days preceded by 2 days for the physical working groups established.

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<sup>16</sup> CRD 15 (document prepared by Canada)

**SUMMARY STATUS OF WORK**

<b>Subject Matter</b>	<b>Step</b>	<b>Action by</b>	<b>Document Reference in ALINORM 08/31/18</b>
Draft Code of Practice for Fish and Fishery Products (Live and Raw Bivalve Molluscs, Lobsters and relevant Definitions)	8	Governments 31 <sup>st</sup> CAC	para. 62 Appendix II
Draft Standard for Live and Raw Bivalve Molluscs	8	Governments 31 <sup>st</sup> CAC	para. 112 Appendix III
Draft Code of Practice for Fish and Fishery Products (Crabs and relevant Definitions)	6	Governments 30 <sup>th</sup> CCFFP	para 62 Appendix IV
Draft Standard for Sturgeon Caviar	6	Governments 30 <sup>th</sup> CCFFP	para. 122 Appendix V
Proposed Draft List of Methods for the Determination of Biotoxins in the Draft Standard for Raw and Live Bivalve Molluscs	6	Governments 30 <sup>th</sup> CCFFP	para.112 Appendix XI
Proposed Draft Code of Practice for Fish and Fishery Products (other sections)	3	Governments 30 <sup>th</sup> CCFFP	para. 124 Appendix VI
Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat	3	Governments 30 <sup>th</sup> CCFFP	para. 132 Appendix VIII
Proposed Draft Code of Practice on the Processing of Scallop Meat	3	Governments 30 <sup>th</sup> CCFFP	para. 135 Appendix IX
Proposed Draft Standard for Smoked Fish, Smoked-Flavoured Fish and Smoke-Dried Fish	3	Governments 30 <sup>th</sup> CCFFP	para. 150 Appendix VII
Revision of the Procedure for the Inclusion of Additional Species in Standards for Fish and Fishery Products	3	Governments 30 <sup>th</sup> CCFFP	para. 156 Appendix X
Proposed Draft Standard for Fish Sauce	2/3	Governments 30 <sup>th</sup> CCFFP	para. 164
Amendment to the Standard for Quick Frozen Fish Sticks (Nitrogen Factors)	2/3	Governments 30 <sup>th</sup> CCFFP	para. 165
Proposed Draft Standard for Fresh/Live and Frozen Abalone	2/3	Governments 30 <sup>th</sup> CCFFP	para. 171

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**DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS****(At Step 8 of the Procedure)****SECTION 2. DEFINITIONS FOR THE PURPOSE OF THIS CODE****2.3 LIVE AND RAW BIVALVE MOLLUSCS**

<b>Accepted / Acceptable / Approved</b>	means accepted by the official agency having jurisdiction;
<b>Conditioning</b>	means placing live bivalve molluscs in tanks, floats or natural sites to remove sand, mud or slime and improve product acceptability;
<b>Distribution Centre</b>	means any approved on-shore or off-shore installation or establishment for the reception, conditioning, washing, cleaning, grading and packaging of live bivalve molluscs fit for human consumption from which the bivalve molluscs are dispatched alive;
<b>Growing Areas</b>	means all brackish and marine areas approved for the production or harvesting of bivalve molluscs either by natural growth or by aquaculture destined for human consumption. The growing areas may be approved as production or harvesting areas for bivalve molluscs for direct consumption, or they may be approved as production or harvesting areas for bivalve molluscs for either depuration or relaying
<b>Heat Shocking</b>	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.
<b>Depuration</b>	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.,
<b>Depuration centre</b>	means any approved establishment for the depuration of live bivalve molluscs.
<b>Relaying</b>	means the removal of bivalve molluscs from microbiologically contaminated growing area to an acceptable growing or holding area under the supervision of the agency having jurisdiction and holding them there for the time necessary for the reduction of contamination to an acceptable level for human consumption.

**2.9 LOBSTERS**

<b>Autolysis</b>	is the breakdown or deterioration of lobster meat or viscera by means of indigenous enzymes
<b>Black spot</b>	is the appearance of dark pigments at the joints and injured parts of lobster segments, caused by oxidative enzyme reaction;
<b>Butt end of the tail</b>	is that part of the tail muscle of lobsters which extends into the cephalothorax;
<b>Cephalothorax</b>	is the body region of lobsters which is formed anatomically by the fusion of head and thorax;

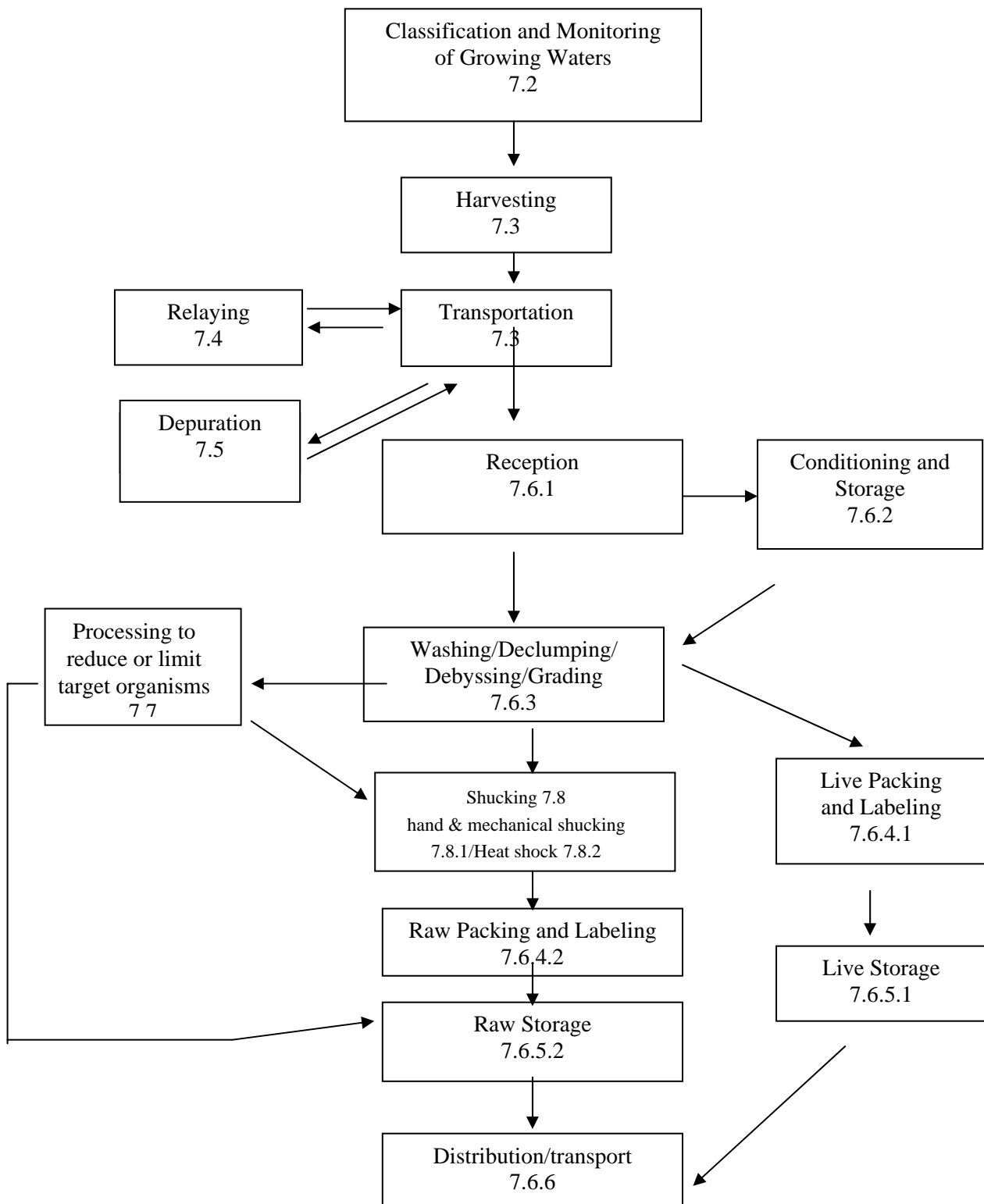
<b>Claw</b>	means the pincer appendage at the end of the lobster arm;
<b>Cooking</b>	means boiling of lobsters in potable water, clean sea water or brine or heating in steam for a period of time sufficient for the thermal centre to reach a temperature adequate to coagulate the protein;
<b>Deterioration</b>	means those natural processes of quality reduction that occur after harvesting and that are quite independent of man's deliberate intervention;
<b>De-vein</b>	is to remove the intestine/vein from the lobster tail;
<b>Enzymatic activity</b>	is the catalytic action of enzymes on biochemical reactions;
<b>Insensible</b>	is the state of unresponsiveness as a result of thermal, electrical, or physical process imposed on lobsters prior to cooking;
<b>Intestine/Vein</b>	is used in this code to mean the posterior portion of the lobster alimentary tract;
<b>Lobster</b>	means commercially important species in the order Decapoda, and families Nephropidae, Palinuridae or Scyllaridae or other important economic taxonomic families;
<b>Pasteurisation</b>	means subjecting lobster meat to heat at times and temperatures, which inactivates spoilage and pathogenic micro-organisms without noticeable changes in appearance, texture and flavour of the product;
<b>Pounding</b>	refers to the holding of live lobsters in water tanks or floating crates for extended periods of time;
<b>Shell</b>	is the hard outer covering of lobsters;
<b>Shucking</b>	is the process of removing the meat from the shell and appendages of the lobsters;
<b>Tail</b>	is the abdomen or posterior part of the body;
<b>Tailing</b>	is the process of separating the tail from the cephalothorax;
<b>Trimming</b>	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;
<b>Waste</b>	means those 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 purposes 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.*



## 7.1 GENERAL REMARKS, ADDITION TO THE PRE-REQUISITE PROGRAMME

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

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

The main hazard known for the production of bivalve molluscs is microbiological contamination of waters in which they grow, especially when the bivalve molluscs are intended to be eaten live or 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 a result from agricultural run-off and/or sewage contamination like enteric bacterial and/or viral pathogens (Norovirus, viruses causing hepatitis) or from natural occurring bacterial pathogens (*Vibrio* spp.). Another hazard is formed by biotoxins. Biotoxins produced by some algae can cause various forms of serious poisoning like diarrhetic shellfish poisoning (DSP), paralytic shellfish poisoning (PSP), neurotoxic shellfish poisoning (NSP), amnesic shellfish poisoning (ASP) or poisoning caused by 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 areas is a responsibility for competent authorities in cooperation with fishermen and primary producers. *E. coli*/faecal coliforms or total coliforms may be used as an indicator for the possibility of faecal contamination. If biotoxins are found in the bivalve molluscs flesh in hazardous amounts the growing area must be closed for harvesting bivalve molluscs until toxicological investigation has made clear that the bivalve mollusc meat is free from hazardous amount of biotoxins. Harmful chemical substances should not be present in the edible part in such amounts that the calculated dietary intake exceeds the permissible daily intake.

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

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



## 7.2 CLASSIFICATION AND MONITORING OF GROWING AREAS

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

Potential Defects: *unlikely*

Technical Guidance:

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

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

### 7.2.1 Classification of growing areas

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

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

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

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

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

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

- suitable for harvesting for direct human consumption, relying in acceptable water or depuration in an approved depuration centre or approved processing to reduce or limit target organisms; or
- non-suitable for growing or harvesting bivalve molluscs.

## 7.2.2 Monitoring of growing areas

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

Biotoxins in bivalve molluscs can be caused by plankton containing toxins. For early warning purposes, where appropriate, 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 should consider the following actions:

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

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

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

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 water and/or molluscan flesh should be monitored for the presence of *E. coli*/faecal coliforms or total coliforms at an appropriate frequency based on the probability and degree of faecal contamination.

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

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

Other methods such as 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* and others (*Vibrio* and viruses), monitoring the bivalve molluscs may be appropriate as part of the process of closure/reopening the affected harvest area. The species, and typically the actual strain, should be known to ensure that monitoring is addressing the source of the pathogen. Predetermined acceptance/rejection levels for the pathogen should have been established in order to use such monitoring results for decision making. Other conditions including the sanitary survey requirements should also have been satisfied as a condition of reopening this area.

### 7.2.2.3 Marine biotoxin control

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

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

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

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

In establishing sampling programme over space and time, consideration should be given to assuring adequate location and number of sampling sites. Testing for a particular biotoxin may not be appropriate when it has been demonstrated that this biotoxin has not been associated with bivalve molluscs in the growing and harvesting areas. Sampling frequency must be sufficient to address spatial-temporal changes in micro-algae, toxins in shellfish and to cover the risks of rapid rises in shellfish toxicity.

#### *Spatial Representational Sampling*

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

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

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

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

*Temporal Representational Sampling*

Minimum weekly sampling frequencies are adopted by most monitoring programmes in areas where toxicity is prevalent and where harvesting is taking place or about to take place. Decisions on the frequency of sampling should be based on risk evaluation. Inputs into the decision may include factors such as seasonality (toxicity and / or harvesting), accessibility, historical baseline information, including toxin and micro-algal data, and the effects of environmental factors such as wind, tide and currents.

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

*Shellfish Sample Size*

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

**7.2.2.4 Marine biotoxin test methods**

Methods suitable for the determination of marine biotoxins are listed in the draft Standard for Live and Raw Bivalve Molluscs. Any methods may be deemed suitable for screening purposes provided they are approved by a country’s competent authority.

**7.2.2.5 Chemical contaminants**

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

**7.3 HARVESTING AND TRANSPORTATION OF LIVE BIVALVE MOLLUSCS**

Refer also to Sections 3.1, 3.3, 3.4 and 3.5

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

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

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

*Potential Defects:* Physical damage

*Technical Guidance:*

- Dredges and other harvesting equipment, decks, holds and containers, which are contaminated from use in a polluted area, should be cleaned and if applicable disinfected (sanitised) before being used for bivalve molluscs from an unpolluted area.
- Holds in which bivalve molluscs are held or containers should be so constructed that the bivalve molluscs are held above the floor level and drained so that the bivalve molluscs is not in contact with wash-down or bilge water, or shell fluid. Where necessary a bilge pumping system must be provided.
- Suitable precautions should be taken to protect bivalve molluscs from being contaminated by polluted water, droppings from sea birds, footwear which may have been in contact with faecal matter or by other polluted material. No overboard discharge of waste, including human faecal material, should occur from harvest vessels around shellfish growing areas. No animals should be allowed on harvest vessels.

- Wash-down pumps should draw water only from non-contaminated seawater.
- Bivalve molluscs should be harvested from and stored in a growing area or relaying area acceptable to the official agency having jurisdiction.
- On removal from water or during handling and transportation, bivalve molluscs should not be subjected to extremes of heat or cold or sudden variations in temperature. Temperature control is critical in handling live bivalve molluscs. Special equipment, such as insulated containers and refrigeration equipment should be used if prevailing temperatures and the time involved so require. Bivalve molluscs should not be exposed to full sun or surfaces heated by the sun or come into direct contact with ice and other freezing surfaces, nor should it be held in closed containers with solid carbon dioxide. In most cases storage above 10°C (50°F) or below 2°C (35°F) should be avoided.
- Bivalve molluscs should be freed from excessive mud and weed soon after being harvested by washing it with clean seawater or potable water under suitable pressure. Wash water should not be allowed to flow over bivalve molluscs already cleaned. The water could be re-circulated if it meets the definition for clean water.
- The interval between harvesting and immersion in water for relaying, storage, conditioning or depuration should be kept as short as possible. This also applies to the interval between final harvesting and handling in a distribution centre.
- If bivalve molluscs are to be re-immersed after harvest they should be re-immersed in clean seawater.
- Appropriate documentation should be maintained for harvesting and transportation activities.

#### 7.4 RELAYING

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

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

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

*Potential Defects:*            *unlikely.*

*Technical Guidance:*

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

- Appropriate documentation should be maintained for relaying operations.

## 7.5 DEPURATION

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

Depuration is intended to reduce the number of pathogenic micro-organisms that may be present in bivalve molluscs which have been harvested from moderately polluted areas to such levels that the bivalve molluscs will be acceptable for human consumption without further processing. Depuration alone is not suitable for cleansing bivalve molluscs from more heavily contaminated areas or areas subject to contamination by hydro-carbons, heavy metals, pesticides, viruses, vibrios or biotoxins. Bivalve molluscs harvested for depuration should only be harvested from areas that are so designated/classified by the official agency having jurisdiction.

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

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

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

Potential Hazards:                    *Microbiological contamination*

Potential Defects:                    *physical damage*

Technical Guidance:

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

- Bivalve molluscs subjected to the depuration process should not contain metallic ions, pesticides, industrial wastes or marine biotoxins in such quantities that it presents a health hazard to the consumer.
- Use only shellstock designated as acceptable by the official agency having jurisdiction.
- The process and the equipment, e.g. tanks, used for depuration should be acceptable to the official agency having jurisdiction.
- Dead or damaged bivalve molluscs should be removed before the depuration process, when practicable. Surfaces of shells should be free from mud and soft commensal organisms. If necessary the bivalve molluscs should be washed with clean sea water before the depuration process.
- The length of the period of depuration should be adapted to the water temperature and physical water quality parameters (clean sea water, salinity, dissolved oxygen and pH levels suitable to permit the bivalve molluscs to function normally), the degree of contamination before depuration and the bivalve molluscs species. Microbiological investigation of process water and of bivalve molluscs meat should be used to assess depuration parameters. It should be taken into account that viruses and *Vibrio* spp. are more persistent during depuration than the indicator bacteria mostly used for microbiological monitoring and that the reducing of the number of indicator bacteria does not always reflect the real situation as regards contamination by viruses and *Vibrio*.
- Water used in depuration tanks should be changed continuously or at suitable intervals or if recirculated be treated properly. The flow of water per hour should be sufficient to the amount of bivalve molluscs treated and should depend on the degree of contamination of the bivalve molluscs.
- Bivalve molluscs undergoing depuration should remain immersed in clean sea water until it satisfies the sanitary requirements of the official agency having jurisdiction.
- Bivalve molluscs should be laid out at a density which will permit them to open and undergo natural depuration.

- During the process of depuration, the water temperature should not be allowed to fall below the minimum at which bivalve molluscs remain physiologically active; high water temperatures which adversely affect the pumping rate and the depuration process should be avoided; tanks should be protected from the direct rays of the sun when necessary.
- Equipment in contact with water, i.e. tanks, pumps, pipes or piping, and other equipment should be constructed of non-porous, non-toxic materials. Copper, zinc, lead and their alloys should preferably not be used in tanks, pumps or piping systems used in depuration processing.
- To avoid recontamination of bivalve molluscs undergoing depuration, unpurified bivalve molluscs should not be placed in the same tank as bivalve molluscs which are already undergoing depuration.
- On removal from the depuration system, bivalve molluscs should be washed with running potable water or clean sea water, and handled in the same manner as living bivalve molluscs taken directly from a non-polluted area. Dead, with broken shells or otherwise unwholesome bivalve molluscs should be removed.
- Before removing the bivalve molluscs from the tanks drain the water from the system to avoid resuspension and reingestion. The tanks should be cleaned after each use and disinfected at suitable intervals.
- After depuration the bivalve molluscs should meet the end product specification.
- Appropriate documentation should be maintained for depuration.

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

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

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

### **7.6.1 Reception**

*Potential Hazards:* Microbiological, chemical and physical contamination

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

*Technical Guidance:*

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

### **7.6.2 Conditioning and storage of bivalve molluscs**

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

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

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

*Technical Guidance:*

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

- The process of storing bivalve molluscs in sea water tanks, basins, floats, natural sites or rafts can be used if it is acceptable to the official agency having jurisdiction.
- Only clean sea water should be used in the tanks, floats, natural sites or rafts and should be of an adequate salinity and adequate physical water quality parameters to permit the bivalve molluscs to function normally. Optimum salinity will vary with bivalve molluscs species and with the harvesting area. Water condition has to be satisfactory adequate for the process. Where natural sites are used for conditioning these should be classified by the official agency having jurisdiction.
- Before conditioning or storage bivalve molluscs should be washed to remove mud and soft commensal organisms and dead or damaged bivalve molluscs should be removed when practicable.
- During storage bivalve molluscs should be laid out at a density and under such conditions that will permit them to open and function normally.
- The oxygen content in the seawater should be maintained at an adequate level at all times.
- The temperature of the water in storage tanks should not be allowed to rise to such levels as to cause weakness of the bivalve molluscs. If ambient temperatures are excessively high, tanks should be placed in a well-ventilated building or away from the direct rays of the sun. The length of the period of conditioning should be adapted to the water temperature.
- Bivalve molluscs should be stored in clean sea water only for such time as they remain sound and active.
- Tanks should be drained, cleaned and disinfected at suitable intervals.
- Recirculating wet storage systems must contain approved water treatment systems.

### 7.6.3 Washing, declumping, debyssing and grading

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

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

*Potential Defects:* Mechanical damage

*Technical Guidance:*

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

### 7.6.4 Packing and Labelling

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



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

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

#### **7.6.4.1 Packing and Labelling of Live Bivalve Molluscs**

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

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

*Technical Guidance:*

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

#### **7.6.4.2 Packing and Labelling of Raw Bivalve Molluscs**

*Potential Hazards:* Microbiological and physical contamination

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

*Technical Guidance:*

- Labels should be clearly printed and must comply with the labelling laws of the country where the product is marketed. The packaging material or label may be used as a means to convey appropriate storage instructions to the consumer after retail purchase. It is recommended to include the date of packaging
- All packaging material should be stored in a clean and sanitary manner. Only packaging material required for immediate use should be kept in the packing or filling area.
- Shucked and post harvest treated product should be packed and chilled or frozen as soon as possible.
- Freezing should take place quickly (see section 8.3). Slow freezing will damage meat.
- If labels on post harvest treated raw bivalve molluscs make safety claims relating to the post harvest treatment, the claims should be specific to the target hazard that has been eliminated or reduced.”

### **7.6.5 Storage**

#### **7.6.5.1 Storage of Live Bivalve Molluscs**

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

*Potential Defects:* physical damage

*Technical Guidance:*

- The end product should be stored under such conditions as will preclude the contamination with and/or proliferation of micro-organisms. The packaging material of the end product should not have direct contact with the floor but should be placed on a clean, raised surface.
- Storage periods should be kept as short as possible.

- Reimmersion in or spraying with water of live bivalve molluscs must not take place after they have been packed and have left the distribution centre or establishment except in the case of retail sale at the distribution centre.

#### **7.6.5.2 Storage of Raw Bivalve Molluscs**

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

*Potential Defects:* *physical damage*

*Technical Guidance:*

- Storage periods should be kept as short as possible
- Damage to packaging of frozen product should be avoided.

#### **7.6.6 Distribution / Transport**

##### **7.6.6.1 Distribution of Live Bivalve Molluscs**

Refer also to Sections 3.6 and 17

*Potential Hazards:* *Microbiological contamination*

*Potential Defects:* *Physical damage*

*Technical Guidance:*

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

##### **7.6.6.2 Distribution of Raw Bivalve Molluscs**

*Potential Hazards:* *Microbiological contamination*

*Potential Defects:* *unlikely*

*Technical Guidance:*

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

#### **7.7. PROCESSING TO REDUCE OR LIMIT TARGET ORGANISMS**

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

Bivalve molluscs processed to reduce or limit target organisms are products prepared from live or raw bivalve molluscs that have been processed after harvest to reduce or limit specified target organisms within the product to levels that are satisfactory to the official agency having jurisdiction. Processing to reduce or limit target microorganisms is intended to retain the sensory qualities of a live bivalve mollusc. As with all live and raw bivalve molluscs, these bivalve molluscs must meet all microbiological criteria associated with traditional harvest water controls designed to prevent faecal contamination and resulting introduction of enteric pathogens as well as toxins and other contaminants. However, these growing area controls are not designed for control of pathogens that are independent from faecal contamination.

*Potential Hazards:* *Microbiological contamination*

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

*Technical Guidance:*

- Any treatment developed to eliminate or reduce pathogens should be thoroughly validated scientifically to ensure that the process is effective (see the Draft Guidelines for the Validation of Food Safety Control Measures).
- The control treatments (heat, pressure, etc.) should be closely monitored to ensure that the product does not undergo textural changes in the flesh that are unacceptable to the consumer.
- The treatment parameters established to reduce or limit pathogens should be approved by the official agency having jurisdiction.
- Each establishment which purifies bivalve molluscs with a heat treatment must develop a heat treatment process schedule, acceptable to the official agency having jurisdiction, which addresses such critical factors as the species and size of bivalve molluscs, time of exposure to heat, internal bivalve molluscs temperature, type of heat process used, water/steam to bivalve molluscs ratios, nature of heat equipment, measurement devices and their calibration, post heating chilling operations, cleaning and sanitising of heat process equipment.

## **7.8 SHUCKING**

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

### **7.8.1 Hand and Mechanical Shucking and Washing,**

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

*Potential Hazards:* Physical contamination, microbiological contamination

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

*Technical Guidance:*

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

### **7.8.2 Heat shocking of bivalve molluscs followed by packing**

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

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

*Potential Hazards:* Physical contamination

*Potential Defects:* unlikely

*Technical Guidance:*

- The bivalve molluscs must come from approved growing areas and/or after relaying in an approved relaying area or depuration in an approved depuration centre or tank. Each establishment which heat shucks bivalve molluscs should develop a heat shuck process schedule, acceptable to the official agency having jurisdiction, which addresses such critical factors as the species and size of bivalve molluscs, time of exposure to heat, internal bivalve molluscs temperature, type of heat process used, water/steam to bivalve molluscs ratios, nature of heat equipment, measurement devices and their calibration, post heating chilling operations, cleaning and sanitising of heat process equipment.
- All bivalve molluscs should be washed with pressurised potable water or clean sea water and culled for damaged and dead bivalve molluscs prior to heat treatment.
- Before heat shocking the bivalve molluscs should be inspected to determine whether the bivalve molluscs are alive and not badly damaged

- Heat shocked bivalve molluscs should be cooled to 7°C or less within two hours of being heat treated (this time includes the shucking process). This temperature should be maintained during transport, storage and distribution.
- The heat shocked bivalve molluscs should be packed as soon as possible. Before packing the bivalve molluscs should be examined for objectionable matter such as shell pieces.

### **7.9 DOCUMENTATION**

- The transport of live bivalve molluscs from a growing area to a distribution centre, depuration centre, relaying area or establishment should be accompanied by documentation for the identification of batches of live bivalve molluscs.
- Storage and transport temperatures should be indicated.
- Permanent, legible and dated records of relaying and depuration should be kept concerning each lot. These records should be retained for a period of minimal one year.
- Depuration centres or tanks and distribution centres and establishments should only accept lots of live bivalve molluscs with documentation issued by or accepted by the official agency having jurisdiction. Where appropriate, this document should contain the following information
  - the gatherer's identity and signature;
  - the date of harvesting;
  - common and/or scientific name and quantity of bivalve molluscs;
  - the location of the growing area and the status of this area (suitable for harvesting for direct human consumption, suitable for relaying, suitable for depuration, suitable for approved processing to reduce or limit target organisms).
  - for distribution centres and establishments, if appropriate, the date and duration of depuration and the responsible's identity and signature.
  - for distribution centres and establishments, if appropriate, the date and duration of relaying, the location of the relaying area and the responsible's identity and signature
- Complete records of harvest area and date of harvest and length of time of relaying or depuration of each lot should be maintained by the distribution centre or establishment for a period designated by the official agency having jurisdiction.

### **7.10 LOT IDENTIFICATION AND RECALL PROCEDURES**

Refer also to Section 3.7

- "Each product should have an easy identifiable lot number. This lot number must include an identification code, the number of the establishment that distributes the product, the country of origin and day and month of packing, in order to facilitate the traceability/product tracing of the product. A record keeping system should be based on these lot numbers so that individual lots of bivalve molluscs can be traced from the growing area to the end user.
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## SECTION 13 - PROCESSING OF LOBSTERS

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

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

### 13.1 GENERAL – ADDITION TO PRE-REQUISITE PROGRAMME

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

#### 13.1.1 Design and Construction of Equipment and Utensils

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

#### 13.1.2 Hygiene Control Programme

- When an establishment has its own supply of fresh water or seawater or other water sources, and chlorine is used for water treatment, the residual content of chlorine should not exceed that of potable water.
- water, which has been in contact with lobsters, should not be re-used unless reconditioned to avoid taint problems;
- it is undesirable for the same workers to handle the raw as well as the cooked product. If this is unavoidable, stringent precautions should be taken to prevent cross contamination of the cooked product by micro-organisms from raw material;

### 13.2 General Considerations for the Handling of Lobsters

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

#### 13.2.1. Potential Hazards and Defects Associated with Lobsters

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

##### 13.2.1.1 Potential Hazards

###### Bacteria

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

*Staphylococcus* is not found in the normal microflora on fish. The natural habitat for this organism is the skin and mucous membranes of animal and man. The presence of *Staphylococcus* on fish is an indication of post-harvest contamination due to poor personal hygiene. The organism is a poor competitor and will not

multiply in fish. However, in fish or shellfish products, where the normal flora is reduced or eliminated (i.e. cooked peeled shrimp or crab meat), the presence of staphylococci indicates a potential for food poisoning.

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

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

### Chemical Hazards

#### Veterinary Drugs

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

#### Biotoxins

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

#### **13.2.1.2 Potential Defects**

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

#### **13.2.2 Minimise the Deterioration of Lobsters - Handling**

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

- it is generally known that under similar conditions, the quality of lobsters deteriorate more rapidly than fish and therefore care in maintaining the lobsters live prior to processing is strongly recommended;
- since lobster legs and other appendages can be easily broken and the damage can cause the risk of infection and weakening of the lobster, care should be taken to handle live lobsters at all times;
- tanks and wells for pounding live lobsters should be so placed and constructed as to ensure survival of the lobsters;
- live lobsters 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 lobsters due to slime or mud;
- care also should be taken to maintain the necessary humidity in holding the lobsters 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 lobsters alive until the time of processing, lobsters should be killed. Tails should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible.

### **13.3 Processing Operations – Lobsters**

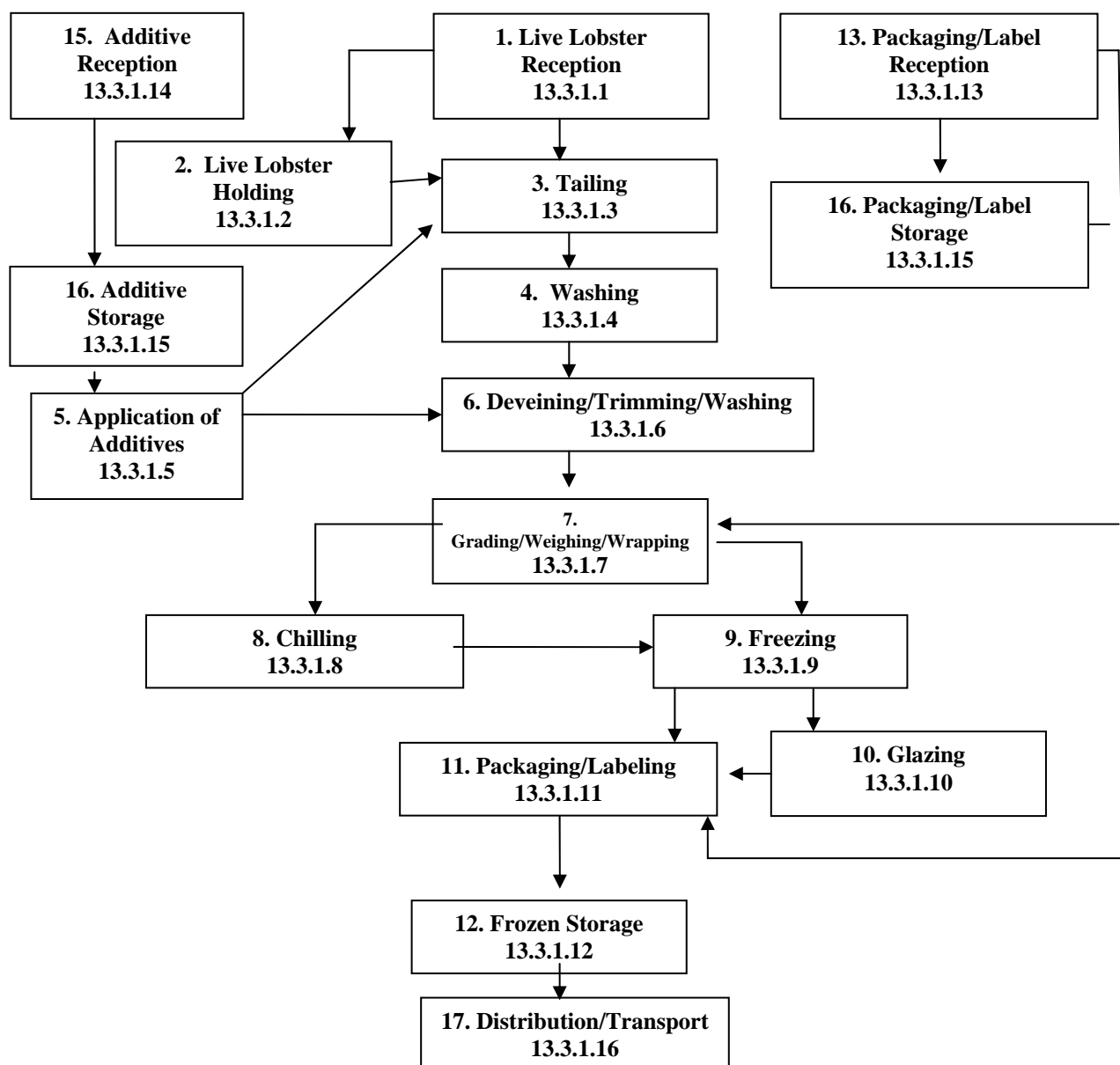
Once a processing facility has established a pre-requisite programme (Section 3) the principles of HACCP (Section 5) can be applied to each individual process within that facility.

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

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

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

**Figure 13.1 Example of flow chart for frozen raw lobster processing**



### 13.3.1 Frozen Raw Lobster Tail

#### 13.3.1.1 Live Lobster Reception (Processing Step 1)

Potential Hazards:

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

Technical Guidance:

- live lobsters should be inspected upon receipt to ensure that they are alive, which can be demonstrated by active leg movement and the tail of lobsters being curled lightly underneath the body when the lobster is picked up. Dead lobsters have a high probability of decomposition due to a high autolysis rate and should not be processed
- 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;
- 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 lobsters – Handling, of this document. Refer also to “Section 6.1.2 – Growing Water Quality” and Section 6.3.2 Veterinary Drugs.

*Potential Hazards:*            *Veterinary Drug Residues*

*Potential Defects:*            *Lobster decomposition*

*Technical Guidance:*

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

### 13.3.1.3 Tailing (Processing Step 3)

*Potential Hazards:*            *Microbiological contamination*

*Potential Defects:*            *Improper tailing, decomposition*

*Technical Guidance:*

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

### 13.3.1.4 Washing (Processing Step 4)

Refer also to section 8.1.5 – Washing and Gutting.

*Potential Hazards:*            *Unlikely*

*Potential Defects:*            *Poor cleaning*

*Technical Guidance:*

- lobster tails should be washed in plenty of running potable water, or clean sea water, or water as outlined in 13.1.2, to remove all impurities;

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

*Potential Hazards:*            *The use of non-approved additives; incorrect application of Sulphites<sup>1</sup>.*

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

Potential Defects:            *Physical contamination, black spots due to inadequate application of Sulphites<sup>7</sup>, incorrect application of Phosphates<sup>7</sup>.*

Technical Guidance:

- Mixing and application of appropriate additives should be carried out by trained operators;
- Regular checks of the additive levels should be carried out.
- Tails with black spots should be discarded.
- Non-approved additives should not be allowed in the processing facility.
- sulphites should be used in accordance with manufacturer's instructions and Good Manufacturing Practice.

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

Refer to Section 8.1.5 – Washing and Gutting

Potential Hazards:            *Microbiological contamination*

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

Technical Guidance:

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

### 13.3.1.7 Grading/Weighing /Wrapping (Processing Step 7)

Potential Hazards:            *Microbiological contamination*

Potential Defects:            *Incorrect net weight, inadequate wrapping, inappropriate packaging material, 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;
- balances should be calibrated periodically with a standardized weight to ensure accuracy;
- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- the wrapping and packaging operation should be conducted in a sanitary manner to avoid contamination of the product;
- care should be taken to ensure that the front end of tail where the meat is exposed is completely wrapped to protect against dehydration;
- weights of finished packages should be monitored at regular intervals to assure that they are the proper net weight.

### 13.3.1.8 Chilling (Processing Step 8)

Refer to sections 4.2 – Time and Temperature Control.

Potential Hazards: *Microbiological contamination*

Potential Defects: *Decomposition*

Technical Guidance:

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

#### **13.3.1.9 Freezing (Processing Step 9)**

Refer to section 8.3.1 – Freezing Process

Potential Hazards: *Unlikely*

Potential Defects: *Poor texture*

Technical Guidance:

- air blast, liquid nitrogen, or other freezing methods should be rapid to produce high quality tails and to ensure that the textural qualities of the product are retained;

#### **13.3.1.10 Glazing (Processing Step 10)**

Refer to Section 8.3.2 – Glazing

Potential Hazards: *Microbiological contamination*

Potential Defects: *Incomplete glaze, foreign matter*

Technical Guidance:

- glaze water should be replaced regularly to ensure that a high bacterial load does not occur and to prevent build-up of foreign material;
- chilling of glaze water will result in a more uniform application of glaze that will better protect the product;

#### **13.3.1.11 Final Packaging/Labelling (Processing Step 11)**

Refer to Section 8.2.3 – Labelling.

Potential Hazards: *Absence of labelling of allergenic additives*

Potential Defects: *Subsequent dehydration, incorrect labelling.*

Technical Guidance:

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

#### **13.3.1.12 Frozen Storage (Processing Step 12)**

Refer to Section 8.1.3 – Frozen Storage

Potential Hazards: *Unlikely*

Potential Defects: *Freezer burn, dehydration.*

Technical Guidance:

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

### 13.3.1.13 Packaging and Label Reception (Processing Step 13)

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

*Potential Hazards:* Unlikely

*Potential Defects:* Contaminated packaging, incorrect labels.

*Technical Guidance:*

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

### 13.3.1.14 Additives Reception (Processing Step 15)

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

*Potential Hazards:* Biological, chemical and physical contamination

*Potential Defects:* Contamination, mislabelling

*Technical Guidance:*

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

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

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

*Potential Hazards:* Unlikely

*Potential Defects:* Contaminated additives or packaging material.

*Technical Guidance:*

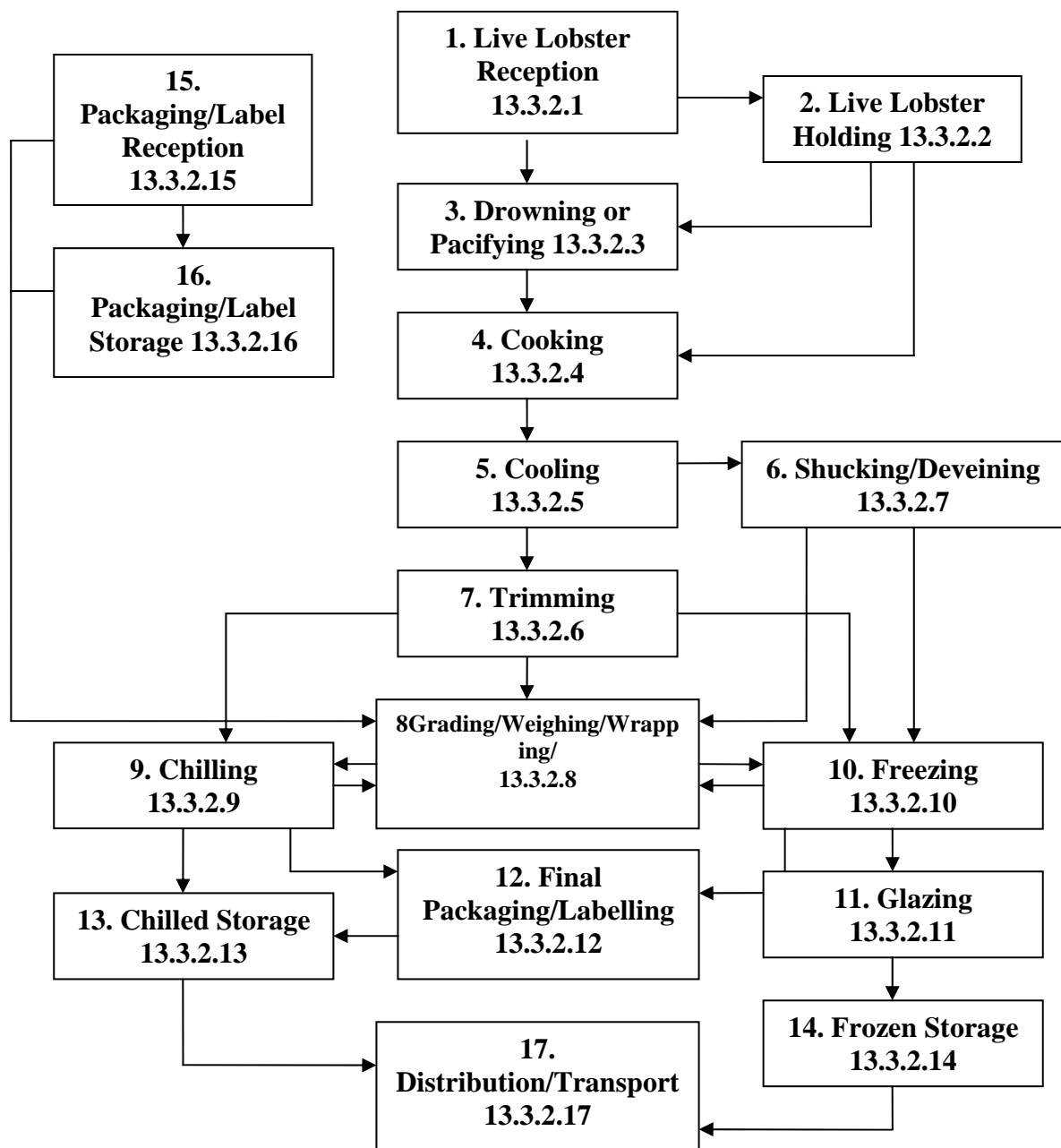
- food additives and packaging material should be protected from dust, dirt and other sources of contaminants;
- pests and insects should be excluded from the packaging storage area;

### 13.3.1.16 Distribution and Transport (Process Step 17)

Refer to Section 17 – Transport

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

**Figure 13.2 Example of Flow Chart for Processing of Cooked Lobsters**



### 13.3.2 Chilled and Frozen Cooked Whole Lobster and Cooked Lobster Meat

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

#### 13.3.2.1 Live Lobster Reception (Processing Step 1)

Refer to Subsection 13.3.1.1 of this document.

#### 13.3.2.2 Live Lobster Holding (Processing Step 2)

Refer to subsection 13.3.1.4 of this document

#### 13.3.2.3 Drowning or Pacifying (Processing Step 3)

Potential Hazards: Unlikely

Potential Defects: Unlikely

Technical Guidance:

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

#### 13.3.2.4 Cooking (Processing Step 4)

Potential Hazards: Microbiological contamination

Potential Defects: Over / undercooking

Technical Guidance:

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

#### 13.3.2.5 Cooling (Processing Step 5)

Potential Hazards: Microbiological contamination

Potential Defects: Unlikely

Technical Guidance:

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

- shell removal should not be performed until the product has adequately cooled;
- care should be taken to ensure that cross contamination of cooked lobsters does not occur;
- cooked lobsters should be handled as a ready-to-eat product that has its normal microflora destroyed which can allow pathogens to proliferate.

#### 13.3.2.6 Trimming (Processing Step 7)

*Potential Hazards:* Microbiological contamination

*Potential Defects:* Unlikely

*Technical Guidance:*

- an adequate supply of clean sea water, potable water or water as outlined in section 13.1.2 should be available to remove adhering coagulate protein. Spray washing on a conveyor is sometimes sufficient but it may be necessary to brush by hand. These methods can be combined;
- all surfaces and brushes should be frequently cleaned during operation in order to minimise the microbial activity of contact surface and utensils;

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

*Potential Hazards:* Microbiological contamination

*Potential Defects:* Presence of shell fragments

*Technical Guidance:*

- the shucking and de-veining of cooked lobsters should be done quickly and carefully, in order to provide an attractive product;
- care should be taken to prevent cross-contamination of cooked product with raw lobster 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 water as outlined in section 13.1.2;

#### 13.3.2.8 Grading/Weighing/Wrapping (Processing Step 8)

*Potential Hazards:* Microbiological contamination

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

*Technical Guidance:*

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

#### 13.3.2.9 Chilling (Processing Step 9)

Refer to sections 4.2 – Time and Temperature Control.

*Potential Hazards:* Microbiological contamination

*Potential Defects:* Deterioration

Technical Guidance:

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

**13.3.2.10 Freezing (Processing Step 10)**

Refer to section 8.3.1 – Freezing Process

Potential Hazards: Unlikely

Potential Defects: Unlikely

Technical Guidance:

- air blast, liquid nitrogen, or other freezing methods should be rapid to produce high quality whole lobsters and lobster meats to ensure that the textural qualities of the product are retained;

**13.3.2.11 Glazing (Processing Step 11)**

Refer to Section 13.3.1.10 of this document

**13.3.2.12 Final Packaging/Labelling (Processing Step 12)**

Refer to Section 8.2.3 – Labelling.

Potential Hazards: Absence of labelling of allergenic additives

Potential Defects: Subsequent dehydration, incorrect labelling.

Technical Guidance:

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

**13.3.2.13 Chilled Storage (Processing Step 13)**

Refer to Section 8.1.2 – Chilled Storage

Potential Hazards: Microbiological contamination

Potential Defects: Decomposition, foreign matter

Technical Guidance:

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

**13.3.2.14 Frozen Storage (Processing Step 14)**

Refer to Section 13.3.1.12 of this document.

**13.3.2.15 Packaging/Label Reception (Processing Step 15)**

Refer to Section 13.3.1.13 of this document.

**13.3.2.16 Packaging/Label Storage (Processing Step 16)**

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

Potential Hazards: Unlikely

Potential Defects: Contaminated Packaging Material.

Technical Guidance:

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



**13.3.2.17      Distribution and Transport (Process Step 17)**

Refer to Section 17 –Transport

**APPENDIX III****DRAFT STANDARD FOR LIVE AND RAW BIVALVE MOLLUSCS****(At Step 8 of the Procedure)****1. SCOPE**

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

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

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

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

**I-2.2 Process Definition**

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

**I-2.3 PRESENTATION**

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

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

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

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

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

**I-3.2 Final Product**

Live bivalve molluscs shall meet the requirements of this standard when lots examined in accordance with Section I-10 comply with the provisions set out in Section I-9. Live bivalve molluscs shall be examined by the methods given in Section I-8.

**I-4. FOOD ADDITIVES**

Food additives are not permitted in live bivalve molluscs.

**I-5. CONTAMINANTS**

**I-5.1** The products covered by this Standard shall comply with the Maximum Levels of the Codex General Standard for Contamination and Toxins in Foods (CODEX/STAN 193-1995) and the maximum residue limits for pesticides and veterinary drugs established by the CAC.

**I-5.2** The following provisions apply to the edible parts of live bivalve mollusc (the whole part or any part intended to be eaten separately)

Name of biotoxin groups	Maximum level /kg of mollusc flesh
Saxitoxin (STX) group	≤0.8 milligrams (2HCL) of saxitoxin equivalent
Okadaic acid (OA) group	≤0.16 milligrams of okadaic equivalent
Domoic acid (DA) group	≤20 milligrams domoic acid
Brevetoxin (BTX) group	≤200 mouse units or equivalent
Azaspiracid (AZP) group	≤0.16 milligrams

## I-6. HYGIENE AND HANDLING

**I-6.1** It is recommended that the products covered by provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1 – 1969), the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003) and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

**I-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).

**I-6.3** Growing area monitoring programs, irrespective of the type of indicator bacteria used, must ensure that live bivalve molluscs destined for direct human consumption meet the *E.coli* limit as identified below when tested in accordance with an MPN method specified in ISO 16649-3 or equivalent.

**I-6.4** In analysis involving five (5) 100g samples of the edible parts (the whole part or any part intended to be eaten separately), none may contain more than 700 *E. coli* and not more than one (1) of five (5) samples may contain between 230 and 700 *E.coli*, or equivalent as decided by the competent authority having jurisdiction

Microorganism = *Escherichia coli*      n=5      c=1      m=230      M=700      3 Class Plan

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

**I-6.5** In analysis involving five (5) 25g samples of the edible parts (the whole part or any part intended to be eaten separately), no sample may indicate the presence of *Salmonella* when tested using a method validated against the reference method ISO 6579.

Microorganism = *Salmonella*      n=5      c=0      m=0/25g      2 Class Plan

where n = number of samples that must conform to the criteria; c = the maximum allowable number of defective sample units; m = a microbiological limit which separates good quality from defective quality.

**I-6.6** Where the microbiological criteria are not met, actions should be taken as deemed appropriate by the competent authority. In following up, consideration should be given to detention, recall and further processing in a manner to eliminate the hazard from implicated lots. In addition, assessment of the status of harvesting areas and/or establishment controls should be undertaken.

## I-7. LABELLING

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

### I-7.1 The Name of the Food

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

to mislead the consumer.

**I-7.1.1** There shall appear on the label, reference to the presentation provided for in Section I-2.3- Presentation in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation of the product to avoid misleading or confusing the consumer.

**I-7.1.2** 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-7.2 Content Declaration**

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

### **I-7.3 Storage Instructions**

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

### **I-7.4 Labelling of Non-retail Containers**

Labelling for live bivalve molluscs shall contain the following information::

- (i) Identification of the product by common and/or scientific names as determined by the competent authority. The country where the product is sold can determine if the scientific name must be indicated on the label.
- (ii) Information that might be needed in the event of a food safety problem, including lot identification which could be lot code or date and location of harvest, information about harvest area, date of harvesting, purification or relaying as appropriate, as well as identification of the despatch centre or other establishment from which they were shipped.
- (iii) Durability or shelf life.

Date of minimum durability may be replaced by the statement "Bivalves must be alive when sold".

## **I-8. SAMPLING, EXAMINATION AND ANALYSES**

### **I-8.1 Sampling**

- (i) Each sample shall contain a sufficient number of bivalve molluscs to ensure that the sample is representative.
- (ii) The portion of the bivalve mollusc analysed should be the edible part. This is generally the whole tissue. Where whole-tissue analysis is not possible or practical, the most contaminated tissue (e.g. the digestive gland) may be dissected and analysed and the results converted to an edible tissue basis. The conversion factor should be supported by adequate data.

### **I-8.2 Sensory and Physical Examination**

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

### **I-8.3 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-8.4 Method of Analysis of *Escherichia coli* in bivalve molluscs**

The ISO/TS 16649-3 – Horizontal method for the enumeration of beta-glucuronidase-positive *Escherichia coli* – Part 3: Most probable number technique using 5-bromo-4-chloro-3-indolyl-beta-D-glucuronide or other validated methods in accordance with the protocol set out in the ISO 16140 or other internationally accepted similar protocol.

### **I-8.5 Method of Analysis of *Salmonella* in bivalve molluscs**

The methods to be employed for *Salmonella* should be ISO 6579, or other validated methods that provide

equivalent sensitivity, reproducibility and reliability.

### **I-8.6 Determination of Biotoxins**

<b>Provision</b>	<b>Methodology</b>	<b>Principle</b>	<b>Type</b>
Saxitoxin group	AOAC Official Method 2005.06 (Paralytic Shellfish Poisoning Toxins in Shellfish) four matrices and 12 toxins	LC-FL	II

### **I-9 DEFINITION OF DEFECTIVES**

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

#### **I-9.1 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-9.2 Dead or Damaged Product**

The presence of dead or damaged product. Dead product is characterised by no response to percussion (i.e. shellfish will close by themselves when tapped). Damaged product includes product that is damaged to the extent that it can no longer function biologically. A Sample unit shall be considered defective if dead or damaged bivalve molluscs exceed 5% by count.

### **I-10 LOT ACCEPTANCE**

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

- (i) the total number of defectives as classified according to section I-8 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (ii) the total number of sample units not meeting the count designation as defined in section I-7.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;
- (iv) the Food Additives, Contaminants, Hygiene and Labelling requirements of Sections I-4, I-5, I-6 and I-7 are met.

## **PART II – RAW BIVALVE MOLLUSCS**

### **II-2 DESCRIPTION**

#### **II-2.1 Product Definition**

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

#### **II-2.2 Process Definition**

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

Bivalve molluscs that have been processed to reduce or limit target organisms while essentially retaining the sensory characteristics of live bivalve molluscs are ones that have been processed to assure reduction or

limitation of the target organisms to the satisfaction of the official agency having jurisdiction.

### **II-2.3 Presentation**

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

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

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

## **II-3 ESSENTIAL COMPOSITION AND QUALITY FACTORS**

### **II-3.1 Raw Bivalve Molluscs**

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

### **II-3.2 Ingredients**

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

### **II-3.3 Final Product**

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

## **II-4 FOOD ADDITIVES**

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

### **Antioxidants**

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

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

## **II-5 CONTAMINANTS**

Raw bivalve molluscs should meet the requirements of I-5

## **II-6 HYGIENE AND HANDLING**

Raw bivalve molluscs should meet the requirements of I-6

## **II-7 LABELLING**

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

### **II-7.1 The Name of the Food**

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

**II-7.1.1** There shall appear on the label, reference to the presentation provided for in Section II-2.3- Presentation in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation of the product to avoid misleading or confusing the consumer.

**II-7.1.2** In addition to the specified labelling designations above, the usual or common trade names of the variety may be added so long as it is not misleading to the consumer in the country in which the product will be distributed.

### **II-7.2 Content Declaration**

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

### **II-7.3 Storage Instructions**

The label shall specify the conditions for storage and/or temperature that will maintain the food safety and characteristics of the product during transportation, storage and distribution including date of minimum durability and for date of shucking.

### **II-7.4 Labelling of Non-retail Containers**

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

**II-7.4.1** Every package containing bivalve molluscs that have been processed to reduce or limit target organisms must be provided with a label certifying that all molluscs have been processed to reduce the target organism to levels acceptable to the official agency having jurisdiction.

**II-7.4.2** Safety claims for bivalve molluscs processed to reduce or limit target organisms should be specific to the target organisms that have been reduced or limited as described in the Code of Practice. **II-8. SAMPLING, EXAMINATION AND ANALYSES**

### **II-8.1 Sampling**

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-8.2 Sensory and Physical Examination**

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

### **II-8.3 Determination of Net Weight and Drained Weight**

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

#### **II-8.3.1 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-8.3.2 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-8.3.3 Determination of Net Weight of Products Covered by Glaze**

AOAC official method 963.18, Net Contents of Frozen Seafoods

**II-8.3.4** 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-8.3.5 Determination of Drained Weight**

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

### **II-8.4 Determination of Count per Unit Weight or Volume**

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

## **II-8.5 Sample Preparation**

### **II-8.5.1 Procedures for Thawing**

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

### **II-8.6 Methods of Analysis of *Escherichia coli***

Refer to I-8.4 Methods of Analysis of *Escherichia coli*

### **II-8.7 Method of Analysis of *Salmonella***

Refer to I-8.5 Method of Analysis of *Salmonella*

### **II-8.8 Determination of Biotoxins**

Refer to I-7.5 Determination of Biotoxins

## **II-9 DEFINITION OF DEFECTIVES**

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

### **II-9.1 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-9.2 Foreign Matter**

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

### **II-9.3 Odour/Flavour**

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

### **II-9.4 Texture**

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

## **II-10 LOT ACCEPTANCE**

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

- (i) the total number of defectives as classified according to section II-8 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (ii) the total number of sample units not meeting the count designation as defined in section II-2.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the General Guidelines on Sampling (CAC/GL 50-2004);
- (iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;
- (iv) the Food Additives, Contaminants, Hygiene and Labelling requirements of Sections II-4, II-5, II-6 and II-7 are met.



## APPENDIX IV

## PROPOSE DRAFT CODE OF PRACTICE FOR CRABS

(At Step 6 of the Procedure)

## 2.XX CRABS

<b>Batch systems</b>	are those processing methods where crabs are processed as bulk units;
<b>Butchering</b>	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;
<b>Brown Meat</b>	the edible parts of the crab, excluding the claw, leg and shoulder meat, which may include the liver and gonads.
<b>Claw</b>	means the pincer appendage at the end of the crab.
<b>Cooking</b>	means boiling of crabs 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;
<b>Crab</b>	means the commercially important species of the Decapoda order in the Brachyura and Anomura sections;
<b>Deterioration</b>	means those natural processes of quality reduction that occur after harvesting and that are quite independent of man's deliberate intervention;
<b>Enzymatic activity</b>	is the catalytic action of enzymes on biochemical reactions;
<b>Insensible</b>	is the state of unresponsiveness as a result of thermal, electrical, or physical process imposed on crabs prior to cooking;
<b>Leg tips</b>	are the third leg segments counting from the crab shell;
<b>Pasteurisation</b>	means subjecting crab meat to heat at times and temperatures, which inactivates spoilage and pathogenic micro-organisms without noticeable changes in appearance, texture and flavour of the product;
<b>Picking</b>	refers to the process of removing meat from the crabs shell by machine or by hand;
<b>Pounding</b>	refers to the holding of live crabs in water tanks or floating crates for extended periods of time;
<b>Sections</b>	are the cleaned, eviscerated and degilled crab parts usually consisting of one half of the crab body and the attached walking legs and claw;
<b>Shaking</b>	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;
<b>Shell</b>	the hard outer covering of crabs;
<b>Shoulder</b>	is the section containing meat in the body of the crab;
<b>Shucking</b>	is the process of removing the meat from the shell;
<b>Tail</b>	in crabs is the abdomen or posterior part of the body;
<b>Tailing</b>	is the process of separating the tail from the cephalothorax;
<b>Trimming</b>	is the process of removing any signs of blood, membrane or remnants of the gut which may be attached to the shell.
<b>Waste</b>	means those crab parts which remain after the meat removal operation is completed.

## SECTION XX<sup>1</sup> - PROCESSING OF CRABS

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

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

### XX.1 GENERAL – ADDITION TO PRE-REQUISITE PROGRAMME

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

#### xx.1.1 Design and Construction of Equipment and Utensils

Refer to Section 13.1.1

#### xx.1.2 Hygiene Control Programme

Refer to Section 13.1.2

### xx.2 General Considerations for the Handling of Crabs

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

#### xx.2.1. Potential Hazards and Defects Associated with Crabs

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

##### xx.2.1.1. Potential Hazards

###### Bacteria

Refer to Section 13.2.1.1

###### Chemical Hazards

Veterinary Drugs

Refer to Section 13.2.1.1

###### Parasites

The Food-borne trematode, *Paragonimus* in certain species of freshwater crabs.

###### Biotoxins

PSP toxins (saxitoxins) and ASP toxin in viscera of dungeness crabs (*Cancer magister*), tanner crabs (*Chionoectes bairdi*), red rock crabs (*Cancer productis*) and brown crabs (*Cancer pagurus*).

##### xx.2.1.2 Potential Defects

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

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<sup>1</sup> Final numbering of the section to be determined

(hemolymph) and may be avoided by eliminating the blood to the extent practicable in the cooking and canning process.

Another form of discoloration caused by fungus infection, particularly of snow crabs, is known as "black mat". While light infections may be physically removed, crabs with heavy infections should be culled as the shells cannot be completely cleaned and because there is tissue penetration of colourless hyphae that can affect the meat quality.

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

### **xx.2.2 Minimise the Deterioration of Crabs - Handling**

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

- it is generally known that under similar conditions, the quality of crabs deteriorate more rapidly than fish and therefore care in maintaining the crabs live prior to processing is strongly recommended;
- since crab legs and other appendages can be easily broken and the damage can cause the risk of infection and weakening of the crab, care should be taken to handle live crabs at all times;
- tanks and wells for pounding live crab should be so placed and constructed as to ensure survival of the crab;
- time is one of the most effective methods in controlling crab product processing. It is strongly recommended that all operations in crab product processing be achieved as rapidly as possible;
- good quality of crab butchered sections can be maintained by immediate cooking and chilling or freezing;
- live crabs 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 crabs due to slime or mud;
- care also should be taken to maintain the necessary humidity in holding the crabs 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 crabs alive until the time of processing, crabs should be butchered. Sections should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible.

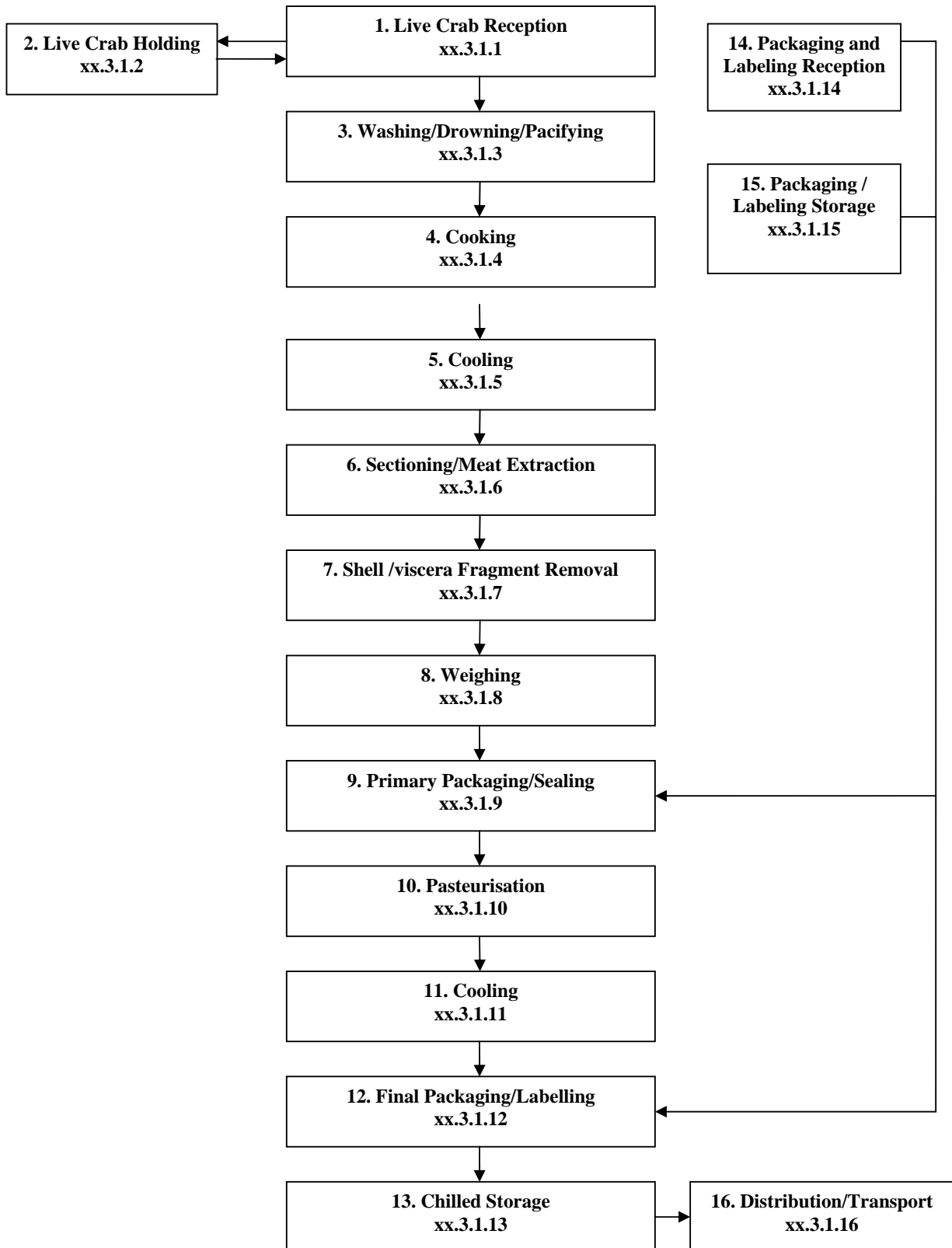
### **xx.2.3 Processing Operations –Crabs**

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

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

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

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



**xx.3.1 Chilled Pasteurized Crab Meat****xx.3.1.1 Live Crab Reception (Processing Step 1)**

Refer also to section 13.3.1.1 of this document.

Potential Hazards: *Biotoxins (for certain species), parasites*

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.
- The hazards of toxins in crabs is associated with consumption of brown meat. When brown meat is suspected of being associated with biotoxin contamination e.g. through phytoplankton monitoring or shellfish flesh testing, then testing of the brown meat should be carried out to determine its suitability for consumption.
- 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 of species of crabs that pose a risk of parasites as well as defects, such as ecto-parasites and black shell;
- in factories which process crabs, any dead crabs should be discarded. Where sections are processed, any defective or deteriorated parts should be removed from the lot and disposed off in a proper manner;
- weak crabs should be processed immediately.

**xx.3.1.2 Live Crab Holding (Processing Step 2)**

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

Potential Hazards: *Unlikely*

Potential Defects: *Crab Mortality*

Technical Guidance:

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

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

Potential Hazards: *Unlikely*

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

Technical Guidance:

- crabs should be washed in plenty of running potable water, or clean sea water, or as defined in Section 13.1.2 to remove all impurities. For some species, scrubbing by brush may be necessary. These methods can be combined;
- crabs which are to be processed whole for fresh and frozen products should be pacified or killed just prior to cooking to prevent legs and claws loss. This may be accomplished by the following methods:
  - cooling the crabs to 0°C or lower, depending of the species;
  - immersion of the crabs in potable water or clean sea water which is approximately 10-15°C warmer than the natural environment of the species;
  - piercing of the two nerve centres by means of a stainless steel skewer or rod. A rod is inserted through one of the eyes and through the vent;

- stunning the crabs by passing a weak electric current through seawater or freshwater in which the crabs are immersed;
- since spoilage in dead crabs takes place very rapidly and any delay prior to cooking may reduce the meat quality, crabs that are rendered insensible or killed should be cooked immediately;

#### **xx.3.1.4 Cooking (Processing Step 4)**

*Potential Hazards:* Unlikely

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

*Technical Guidance:*

- where the final product is to be marketed as cooked crabs in the shell or the shucked meat should be chilled to a temperature approaching 4° C. or less and either passed into the distribution chain or processed within 18 hours;
- in most cases the cooking of crabs in boiling water is preferred to steaming. Steaming has a tendency to dry the meat, resulting in the flesh adhering to the shell. Cooking utilizing continuous conveyors is recommended;
- Cooking should be carried out by appropriately trained personnel who has acquired the necessary skills to monitor and ensure that all crabs are given the same time/temperature exposure during the operation;
- adequate uniform cooking is essential because too much cooking causes excessive meat shrinkage, moisture loss, lower yields and poor texture. Too little cooking makes it difficult to remove the meat from the shell, and may cause blue discoloration;
- it is difficult to specify cooking times and temperatures generally due to differences in size, structure and physiology of the different species of crabs.

#### **xx.3.1.5 Cooling (Processing Step 5)**

*Potential Hazards:* Microbiological contamination

*Potential Defects:* unlikely

*Technical Guidance:*

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

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

*Potential Hazards:* Microbiological contamination, biotoxin

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

*Technical Guidance:*

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

#### **xx.3.1.7 Shell Fragments and Viscera Fragments Removal (Processing Step 7)**

*Potential Hazards:* Microbial toxin formation

*Potential Defects:* Presence of viscera fragments, foreign material, shell fragments

*Technical Guidance:*

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

#### **xx.3.1.8 Weighing (Processing Step 8)**

*Potential Hazards:* Survival of *Clostridium botulinum* spores

*Potential Defects:* Underweight cans

*Technical Guidance:*

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

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

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

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

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

*Potential Defects:* Incorrect labelling

*Technical Guidance:*

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

#### **xx.3.1.10 Pasteurisation (Processing Step 10)**

Potential Hazards: *Microbiological contamination, parasites*

Potential Defects: *Deterioration*

Technical Guidance:

- pasteurising of product should be carried out by appropriately trained personnel who have acquired the necessary skills to monitor and ensure that all packages are given the same time/temperature exposure during the operation;
- pasteurisation should be carried out in hermetically sealed containers;
- to prevent any possible deterioration of the product the crab meat should be pasteurised immediately after picking and packaging. It is preferable that the meat be at a temperature of approximately 18°C (64.4°F) when the containers are hermetically sealed to provide a slight vacuum after chilled storage temperatures;
- a time and temperature regime for the pasteurisation of different crab products should be established and should take into consideration the pasteurisation equipment and capacity, the physical properties of the crab and packaging container including their thermal conductivity, thickness, shape and temperature, to ensure that adequate heat penetration has been achieved for all containers in the lot;
- each container of crab meat should be subject to time and temperature that address non-proteolytic *Clostridium botulinum* risk to a scheduled time and temperature that will inactivate microorganisms of public health concern that could grow during storage.;
- cook time and temperatures must be sufficient to kill trematode parasites;
- the water bath should be preheated to a temperature of 90°C (194°F) before the loaded basket is put into it. Special concern should be given to proper water circulation within the bath and around each individual container being pasteurised. Hot water bath temperature should remain constant until processing is completed;
- once proper times and temperatures are established, they must be adhered to closely and pasteurisation processes should be standardized by accurate thermocouple measuring equipment. It is recommended that new equipment be standardized after installation and re-standardize on an annual basis or when difficulties are experienced;
- calibration and appropriate maintenance of temperature recording equipment should be performed on a regular basis to ensure accuracy;

#### **xx.3.1.11 Cooling (Processing Step 11)**

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

Potential Defects: *Unlikely*

Technical Guidance:

- the pasteurized container of meat should be immediately cooled after processing.
- cooling is best accomplished in an ice water bath. The size of the cooling bath should exceed the size of the pasteurizing water bath to allow for an excess of ice, which is needed if the water is to be kept below 8°C (46.4°F) and a maximum cooling rate is to be realised. No water



agitation is required since adequate convection currents are created by differences between bath and product temperatures;

- the water used at the cooling operation should be [chlorinated] in order to avoid recontamination of the product;
- the product should be removed from the ice bath when the temperature has been reduced to below 3.0°C (38°F) with subsequent transfer to chilled storage as quickly as possible;
- crates used to hold container in chilled storage should allow free passage of air currents in order to complete the cooling cycle;
- the processing facility should implement a traffic control system that will ensure that the unpasteurised product cannot be mixed with any pasteurized product.

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

Refer to Section 8.2.3 “Labelling”

*Potential Hazards:* Unlikely

*Potential Defects:* Incorrect labelling, dehydration

*Technical Guidance:*

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

#### **xx.3.1.13 Chilled Storage (Processing Step 13)**

*Potential Hazards:* Formation of *Clostridium botulinum* toxin.

*Potential Defects:* Unlikely

*Technical Guidance:*

- the pasteurized crab meat should be moved to the chilled storage facility without undue delay;
- the pasteurized product is perishable and unless it is kept chilled at a minimum temperature of below 3°C (38°F), there is a possibility that *Clostridium botulinum* may grow and produce toxins;
- the chillroom should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended;

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

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

*Potential Hazards:* Unlikely

*Potential Defects:* Contaminated packaging material

*Technical Guidance:*

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

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

Refer to Section 8.5.2 Storage – Packaging, Labels & Ingredients

*Potential Hazards:* Unlikely

*Potential Defects:* Contaminated packaging material.

*Technical Guidance:*

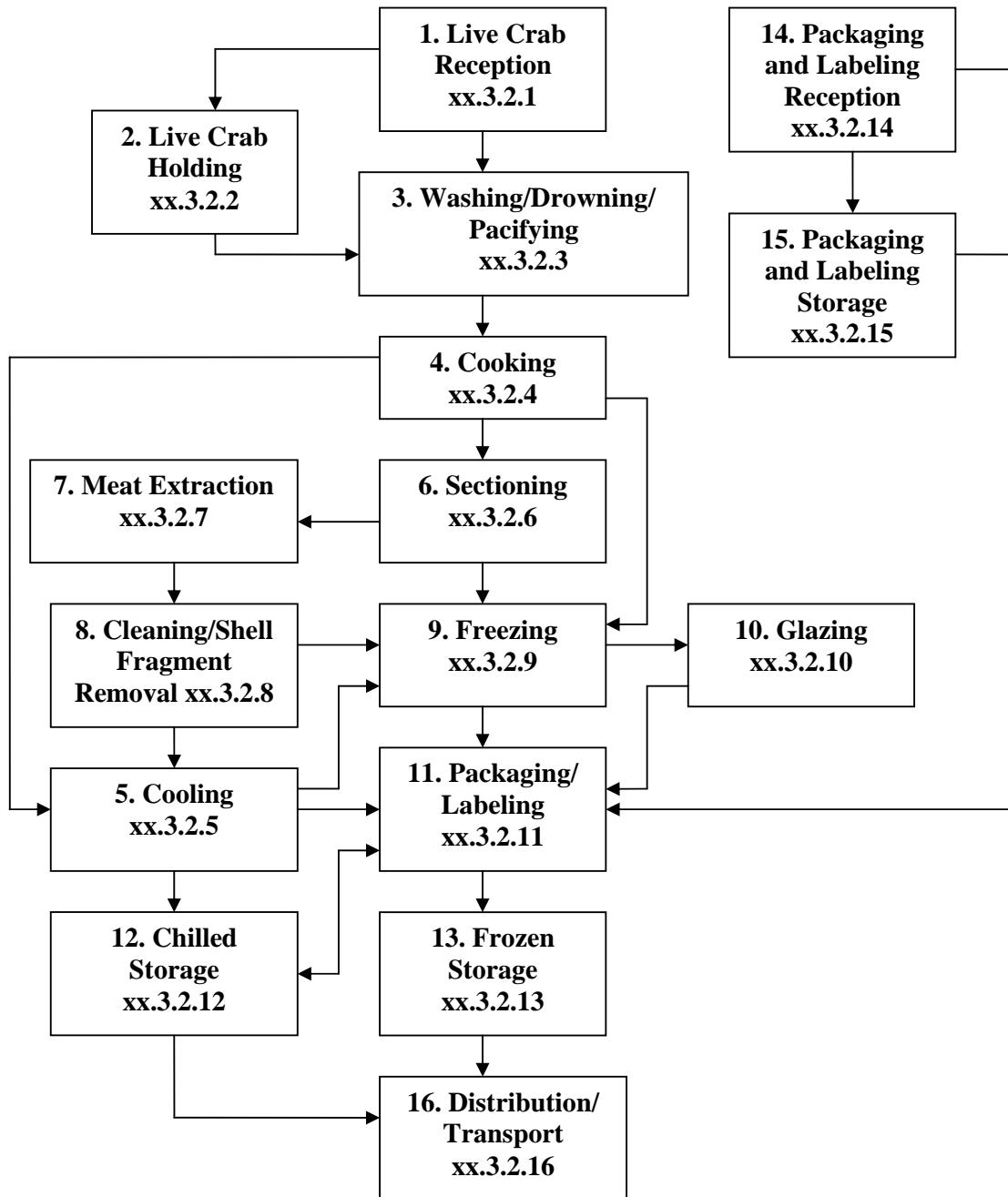
- packaging material should be protected from dust, dirt and other sources of contaminants;
- Pests and insects should be excluded from the packaging storage area;

**xx.3.1.16 Distribution/Transport (Processing Step 16)**

Refer to Section 17 – Transport

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

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



**xx.3.2 Chilled and Frozen Cooked Crab****xx.3.2.1 Live Crab Reception (Processing Step 1)**

Refer to section xx.3.1.1 of this document.

**xx.3.2.2 Live Crab Holding (Processing Step 2)**

Refer also to Section xx.3.1.2 of this document.

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

Refer to Section xx.3.1.3 of this document.

**xx.3.2.4 Cooking (Processing Step 4)**

Refer to Section xx.3.1.4 of this document.

**xx.3.2.5 Cooling (Processing Step 5)**

*Potential Hazards: Microbiological contamination*

*Potential Defects: unlikely*

*Technical Guidance:*

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

**xx.3.2.6 Sectioning (Processing Step 6)**

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

*Potential Defects: Presence of gills and viscera*

*Technical Guidance:*

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

**xx.3.2.7 Meat Extraction (Processing Step 7)**

*Potential Hazards: Recontamination with pathogenic micro-organisms,*

*microbiological growth, microbial toxin formation*

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

Technical Guidance:

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

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

Refer to Section xx.3.1.7 of this document.

#### **xx.3.2.9 Freezing (Processing Step 9)**

Refer to section 8.3.1 – Freezing Process

Potential Hazards: *Unlikely*

Potential Defects: *Poor texture.*

Technical Guidance:

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

#### **xx.3.2.10 Glazing (Processing Step 10)**

Refer to section 8.3.2 – Glazing

Potential Hazards: *Unlikely*

Potential Defects: *Incomplete glaze, foreign material.*

Technical Guidance:

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

#### **xx.3.2.11 Packaging/Labeling (Processing Step 11)**

Refer to Section xx.3.1.12 of this document

#### **xx.3.2.12 Chilled Storage (Processing Step 12)**

Refer to Section 8.1.2 – Chilled Storage.

Potential Hazards: *Microbiological Growth*

Potential Defects: *Decomposition, foreign matter*

Technical Guidance:

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

**xx.3.2.13 Frozen Storage (Processing Step 13)**

Refer to Section 8.1.3 – Frozen Storage.

Potential Hazards:            *Unlikely*

Potential Defects:            *Freezer burn, dehydration*

Technical Guidance:

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

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

Refer to Section xx.3.1.14 of this document.

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

Refer to Section xx.3.1.15 of this document.

**xx.3.2.16 Distribution/Transport (Processing Step 16)**

Refer to Section 17 – Transport

## APPENDIX V

## DRAFT STANDARD FOR STURGEON CAVIAR

## (At Step 6 of the Procedure)

**1. SCOPE**

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

**2. DESCRIPTION****2.1. Definitions**

The following definitions are used in this standard:

**Fish eggs:** non-ovulated eggs separated from the connective tissue of ovaries. Ovulated eggs may be used from aquacultured sturgeons.

**Caviar:** the product made from fish eggs of the *Acipenseridae* family by treating with food grade salt.

**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 eggs are of about one size and evenly and characteristically coloured according to the species used. Colour can vary from light grey to black or from light yellow to yellowish grey. Brownish and greenish shades are permissible. The product is made with addition of salt and/or with, or without food additives, and is intended for direct human consumption. The salt content of the product is equal or above 3g/100g and below or equal to 5g/100g in the end product.

**2.3 Process Definition**

2.3.1 The product, after suitable preliminary preparation of the caviar, shall be subject to treatment or conditions sufficient to prevent the growth of spore and non-spore forming pathogenic microorganisms and shall comply with the conditions laid down hereafter.

The product shall be prepared by salting fish eggs with food grade salt. During packaging, storage and retail, the product temperature is between +2 and +4°C, whereas for wholesale business, including storage and transportation, the temperatures are between 0° and -4°C. Freezing as well as frozen storage of caviar is not permitted unless the deterioration of quality is avoided.

The product shall be packed in:

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

2.3.2 Re-packaging of the product from larger to smaller containers under controlled conditions which maintain the quality and safety of the product shall be permitted. No mixing of caviar from different lots shall be permitted.

**3. ESSENTIAL COMPOSITION AND QUALITY FACTORS****3.1 Raw Material**

Caviar shall be prepared from fish eggs extracted from sound and wholesome sturgeons of biological species of the genera described in Section 2.2, which are of a quality fit to be sold fresh for human consumption.

**3.2 Salt**

Salt shall be of food grade quality and conform to all applicable Codex Standards.

**3.3 Final Product**

The product shall meet the requirements of the present Standard, when a lot examined in accordance with the requirements described in Section 10 complies with the provisions set out in Section 9.

The product shall be examined by the methods given in Section 8.

#### **4. FOOD ADDITIVES**

4.1 The use of colours is not allowed.

4.2 Only those food additives listed below may be used and only within the limits specified: (to be elaborated)

#### **5. CONTAMINANTS**

The products covered by this Standard shall comply with the Maximum Levels of the Codex General Standard for Contaminants and Toxins in Foods (CODEX/STAN 193-1995) and the maximum residue limits for pesticides and veterinary drugs established by the CAC.

#### **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) and other relevant Codex Codes of Practice.

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

[6.3 The product shall not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission.

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

#### **7. LABELLING**

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

##### **7.1 The Name of the Food**

7.1.1 For the *Acipenseridae* family, the name of the food shall be “caviar” or “caviar” completed with the usual name (Beluga for *Huso huso*, Ossetra for *Acipenser guldenstaedtii* and *Acipenser persicus*, Sevruga for *Acipenser stellatus*), in accordance with the law and custom of the country in which the product is sold, in a manner not to mislead the consumer.

7.1.3 For sturgeons having no common names the name may be supplemented with the identification code of the biological species of the fish in accordance with Annex A, e.g. «Sturgeon caviar».

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

[7.1.5 The label shall be in compliance with the CITES labeling requirements.]

##### **7.2 Storage Instruction**

The label shall include terms to indicate that the product shall be stored under an appropriate temperature as indicated on the label.

##### **[7.3 Country of origin**

The country of origin of the product shall be declared.]

In case of repackaging of the product the facility registration code shall be identified.

7.4 Each primary container shall be labelled with the number markings of the lot.

#### **8. SAMPLING, EXAMINATION AND ANALYSES**

##### **8.1 Sampling**

8.1.1 Sampling of lots for examination of the product shall be in accordance with the General Guidelines on Sampling (CAC/GL 50-2004). A sample unit is the primary container.

8.1.2 Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the Codex Alimentarius Commission.



8.1.3 Sampling of lots for pathogenic microorganisms and parasites shall be in accordance with the Principles for the Establishment and Application of Microbiological Criteria to Foods (CAC/GL 21-1997).

## **8.2 Sensory and Physical/Chemical Examination**

Samples taken for sensory and physical/chemical examination shall be assessed by person trained in such examination and in accordance with methods elaborated in Sections 8.2.1 – 8.2.2 and the Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

### **8.2.1. The Determination of Net Weight**

The net weight (excluding packaging material) of each sample unit in the sample lot shall be determined by deducting the weight of the empty container from the total weight.

### **8.2.2 The Determination of Salt Content**

The determination of salt content is performed according to the method described in the Codex Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family of Fishes (CODEX STAN 167- 1989).

## **9. DEFINITION OF DEFECTS**

The sample unit shall be considered as defective when it exhibits any of the properties defined in Sections 9.1- 9.4.

### **9.1 Foreign matter**

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

### **9.2 Odour and Flavour**

The product affected by persistent and distinct objectionable odour and/or flavour indicative of decomposition, oxidation, or taste of feed (in fish reared in aquaculture), or contamination by foreign substances (such as fuel oil).

### **9.3 Consistency and Condition**

The presence of hard cover of caviar grains that is not easily chewable or tenuous.

### **9.4 Extraneous material**

The presence of remnants of membranes and fat in finished caviar.

## **10. LOT ACCEPTANCE**

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

1. The total number of defectives as classified according to Section 9 does not exceed the acceptable number of the appropriate sampling plan given in the General Guidelines on Sampling (CAC/GL 50-2004).
2. The average net weight of all sample units is not less than the declared weight, provided no individual container is less than 95% of the declared weight.
3. The Food Additives, Hygiene, Packing and Labelling requirements of Sections 4, 2.3, 5, 6, 7 and 8 are met.

## ANNEX A

Table .1 - IDENTIFICATION CODES OF STURGEON SPECIES

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

## APPENDIX VI

## PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

(At step 3 of the procedure)

**2.8 SMOKED FISH**

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

**SECTION 12 - PROCESSING OF SMOKED FISH**

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

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

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

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

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

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

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

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

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

Cold smoked fish should meet the requirements set out in the Codex Standard for Pre-Packed Cold Smoked Fish<sup>1</sup>.

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.

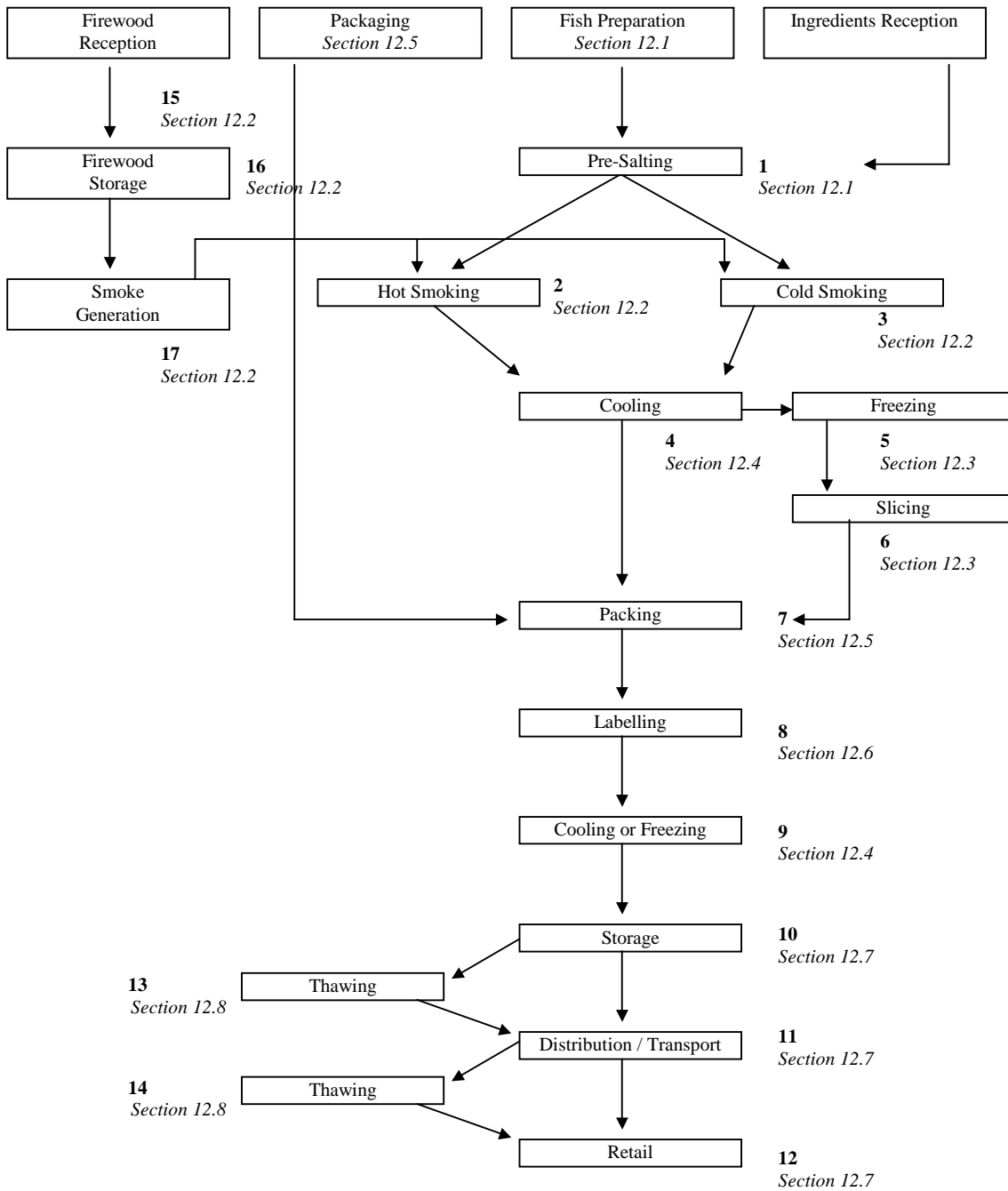
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<sup>1</sup> Codex Standard for Pre-Packed Cold Smoked Fish (under elaboration)

*This flow chart is for illustrative purposes only.*

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

*References correspond to relevant Sections of the Code.*



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

## 12.1 PRE-SALTING (PROCESSING STEP 1)

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

Potential Defects: Decomposition, physical contamination

Technical Guidance:

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

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

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

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

## 12.2 THE SMOKING (PROCESSING STEPS 2 & 3)

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

Potential Defects: Decomposition, physical contamination

Technical Guidance:

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

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

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

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

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

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

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

Potential Hazards: Microbiological cross contamination, microbiological growth

Potential Defects: Unlikely

Technical Guidance:

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

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

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

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

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

Potential Hazards: Microbiological contamination, microbiological growth

Potential Defects: Decomposition, physical contamination

Technical Guidance:

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

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

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

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

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

Potential Defects: Physical contamination

Technical Guidance:

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

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

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

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

#### **12.6 LABELLING (PROCESSING STEP 8)**

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: Unlikely

Potential Defects: Incorrect labelling

Technical Guidance:

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

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

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

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

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

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

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

## **12.8 THAWING (PROCESSING STEPS 13 & 14)**

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

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



## 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<sub>2</sub>, 25-35% O<sub>2</sub> and 25-35% N<sub>2</sub> are recommended. Gas mixtures containing up to 60% CO<sub>2</sub> in combination solely with N<sub>2</sub> are recommended for oily fish. The inclusion of CO<sub>2</sub> 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<sub>2</sub> in the gas mixture can induce pack collapse, excessive drip and may cause bleaching. Other gases, N<sub>2</sub> and O<sub>2</sub>, are included as diluents to prevent these effects. O<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> absorption takes place rapidly.

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

**OPTIONAL FINAL PRODUCT REQUIREMENTS<sup>2</sup> - FRESH, FROZEN AND MINCED FISH**

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

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

**1.1 Quick Frozen Finfish, Uneviscerated and Eviscerated**

<i>Defect</i>	<u>Recommended Defect Description</u>
a) Body Deformation	Deformation of the back (hump-back) or of the head if present (hooked snout) as a result of the extension of cartilaginous material in these areas as the fish approaches spawning condition.
b) Damage to protective coating	Voids in the ice glaze or tears in the covering membrane.
c) Surface defects:	
Discoloration from bruises	Readily discernible localised discoloration caused by diffusion of blood into the flesh.
Cuts, wounds and other skin breaks	Readily discernible damage to the skin
Discoloured skin	Readily discernible deviation from the normal characteristic colour of the species concerned.
d) Gutting and Cleaning Defects	Improper washing Belly burn or loose belly bones. Misplaced cuts made during gutting.
Gill and body cavity cuts	Incomplete removal of the viscera.
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<sup>3</sup>**

<u>Defect</u>	<u>Recommended Defect Description</u>
a) Moderate Dehydration	A loss of moisture from the surface of the sample unit, which is colour masking, but does not penetrate the surface and can be easily removed by scraping. Over 10% of the total surface area; or
	<u>Pack Size</u> <u>Defect Area</u>
	a) <200 g units                      >25cm <sup>2</sup>

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

<sup>3</sup> 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) 201-500 g units	>50cm <sup>2</sup>
	c) 501- 5000 g units	>150cm <sup>2</sup>
	d) 5001-8000 g units	>300cm <sup>2</sup>
	e) 8000 g units	>500 cm <sup>2</sup>
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 <sup>2</sup>	
e) Black Membrane or Belly Lining (does not include white membrane)	Skin-on fillets Each piece greater than 3 cm <sup>2</sup>	
f) Scales: Attached to skin Readily noticeable loose scales	Skin-on fillets - scaled Each area of scale greater than 3 cm <sup>2</sup> 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 <sup>2</sup> .	
i) Fins or part of fins	Two or more bones connected by membrane, including internal or external bones, or both in a cluster. Any instance where a bone in the fin exceeds 40 mm in length.	
j) Bones	Any bone greater than or equal to 10 mm in length or with a diameter greater than or equal to 1 mm; any bone greater than or equal to 5 mm in length is not to be considered if the diameter is not greater than or equal to 2 mm. The foot of a bone (where it has been attached to the vertebra) shall be disregarded if its width is less than or equal to 2 mm or if it can be easily stripped off by a finger nail	
Critical Bone	Each defect whose maximum profile cannot be fitted into a rectangle, drawn on a flat solid surface, which has a length of 40 mm and a width of 10 mm.	
k) Packaging Material	Each instance.	
l) Viscera	Each instance of the internal organs.	

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

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

	Over 10% of total surface area, or <u>Pack Size</u>	<u>Defect Area</u>
	a) <200g units	>25cm <sup>2</sup>
	b) 201-500g units	>50cm <sup>2</sup>
	c) 501-5000g units	>150 cm <sup>2</sup>
	d) 5001-8000g units	>300 cm <sup>2</sup>
	e) >8000g units	>500 cm <sup>2</sup>
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 <sup>2</sup>	
f) Black Membrane or Belly Lining (does not include white membrane)	Skin-on fillet blocks Each instance greater than 3 cm <sup>2</sup>	
g) Scales (Attached to skin)	Skin-on fillet blocks (scaled) Each area of scale greater than 3 cm <sup>2</sup>	
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 <sup>2</sup> .	
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.]	

## ANNEX IV

**OPTIONAL FINAL PRODUCT REQUIREMENTS - FROZEN SURIMI**

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

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

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

**1. Primary Quality Attribute****1.1 Raw Surimi Tests***Preparation of test sample:*

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

**1.1.1 Moisture**

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

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

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

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

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

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

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

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

**1.1.2 pH**

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

**1.1.3 Objectionable Matter**

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

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

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

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

## **1.2 Cooked Surimi Gel Tests**

### **1.2.1 Gel Strength and Deformability**

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

#### **1.2.1.1 Puncture Test**

*Preparation of test sample:*

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

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

#### **A. Comminution**

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

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

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

#### **B. Stuffing**

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

#### **C. Heating**

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

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

#### **D. Cooling**

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

### **Test Method**

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

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

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

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

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

### 1.2.1.2 Torsion Test

Preparation of the surimi gel test specimen

#### A. Comminution

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

#### B. Stuffing

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

#### C. Heating

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

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

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

#### D. Cooling

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

#### Test Method

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

Measurement of Stress and Strain:

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

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

### 1.2.2 Colour

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

## 2. Secondary Quality Attributes

### 2.1 Raw Surimi Tests

#### *Preparation of test sample:*

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

#### 2.1.1 Objectionable Matter(Scales)

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

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

#### 2.1.2 Crude Protein Content

AOAC Kjeldahl Method

#### 2.1.3 Sugar Content

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

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

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

#### 2.1.4 Crude Fat Content

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

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

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



Extraction speed shall be 20 times per hour.

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

S : Quantity of test sample taken(g)

W<sub>0</sub> : Weight of receptacle(g)

W<sub>1</sub> : 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\*)<sup>2</sup> + a\*<sup>2</sup> + b\*<sup>2</sup>]<sup>0.5</sup>.

### 2.1.6 Pressure Induced Drip

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

## 2.2 Cooked Surimi Tests

### 2.2.1 Preparation of test sample

#### 2.2.1.1 Water-added Surimi gel:

##### A. Comminution

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

##### B. Casing

Same as Section 1.2.1.1.B of this Appendix

##### C. Heating

Same as Section 1.2.1.1.C of this Appendix

##### D. Cooling

Same as Section 1.2.1.1.D of this Appendix

#### 2.2.1.2 Starch-added Surimi gel

##### A. Comminution

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

**B. Stuffing**

Same as Section 1.2.1.1.B of this Appendix

**C. Heating**

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

**D. Cooling**

Same as Section 1.2.1.1.D of this Appendix.

**2.2.1.3 Suwari (setting)-treated Surimi gel**

**A. Comminution**

Same as Section 1.2.1.1.A of this Appendix.

**B. Casing**

Same as Section 1.2.1.1.B of this Appendix.

**C. Heating**

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

**D. Cooling**

Same as Section 1.2.1.1.D of this Appendix.

**2.2.2 Test method**

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

**2.2.2.1 Whiteness**

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

**2.2.2.2 Expressible Moisture**

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

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

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

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

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

Water holding capacity (%) is calculated as follows.

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

**2.2.2.3 Folding test:**

The folding test is conducted by folding a 5-millimeter thick slice of gel slowly in half and in half again while examining it for signs of structural failure (cracks). Make sure the sample is folded completely in half.

Keep the folded state for five seconds, and then evaluate the change in the shape by 5 - stage merit marks. The minimum amount of folding required to produce a crack in the gel determines the score for this test. Test three or more slice pieces of the same inspection sample, and indicate the average mark obtained. In case of folding by hand, apply constant power throughout the folding surface.

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

#### 2.2.2.4 Sensory (Biting) Test

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

#### Merit Mark “Ashi (footing) Strength”

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

## ANNEX V

## OPTIONAL FINAL PRODUCT REQUIREMENTS: COATED QF FISHERY PRODUCTS

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

Thawed state	Skin and black membranes (does not include sub-cutaneous layer silver lining)	Skinless fillet. Each piece greater than 3 cm <sup>2</sup>
	Black membrane or belly-lining (does result in coating damage during cooking)	Skin-on fillet. Each instance greater than 3 cm <sup>2</sup> (not including white membrane)
	Scales (attached to skin)  Readily noticeable loose scales	Skin-on fillet – scaled. Each area of scale greater than 3 cm <sup>2</sup> . 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 <sup>2</sup>
	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.

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

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

### ***1. Product designation of Salted Fish of family Gadidae***

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

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

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

### **Quality classification**

#### **Imperial/superior**

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

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

This category may include fish with the following characteristics:

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

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

#### **Universal**

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

This trade category may include fish with the following characteristics:

1. inadequately split
2. round tail
3. inadequately washed or rinsed

4. insufficient removal of backbone
5. moderate blood clot
6. major tears or longitudinal cracks
7. moderate cracking
8. minor blood, liver and/or bile stains

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

### **Popular**

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

## **2. Product designation of ....**

### **ANNEX VII**

#### **OPTIONAL PRODUCT REQUIREMENTS – SMOKED FISH**

[TO BE COMPLETED]

### **ANNEX VIII**

#### **OPTIONAL FINAL PRODUCT REQUIREMENTS – LOBSTERS AND CRABS (HAS TO BE COMPLETED)**

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

### **Quick Frozen Lobsters**

<b>Defect</b>	<b>Recommended Defect Description</b>
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.
d) Opacity	The raw meat is not characteristically translucent. (% affected by weight)
e) Texture	The meat of lobster, rock lobsters, spiny lobsters and slipper lobsters is tough, fibrous, mushy or gelatinous. (% affected by weight).

## ANNEX IX

## OPTIONAL FINAL PRODUCT REQUIREMENTS:- SHRIMPS &amp; 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:

<b>100 to 90</b>	<b>First quality</b>
<b>89 to 80</b>	<b>Second quality</b>

<b>Flavour:</b>	Characteristic, without unpleasant flavours.
<b>Frozen:</b>	Means the product with a thermal centre of maximum temperature of -18° C ( 0° F )
<b>Odour:</b>	Characteristic. Yodoform odour isn't considered a defect.
<b>Dehydration:</b>	The shell and/or meat of the shrimps or prawns have parts that affect appearance, texture and flavour.
<b>Texture:</b>	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.
<b>Black spots:</b>	The shell and/or meat of the shrimps or prawns should be absent of black spots that affect the appearance.
<b>Broken:</b>	Shrimps with a broken part bigger than $\frac{3}{4}$ of the size.
<b>Piece:</b>	Part of shrimps or prawns, minimal $\frac{1}{4}$ of the size.
<b>Extraneous material:</b>	All the material present in the pack that isn't part of shrimps or prawn and is not dangerous.
<b>Uniformity of size:</b>	Select by count 10 of the largest shrimps or prawns, and 10 of the smallest shrimps or prawns and divide the largest weight by the smallest weight to get a weight ratio.

**Evaluation of flavour and odour:**

For the evaluation of odour hold the shrimps or prawns close to the nose for evaluation. If the results of the raw odour evaluation indicate the existence of any off-odours, the sample shall be cooked to verify the flavour and odour.

**Steam method:**

Put the sample in a plastic bag, and place on a wire rack suspended over boiling water in a covered container. Steam the packaged product for 5 to 10 minutes.

**Examination for physical defects:**

Each of the shrimps or prawns in the sample should be examined for defects using the list of defect definitions.



## Schedule of Point Deductions per Sample

Type of Product	Factor scored	Method of determining score	Deduct
Frozen State	Dehydration	Up to 5%	0
		From 5.1% to 10%	3
		More than 10%	6
		More than 15%	11
Thaw State	Black spot only in shell	Absence	0
		Up to 5%	1.5
		Each 4% additional or less	2
	Black spot in meat	Absence	0
		Up to 3%	1
		From 3.1% to 5%	2
		Each 5% additional or less	2
	Broken, damaged and pieces	Up to 1%	1
		From 1.1% to 3%	2.5
		Each 3% additional or less	2.5
	Dehydration	Absence	0
		Up to 2%	3
		From 2.1 to 5%	6
		More than 5%	11
Dehydration in meat	Absence	0	
	Slight	3	
	Moderate	6	
	Excessive	11	
Heads and unacceptable shrimps or prawns	Up to 1%	2	
	Each 1% additional or less	3	
Extraneous material, not dangerous	1 piece	1	
	2 pieces	2	
	More than 2 pieces	4	
	Sand	21	
Uniformity of size	Slightly larger or smaller. Each 3% or fraction.	1	
	Larger or smaller. Each 3% or fraction.	2	
Odour	Characteristic.	0	
	Slightly different to characteristic.	6	
	Moderately different to characteristic.	12	
	Excessively different to characteristic.	21	
Inappropriate peel and de-vein	Absence	0	
	Over 1%; not over 6%	1	
	Over 6.1%; not over 10%	2	
	More than 10%	4	
Shells	Up to 3%	0	
	Each 1% additional or less	2	
Cooked State	Texture	Firm, but tender and moist	0
		Slight	2
		Moderate	4
Excessive		21	
Odour	Characteristic	0	
	Slight Unpleasant	21	

**B. BREADED SHRIMPS OR PRAWNS****QUALITY FACTOR****Determination of Grade**

The grade should be determined by examining the product in the frozen and cooked states, using the table of deduction:

**100 to 85**    **First quality**  
**84 to 75**    **Second quality**

**Schedule of Point Deductions per Sample:**

<b>Type of Product</b>	<b>Factor scored</b>	<b>Method of determining score</b>	<b>Deduct</b>
Frozen State	Broken	Break or cut greater than $\frac{3}{4}$ of the size	15
	Uniformity of size	Over 1.0; not over 1.35	0
Over 1.36; not over 1.40		1	
Over 1.41; not over 1.45		1.5	
Over 1.46; not over 1.50		2	
Over 1.51; not over 1.55		2.5	
Over 1.56; not over 1.60		3.0	
Over 1.61; not over 1.65		3.5	
	Easy of separation	Slight: Hand separation difficult. Each affected.	1
		Moderate: Separated with knife. Each affected.	2
Cook State	Black spot in meat	Absence	0
		Up to 5%	1.5
		Each 4% additional or less	2
	Coating defects	Absence	0
		Up to 3%	1
		From 3.1% to 5%	2
Texture	Shrimp flesh	Each 5% additional or less	2
		Firm, but tender and moist	0
		Slight	2
		Moderate	4
	Excessive	15	
	Coating	Moderately dry, soggy or tough	5
		Mealy, pasty, very tough	15

**OPTIONAL FINAL PRODUCT REQUIREMENTS - CEPHALOPODS  
[TO BE COMPLETED]**

## ANNEX XI

**OPTIONAL FINAL PRODUCT REQUIREMENTS - CANNED FISH**

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

**1. Canned finfish**

<u>Defects</u>	<u>Recommended Defect Description</u>						
a) Drained or Washed Drained Weight	The drained weight of fish (liquid pack), or the washed drained weight of fish (sauce packs) shall be not less than the following % (m/m) of water capacity of the can when packed in : <table border="0" style="margin-left: 20px;"> <tr> <td>(i) edible oil</td> <td style="text-align: right;">70%</td> </tr> <tr> <td>(ii) own juice ; brine or water ; marinade ; aspic</td> <td style="text-align: right;">60%</td> </tr> <tr> <td>(iii) sauces, also with other packing media added</td> <td style="text-align: right;">50%</td> </tr> </table>	(i) edible oil	70%	(ii) own juice ; brine or water ; marinade ; aspic	60%	(iii) sauces, also with other packing media added	50%
(i) edible oil	70%						
(ii) own juice ; brine or water ; marinade ; aspic	60%						
(iii) sauces, also with other packing media added	50%						
Exuded water (oil packs only)	Water content (expressed as % of declared net contents of can). <table border="0" style="margin-left: 20px;"> <tr> <td>(i) fish packed in oil</td> <td style="text-align: right;">&gt; 8%</td> </tr> <tr> <td>(ii) fish packed in oil with own juice</td> <td style="text-align: right;">&gt; 12%</td> </tr> </table>	(i) fish packed in oil	> 8%	(ii) fish packed in oil with own juice	> 12%		
(i) fish packed in oil	> 8%						
(ii) fish packed in oil with own juice	> 12%						
Separation of sauces	Sauce separated into solid and liquid (except oil)						
b) Appearance	The product in a can shall comprise fish of an appearance and colour characteristic of the genus processed and packed in the manner indicated.						
Dressed Fish and Cutlets in Various Packing Media	Cutting, Trimming and Evisceration <table border="0" style="margin-left: 20px;"> <tr> <td>(i) Parts of tail (except for small fish) and/or head</td> </tr> <tr> <td>(ii) Hard scutes (jack mackerel)</td> </tr> <tr> <td>(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.</td> </tr> </table> <p>Excessive amount of viscera (one or more fish not eviscerated).</p> <p>Non characteristic pieces</p> <table border="0" style="margin-left: 20px;"> <tr> <td>(i) Each additional small piece</td> </tr> <tr> <td>(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.</td> </tr> </table>	(i) Parts of tail (except for small fish) and/or head	(ii) Hard scutes (jack mackerel)	(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.	(i) Each additional small piece	(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.	
(i) Parts of tail (except for small fish) and/or head							
(ii) Hard scutes (jack mackerel)							
(iii) More than one fish with feed except for small fish and cutlets in the belly uncut.							
(i) Each additional small piece							
(ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.							
Fillets, Bits, and Flakes in Various Packing Media	Cutting and Trimming <p>Parts of head, tail, viscera or scutes each instance.</p> <p>Skin (fillets labelled skinless) - Each instance greater than 3 cm<sup>2</sup></p> <p>Black Membrane - Each instance greater than 5 cm<sup>2</sup></p> <p>Non characteristic pieces (fillets and pieces only)</p> <p>Flake or further disintegrated fish flesh clearly separated from fillets or pieces of fillets (expressed as % of drained fish solids material)</p>						
Discoloration, packing media	The packing medium not of normal colour and consistency for the type of pack.						
Fill of Container	A can not well filled with fish and packing media not in accordance with the type of pack.						

**2. Canned sardines and sardine-type products**

<u>Defects</u>	<u>Recommended Defect Description</u>
a) Appearance	<p>The fish in the container :</p> <p>(i) are not reasonably uniform in size ;</p> <p>(ii) are not of an appearance or colour characteristic of the species processed or packed in the manner indicated ;</p> <p>(iii) are not neatly cut to remove the head ;</p> <p>(iv) have excessive ventral breaks (unsightly rupture of the ventral area), or breaks and cracks in the flesh.</p> <p>(v) More than 40% of fish in a can having ventral breaks of half the length or more of the abdominal cavity</p> <p>(vi) The packing medium is not of normal colour and consistency for the type.</p> <p>(vii) The can is not well filled with fish.</p>
b) Exuded water (oil packs only)	Water content expressed as % of net contents of can

**3. Canned tuna and bonito**

No optional defects have been developed for this product.

**4. Canned salmon**

<u>Defect</u>	<u>Recommended Defect Description</u>
a) Appearance	(i) The can is not well filled with fish.
(i) Cross fill	(ii) In the case of regular packs, the sections of fish are not arranged so that the cut surfaces are approximately parallel to the opened end and the skin side is not parallel to the walls of the can.
(ii) Ragged appearance	Regular packs are not reasonably free from cross packs and pieces or sections of vertebrae across the top of the can.
	(iii) The oil and liquid released during processing are not normal and characteristic of the species packed.
b) Bones	Hard bone
c) Colour of Flesh	Fish having the appearance and colour of the following :
	(i) Mixed colours in a single can
	(ii) Abnormal pale colour for the species
	(iii) Belly burn
d) Bruising and Blood Spots	Presence of bruising or blood spots expressed as a % of the net content of the can.

**5. Canned crab meat**

<u>Defect</u>	<u>Recommended Defect Description</u>
Appearance	On opening the cans are not well filled and are not well arranged where appropriate for the style of presentation.

**6. Canned shrimps or prawns**

No optional defects have been developed for this product.

## APPENDIX VII

**PROPOSED DRAFT STANDARD FOR SMOKED FISH, SMOKE-FLAVOURED FISH AND SMOKE-DRIED FISH****(At Step 3 of the Procedure)****1. SCOPE**

This standard applies to smoked, smoke-flavoured and smoke-dried fish prepared from fresh, chilled or frozen raw material. It deals with whole fish, fillets and sliced- and similar products thereof. The standard applies to fish, either for direct consumption, for further processing, or for addition into speciality or minced products where fish constitutes only part of the edible contents.

It does not apply to fish treated with carbon monoxide (filtered, “clear” or ‘tasteless’ smoke), fish packaged in hermetically sealed containers processed to commercial sterility. Speciality or minced products as such are not included. (e.g., fish-salads).

**2. DESCRIPTION****2.1 SMOKED FISH****2.1.1 Product definition**

Smoked fish is prepared from fish that has undergone a hot or cold smoking process. The smoke must be applied through one of the smoking processes defined in 2.1.2 and the end product must have smoked sensory characteristics.

Countries where the products are to be consumed may allow these products in an uneviscerated state or may require evisceration, either before or after processing, in such a way as to control the risk of *Clostridium botulinum* (refer to Annex 3).

**2.1.2 Process definitions**

- **“Smoking”** is a process of treating fish by exposing it to smoke from smoldering wood or plant materials. This process is characterised by an integrated combination of salting, drying, heating and smoking steps in a smoking chamber.
- **“Smoking by regenerated smoke”** is a process of treating fish by exposing it to smoke which is reproduced or regenerated by atomizing smoke condensate (liquid smoke) in a smoking chamber under the time and temperature conditions similar to those for hot or cold smoking.
- **“Hot smoking”** is a process in which fish is smoked at an appropriate combination of temperature and time sufficient to cause the complete coagulation of the proteins in the fish flesh. Hot smoking is generally sufficient to kill parasites, to destroy non-sporulated bacterial pathogens and to injure sporeformers of human concern.
- **“Cold smoking”** is a process of treating fish with smoke using a time/temperature combination that will not cause significant coagulation of the proteins in the fish flesh but that will cause some reduction of the water activity. **“Salting”** is a process of treating fish with salt of food grade quality to lower water activity in fish flesh and to enhance flavour by any appropriate salting technology (e.g. dry salting, brining, injection salting).
- **“Drying”** is a process in which the moisture content in the fish flesh is decreased by exposing the fish to circulating air.
- **“Packaging”** is a process in which smoked fish is put in a container, either aerobically or under reduced oxygen conditions, including under vacuum or in a modified atmosphere.
- **“Storage”** is a process in which smoked fish is kept refrigerated or frozen to assure product safety and quality in conformity with Sections 3 and 5.

**2.2 SMOKE FLAVOURED FISH****2.2.1 Product definition**

Smoke flavoured fish is prepared from fish that has been treated with smoke flavours, without undergoing a smoking process as described in 2.1. The end product must have a smoked taste.

Countries where the products are to be consumed may allow these products in an uneviscerated state or may require evisceration, either before or after processing, in such a way as to control the risk of *Clostridium botulinum* (refer to Annex 3).

### 2.2.2 Process definition

- **Smoke flavours** are either smoke condensates or artificial flavour blends prepared by mixing chemically-defined substances in known amounts or any combination of both (smoke-preparations).
- **“Smoke flavouring”** is a process in which fish or fish preparations are treated with smoke flavour. The smoke flavour can be applied by any technology (e.g. dipping, spraying, injecting, soaking).
- **“Packaging”** is a process in which smoke-flavoured fish is put in a container, either aerobically or under reduced oxygen conditions, including under vacuum or in a modified atmosphere.
- **“Storage”** is a process in which smoke-flavoured fish is kept refrigerated or frozen to assure product safety and quality in conformity with Sections 3 and 5.

## 2.3 SMOKE-DRIED FISH

### 2.3.1 Product definition

Smoke-dried fish is prepared from fish that has undergone a combined smoking and drying process. The smoke must be applied through a smoke-drying process traditional for the respective country or an industrial smoke-drying process and the end product must have smoke-dried sensory characteristics.

Countries where the products are to be consumed may allow these products in an uneviscerated state or may require evisceration, either before or after processing

### 2.3.2 Process definition

- **“Smoke drying”** is a process in which fish is treated by combined smoking and drying steps to such an extent that the final product can be stored and transported without refrigeration and a water activity of 0.85 or less.
- **“Drying”** is a process in which the moisture content in the fish flesh is decreased by exposing the fish to circulating air, mechanical dryers or natural conditions using sun and wind energy.
- **“Salting”** is a process of treating fish with salt of food grade quality to lower water activity in fish flesh and to enhance flavour by any appropriate salting technology (e.g. dry salting, brining, injection salting).
- **“Packaging”** is a process in which Smoke-dried fish is put in a container to avoid contamination and prevent rehydration.
- **“Storage”** is a process in which Smoke-dried fish is typically kept at ambient temperature in a way to assure its safety and quality in conformity with Sections 3 and 5.

## 2.4 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, smoke-flavoured fish and smoke-dried fish shall be prepared from sound and wholesome fish, which may be fresh, chilled or frozen, and of a quality to be sold for human consumption after appropriate preparation.

### 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 the generation of smoke or smoke-condensates must not contain toxic substances either naturally or through contamination, or after having been treated with chemicals, paint or impregnating materials. In addition, wood or other plant material must be handled in a way to avoid contamination..

### 3.4 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.

### 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.

## 4. FOOD ADDITIVES

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

## 5. HYGIENE AND HANDLING

**5.1** 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) and other relevant Codex texts such as codes of practice and codes of hygienic practice, such as the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003).

**5.2** 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. Polycyclic Aromatic Hydrocarbons (PAH)

Benzo(a)Pyrene is widely accepted as indicator for the level of Polycyclic Aromatic Hydrocarbons. No sample unit of smoked fish and smoke-flavoured fish shall contain a level of Benzo(a)Pyrene level that exceeds 5 microgram /kg fish muscle in the end product. For smoke-dried fish this level applies only to the final ready to eat product.

### 5.4 Parasites

Smoked fish and smoke-flavoured products, shall not contain living parasites (e.g. larvae of nematodes) and particular attention needs to be paid to cold smoked products. Viability of nematodes and cestodes and trematodes shall be examined according to Annex 1. If living parasites 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 2.

### 5.5 *Listeria monocytogenes*

This section has to be elaborated.

[The issue of *L. monocytogenes* in foods is addressed by Codex in a separate document titled “Guidelines on the Application of General Principles of Food Hygiene to the Control of *Listeria monocytogenes* in Ready-to-Eat Foods” (CAC/GL61-2007)]

### 5.6 *Clostridium botulinum*

Toxins of *Clostridium botulinum* are not allowed in smoked fish-, smoke-flavoured fish- and smoke-dried 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 3 addresses these control options.

### 5.7 Histamine

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

## **5.8 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, and 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 Prepackaged Foods (CODEX STAN 1-1985) the following specific provisions apply.

### **6.1 Name of the Food**

The name of the food must be "smoked X" if treated by the processes described in paragraph 2.1, "smoked-flavoured X" if treated by the processes described in paragraph 2.2, "smoked-dried X" if treated by the processes described in paragraph 2.3, X being the common or commercial name of the species of fish used in accordance with the law or customs of the country in which the food is sold, so as not to mislead the consumer.

### **6.2 Additional labelling**

Countries where the product is sold can determine whether the use of regenerated smoke must be indicated on the label.

### **6.3 Storage Instructions**

The label shall declare storage instructions appropriate for the product.

### **6.4 Labelling of Non-retail Containers**

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

However, the name and address of the manufacturer or packer may be replaced by an identification mark (e.g., plant approval number) provided that such a mark is clearly identifiable with the accompanying documents.

## **7. SAMPLING, EXAMINATION AND ANALYSIS**

### **7.1 Sampling**

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

A sample unit is the individually packed product or a 1 kg portion from bulk containers.

The sampling of lots for microbial and parasitological 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 7.4 through 7.7 and the "Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999)."

### **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. (See Annex 4).

### **7.5 Determination of Gelatinous Conditions**

The determination of parasite activity, gelatinised parts of the flesh, can be performed according to the AOAC Methods- "Moisture in Meat and Meat Products, Preparation of Sample Procedure"; 883.18 and "Moisture in Meat" (Method A); 950.46; AOAC 1990.



## **7.6 Determination of Net Weight**

The net weight is determined as the weight of the product, exclusive of packaging material, interleaving material, etc.

## **7.7 Temperatures for Thawing**

Frozen final products shall be thawed at temperatures low enough to maintain quality and safety.

## **8. DEFINITION OF DEFECTIVES**

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

### **8.1 Foreign Matter**

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

### **8.2 Parasites**

The presence of two or more parasites per kg of the sample unit detected by the method described in 7.4 with a capsular diameter greater than 3 mm or a parasite not encapsulated and greater than 10 mm in length.

### **8.3 Odour and Flavour**

A sample unit affected by persistent and distinct objectionable odours or flavours indicative for decomposition, or rancidity, burning sensation or other sensorial impressions not characteristic of the product.

### **8.4 [Flesh Abnormalities**

A sample unit affected by excessive gelatinous conditions of the flesh together with greater than 85% moisture found in any individual fish or sample unit with pasty texture resulting from parasitic infestation affecting more than 5% of the sample unit by weight.]

## **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 an appropriate sampling plan (AQL-5.6) in the Codex General Guidelines on Sampling (CAC/GL 50-2004);
- (ii) The average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any container 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

## VIABILITY TEST FOR PARASITES

**1. 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.

**2. Trematodes** Approved methods to be elaborated

**3. Cestodes** Approved methods to be elaborated

**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 2

### 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 -20° C for 24 hours or a minimum of -35° C for 15 hours in the thermal centre of the product. However, some studies from certain countries have demonstrated that 24 hrs is not sufficient to kill parasites<sup>1</sup><sup>2</sup>. As a result, in those cases, a different holding time reference is used. Freezing the product at -35°C or below for a period of not less than 15 hours or at -20°C for a period of not less than 168 hours (7 days)<sup>3 4</sup> will be sufficient to kill these parasites.

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<sup>1</sup> Bier, J. 1976. Experimental Anasakiasis: Cultivation and Temperature Tolerance Determinations. J. Milk Food Technol. 39:132-137.

<sup>2</sup> Deardoff, T.L. et al. 1984. Behavior and Viability of Third-Stage Larvae of *Terranova* sp. (Type HA) and *Anasakis simplex* (Type I) Under Coolant Conditions. J. of Food Prot. 47:49-52.

<sup>3</sup> Health and Welfare Canada (1992) (in consultation with Canadian Restaurant and Food Service Association, Fisheries Council of Canada, and Fisheries and Oceans Canada). Code of practice for the preparation of raw, marinated, and partially cooked fin fish.

<sup>4</sup> USFDA - Centre for Food Safety & Applied Nutrition (June 2001), Fish and Fisheries Products Hazards and Controls Guidance, Chapter 5 Parasites, 3<sup>rd</sup> Edition.

## ANNEX 3

**Control and Prevention of *Clostridium botulinum* Toxin Formation**

Countries where these 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 aqueous 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.

This table does not apply to smoke-dried fish, because the risk is not present in this product.

Storage Temp	Packaging	Aqueous Phase Salt*	Comments
[(0°C to 3°C)]	Any	No minimum aqueous phase salt is needed.	Temperature monitoring required on each package
[(>3°C to 5°C)]	Aerobically Packaged	No minimum aqueous 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 aqueous 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 <i>C. botulinum</i> . 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 aqueous phase salt as a barrier to growth of non-proteolytic strains of <i>C. botulinum</i> if there are concerns about the ability of transporters, retailers or consumers to maintain time/temperature control.
Frozen (< or = -18°C)	Reduced Oxygen (including vacuum packaging and modified atmosphere Packaging**)	No minimum aqueous phase salt is needed for safety.	<i>C. botulinum</i> 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 (including vacuum packaging and modified atmosphere packaging)	Aqueous phase salt at minimum level of between 3% & 3.5% may be selected by the country where the product is to be consumed.	Aqueous phase salt at a minimum level of between 3 and 3.5% (aqueous phase salt) in combination with chilling will significantly delay (or prevent) toxin formation.
[>5°C to	Reduced	5% Aqueous Phase	Non-proteolytic ( <i>C. botulinum</i> ) are controlled

10°C]	Oxygen	Salt	under these conditions.
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\*As an alternative to aqueous phase salt, time/temperature controls alone may be used. *C. botulinum* cannot grow and produce toxin at or below 3°C. 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 4****Determination of the presence of visible parasites**

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

## APPENDIX VIII

**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<sup>1</sup> 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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<sup>1</sup> 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** It is not an acceptable practice to handle and/or store this product in such a manner that would result in a significant uptake of water compared to what naturally occurs in scallops at time of harvest. In order to prevent economic fraud and unfair trade practices, harvesting, storage and handling 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

Polyphosphates are allowed in these products to the extent that their use is acceptable within the country of production and in any country to which they are exported, phosphates must be applied in strict conformance with section 3 and with good manufacturing practices as provided in section “X” of the Code of Practice for Processing of Scallop Meat and elaboration in order to prevent retention of excessive water.

339i Monosodium orthophosphate

340i Monopotassium orthophosphate

340ii Tripotassium orthophosphate

341ii Dicalcium orthophosphate

450i Disodium diphosphate

450iii Tetrasodium diphosphate

450vi Dicalcium diphosphate

452i Sodium polyphosphate

452i Sodium calcium polyphosphate

452v Ammonium polyphosphates

339iii Trisodium orthophosphate

340ii Dipotassium orthophosphate

341i Monocalcium orthophosphate

341iii Tricalcium orthophosphate

450ii Trisodium diphosphate

450v Tetrapotassium diphosphate

450vii Calcium dihydrogen diphosphate

452ii Potassium polyphosphate

452iv Calcium polyphosphate

542 Bone phosphate

10g/kg expressed as P<sub>2</sub>O<sub>5</sub> singly or in combination (including natural phosphates)



## 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) 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,) 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:

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

## 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:

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

## 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.

### **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.

## APPENDIX IX

## PROPOSED DRAFT CODE OF PRACTICE FOR THE PROCESSING OF SCALLOP MEAT

(At Step 3)

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<b>X.3.2.1</b>	Scallop Reception
<b>X.3.2.2</b>	Chilled Storage
<b>X.3.2.3</b>	Washing
<b>X.3.2.4</b>	Application of Additives to Scallop Meat
<b>X.3.2.5</b>	Size Grading
<b>X.3.2.6</b>	Freezing Process
<b>X.3.2.7</b>	Glazing
<b>X.3.2.8</b>	Weighing
<b>X.3.2.9</b>	Labelling
<b>X.3.2.10</b>	Packaging
<b>X.3.2.11</b>	Frozen Storage
<b>Appendix 'X'</b>	Optional Final Product Requirements

## SECTION 2 DEFINITIONS

For the purpose of this Code:

<b>Refrigerated Sea Water</b>	is sea water in fixed tanks chilled by mechanical refrigeration
<b>Roe on scallop</b>	is the scallop adductor muscle meat and the roe sac remaining after the viscera has been completely detached from the scallop shell.
<b>Scallop Meat</b>	is the adductor muscle meat remaining after the viscera and/or roe have been completely detached from the scallop shell.
<b>Shucking</b>	is the process of removing the adductor muscle meat and completely detaching the viscera or viscera and roe from the shell of live scallops.

## SECTION X PROCESSING OF FRESH AND FROZEN SCALLOP MEAT

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.

As stressed by this Code, the application of appropriate elements of the pre-requisite program (Section 3) and HACCP principles (Section 5) at these steps will provide the processor with reasonable assurance that the essential quality, composition and labelling provisions of the appropriate Codex standard will be maintained and food safety issues controlled.

The commercial harvest practices of scallops can be quite variable. For instance, shucking can occur either on board fishing vessels or in land based facilities. In addition, fishing voyages can typically range from 1 to 10 days. For long fishing voyages where shucking is performed at sea and kept chilled by the application of freshwater ice, the time that the scallop meat is exposed to the melting ice can affect both the product quality and composition. The washing of scallop meat during processing is also a source of freshwater exposure affecting product composition. For the product to meet international and/or regulatory standards aimed to prevent consumer fraud and unfair trade practices, scallop fishers and processors should have proper controls in place with particular attention paid to limit excessive addition of freshwater water to the product.

This section covers the processing of fresh scallop meat on board a long haul harvesting vessel prior to offloading and the processing of IQF frozen scallop meat at the processing facility. This section will also address the use of freshwater and polyphosphate treatment during processing. The example of the flow diagram (Figure X.1) will illustrate some of the common steps involved in the processing of scallop meat.

### X.1 GENERAL ADDITION TO PRE-REQUISITE PROGRAMME

Section 3 - Pre-requisite programme gives the minimum requirements for good hygienic practices for a harvesting vessel and processing facility prior to the application of hazard and defect analysis. In addition to the guidelines described in Section 3, the following should also be considered:

- *To be elaborated*

### X.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Refer also to Section 5.3.3 Conduct Hazard and Defect Analysis.

#### X.2.1 Hazards

Refer also to Section 5.3.3.1 Identification of Hazards and Defects. Where marketing of whole scallops and roe-on scallops is concerned, these products should meet the relevant hygienic provisions outlined in the Proposed Draft Codex Standard for Live [and Raw] Bivalve Molluscs (*under development*). For example, marine biotoxins will need to be included in the hazard analysis since the gonads and roe may be toxic.

This Section describes the main hazards and defects specific to scallop meat.

#### **X.2.1.1 Marine Biotoxins**

Phycotoxins such as DSP, PSP or ASP are generally not a food safety concern in scallop adductor muscle meat alone and therefore do not pose a human health risk. Scientific data regarding the contamination of scallop meat with biotoxins are limited and suggests that only some scallops may be affected by marine biotoxins in scallop meat. For instance, it appears that the purple-hinged rock scallop (*Crassidoma giganteum* / *Hinnites multirugosus*) accumulates PSP toxin in the adductor muscle.

#### **X.2.2 Defects**

The potential defects below are outlined in the essential quality, labelling and composition requirements described in the Proposed Draft Codex Standard for Quick Frozen Scallop Adductor Muscle Meat (*under development*).

End product specifications outlined in Appendix 'X' describe optional requirements specific to scallop meat.

##### **X.2.2.1 Parasites**

Parasites are known to affect the respiratory system, organs and the connective tissue of organs (i.e. Perkinsis spp.). Sulcascaris sulcata, a nematode, has been known to parasitize the adductor muscle of calico scallops. Scientific information is limited on the significance of scallop parasites to public health. Never the less, the infestation of mature parasites in scallops or the presence of cysts can be aesthetically offensive to consumers.

##### **X.2.2.2 Excessive Viscera**

During the shucking of scallops, incomplete removal of the viscera and other parts of the intestine from the scallop meat could occur. Excessive amounts could result in undesirable physical attributes in the final product that would be objectionable to consumers.

##### **X.2.2.3 “Added water”**

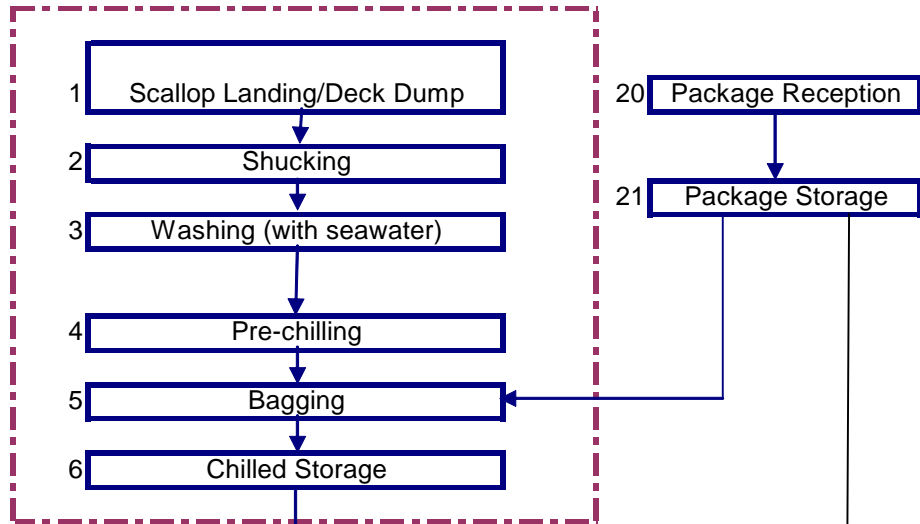
It has been shown that freshwater in contact with scallop adductor muscle meat will increase its moisture content over time. This is because the adductor muscle of a scallop is made up of parallel strands of fibers that can absorb water through capillary action. If scallop adductor muscle meat has been in contact with freshwater for an excessive amount of time, water is added to the product and consumer fraud and unfair trade practices could result. The use of polyphosphates in scallops during processing will bind added water and if used improperly, can potentially lead to consumer fraud and unfair trade practices.

Product labelling can help minimize economic fraud by providing information to consumers so that informed purchasing choices can be made. However, proper processing controls should also be in place by the processor to ensure that added water and polyphosphate use meets international and regulatory standards. (i.e. GMP's must be properly applied and adhered to by the processor.)

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**

**Long Haul Harvesting Vessel Operations**



**Land Based Facility Operations**

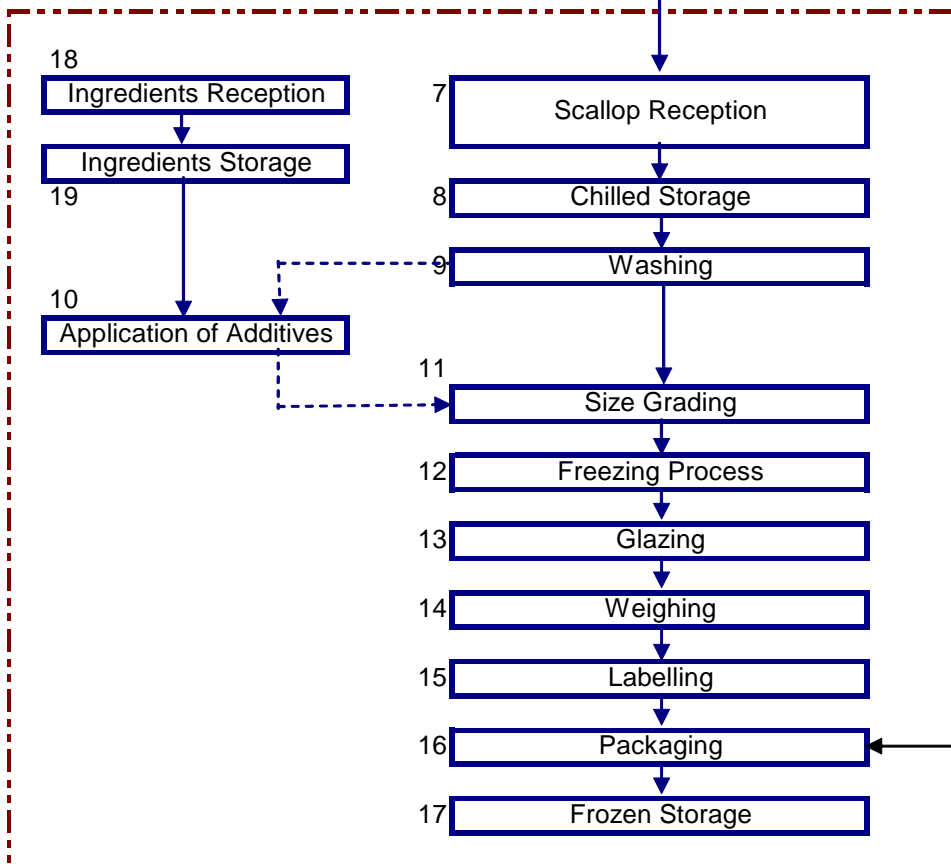


Figure X.1 Example of flow chart of processing of scallop meat



### X.3 PROCESSING OPERATIONS

#### X.3.1 Processing Of Fresh Scallop Meat On Board a Long Haul Harvesting Vessel Prior To Offloading

Generally, there are two categories of voyages characterized by the proximity of the harvest site (fishing ground) relative to the land based processing facility. “Short haul voyages” are typically 1 - 2 days in the case of inshore wild caught fisheries and daily as in the case of aquaculture controlled harvest. “Long haul voyages” are typically offshore fishing voyages that last 10 days or less. On long haul voyages, shucking of scallops is carried out on board fishing vessels. Products are kept chilled by the application of freshwater ice and placed in appropriate refrigerated storage.

##### X.3.1.1 Scallop Landing/Deck Dump (Processing Steps 1)

*Potential*                      *Not likely*

Hazards:

Potential Defects:    *Not likely*

Technical Guidance:

- Live scallops should be collected and placed in clean storage containers without undue delay.
- Scallops requiring shucking on arrival at the processing facility should be adequately chilled, handled without undue delay and with care to avoid contamination.

##### X.3.1.2 Shucking (Processing Steps 2)

*Potential*                      *Not likely*

Hazards:

Potential Defects:    *Remaining viscera*

Technical Guidance:

- Care should be taken to ensure that the viscera, connective tissue and roe (if applicable) are completely removed from the scallop meat.

##### X.3.1.3 Washing with Sea Water (Processing Steps 3)

*Potential*                      *Shell fragments*

Hazards:

Potential Defects:    *Remaining viscera, physical contamination (sand, debris)*

Technical Guidance:

- An adequate supply of clean sea water should be available for washing of:
  - live scallops prior to shucking;
  - scallop meat after shucking to remove any viscera, connective tissue, foreign matter and shell fragments.

##### X.3.1.4 Pre-chilling (Processing Steps 4)

*Potential*                      *Not likely*

Hazards:

Potential Defects:    *Moisture (added water) - applies to pre-chilling using freshwater*

Technical Guidance:

- Pre-chilling of the scallop meat should be employed to reduce the core temperature of the scallop meat prior to being placed in chilled storage. This step can minimize the amount of ice melt and consequently freshwater contact with the scallop meat during chilled storage.

- Pre-chilling involves the immersion of the scallop meat in refrigerated sea water for a specified period of time.
- If freshwater ice is used in conjunction with sea water, the contact time for each batch should be kept as short as practical.
- Water used for pre-chilling should be periodically replaced to minimise the bacterial load and ensure functional water temperature.

#### **X.3.1.5 Bagging (Processing Steps 5, 20, 21)**

Potential                      *Not likely*

Hazards:

Potential Defects:    *Not likely*

Also refer to Section 8.5.1 - Reception – Packaging, Labels & Ingredients; Section 8.5.2 – Storage - Packaging, Labels & Ingredients and Section 8.4.4 - Wrapping and Packing,

Technical Guidance:

- After the scallop meats are packed in clean bags made of a suitable material, a tag or other appropriate identification should be attached to each bag to determine the date of harvest and other relevant product information.
- The bagged scallop meats should be kept in a clean condition.

#### **X.3.1.6 Chilled Storage (Processing Steps 6)**

Potential                      *Not likely*

Hazards:

Potential Defects:    *Decomposition, Moisture (added water)*

Also refer to Section 8.1.2 – Chilled Storage

Technical Guidance:

- The bags of scallop meat should be surrounded by sufficient finely divided ice.
- The chilled storage or storage containers should be adequately drained so that freshwater from the melted ice has minimal contact with the product near the bottom layer.
- Stock rotation schemes/plans should be developed to ensure proper utilisation of the scallops.

### **X.3.2 Processing of IQF Frozen Scallop Meat**

This section is designed to augment the Processing of Fresh Scallop Meat On Board a Long Haul Harvesting Vessel section with additional operation steps pertaining specifically to the processing of IQF frozen scallop meat.

#### **X.3.2.1 Scallop Reception (Processing Steps 7)**

Potential                      *Marine Biotoxin (applies to roe-on scallops)*

Hazards:

Potential Defects:    *Decomposition, Moisture (added water)*

Technical Guidance:

- Product specifications could include the following characteristics:
  - ⇒ organoleptic characteristics such as appearance, odour, texture, etc;
  - ⇒ acceptable upper limit moisture content (*DN: possible methods of analysis (ie. % moisture and M/P ratio could be appended as an annex for reference purposes)*);
  - ⇒ workmanship (excessive viscera/roe (in the case of adductor muscle meat only));
  - ⇒ presence of parasites;
  - ⇒ foreign matter.

- For the marketing of roe-on scallops, a processor should have a process in place to ensure that the toxicity content meets the regulatory requirements to the satisfaction of the official agency having jurisdiction. For example, this could be accomplished by, but not limited to, adherence to monitoring programs or end product testing.
- Skills should be acquired by scallop handlers and appropriate personnel in sensory evaluation techniques to ensure incoming lot meet essential quality provisions of the Codex Standard for Quick Frozen Scallop Adductor Muscle Meat.
- Scallop meats should be processed efficiently, without undue delay and with care to avoid contamination.
- Scallop meat should be rejected if known to contain harmful, decomposed or extraneous substances, 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.

#### **X.3.2.2 Chilled Storage (Processing Steps 8)**

*Potential*                      *Not likely*

Hazards:

Potential Defects:    *Decomposition*

Also refer to Section 8.1.2 – Chilled Storage

Technical Guidance:

- For scallop meat packed in cotton bags, their identification tag facilitate the determination of the harvest date and the number of days the product has been kept in contact with freshwater ice. Stock rotation schemes/plans should be developed to ensure proper utilisation of the scallops.

#### **X.3.2.3 Washing (Processing Step 9)**

*Potential*                      *Shell fragments*

Hazards:

Potential Defects:    *Excessive moisture (added water), physical contamination (sand, debris)*

Technical Guidance:

- Scallop meat should be gently agitated to allow separation from each other and to ensure the removal of foreign matter.
- Since washing requires typically 20 – 40 minutes, chilled salt water (3%) should be used for the washing of scallop meat to minimize the uptake of moisture.
- Chilled salt water should be prepared from potable water and food grade salt.
- The use of freshwater should be avoided. If used, a washing method should be clearly defined and should address the contact time.
- The washing schedule (contact time parameters) should be carefully monitored.
- The washed scallop meats should be adequately drained.
- After washing, the scallop meat should be immediately processed or refrigerated and kept at the adequate temperature (temperature of melting ice).

#### **X.3.2.4 Application of Additives to Scallop Meat (Processing Step 10, 18, 19)**

*Potential*                      *Not likely*

Hazards:

Potential Defects:    *Excess Moisture (added water), off-flavours*

Also refer to Section 8.5.1 Reception – Packaging, Labels & Ingredients and Section 8.5.2 Storage - Packaging, Labels & Ingredients.

Technical Guidance:

- Soaking scallop meat in a phosphate solution is the most common method of polyphosphate application. Polyphosphates can also be applied by dipping, spraying or tumbling in phosphate solution. (add reference??)
- If polyphosphates are used, a processor should develop a process for its application in order to consistently achieve its beneficial functional goals such as retention of natural moisture (i.e. to prevent drip loss) and flavour, inhibiting fluid losses of fresh shipments during transport and prior to sale, inhibiting oxidation flavours and lipids by chelation of heavy metals and cryoprotection, thereby extending shelf life.
- Polyphosphates should be blended in the proper proportions and should adhere to the appropriately validated contact time. The amount of water absorbed by the scallop meat will increase with soaking time.
- Additives should comply with the requirements of the Codex General Standard for Food Additives.

#### **X.3.2.5 Size Grading (Processing Steps 11)**

*Potential Hazards:*                      *Not likely*

*Potential Defects:*

*Decomposition*

*Technical Guidance:*

- Size grading of scallop meat is typically undertaken through mechanical graders of various degrees of sophistication. There is a possibility of scallop meat becoming trapped in the bars of the graders so that regular inspection is required to prevent “carry-over” of old scallop meat.
- After grading, the scallop meat should be immediately processed or refrigerated and kept at the adequate temperature (temperature of melting ice).

#### **X.3.2.6 Freezing Process (Processing Step 12)**

*Potential Hazards:*                      *Not likely*

*Potential Defects:*                      *Texture deterioration, development of rancid odours, dehydration*

Refer to Section 8.3.1 Freezing Process

#### **X.3.2.7 Glazing (Processing Step 13)**

*Potential Hazards:*                      *Not likely*

*Potential Defects:*                      *Subsequent dehydration, incorrect net weight*

Refer to Section 8.3.2 Glazing

- Care should be taken to ensure that the entire surface of the frozen scallop meat is covered with a suitable protective coating of ice and should be free of exposed areas where dehydration (freezer burn) can occur.

#### **X.3.2.8 Weighing (Processing Step 14)**

*Potential Hazards:*                      *Unlikely*

*Potential Defects:*                      *Incorrect net weight*

Refer to Section 8.2.1 Weighing

#### **X.3.2.9 Labelling (Processing Steps 15)**

Potential Hazards:      *Unlikely*

Potential Defects:      *Incorrect labelling, undeclared additive*

Also refer to Section 8.2.3 Labelling

Technical Guidance:

- Where polyphosphate was used in the process, a system should be in place to ensure that this additive is properly declared on the label.
- Where moisture content prescribed by national legislation has been exceeded, the label must indicate that water was added in accordance with the Codex Standard for QF Scallop Adductor Muscle Meat

**X.3.2.10      Packaging (Processing Steps 18, 19, 20, 21)**

Potential                      *Not likely*

Hazards:

Potential Defects:      *Not likely*

Refer to Section 8.5.1 Reception – Packaging, Labels & Ingredients; Section 8.5.2 Storage - Packaging, Labels & Ingredients and Section 8.4.4 Wrapping and Packing

**X.3.2.11      Frozen Storage (Processing Steps 17)**

Potential Hazards:      *Unlikely*

Potential Defects:      *Dehydration, decomposition, loss of nutritional quality*

Refer to Section 8.1.3 Frozen Storage

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**APPENDIX ‘X’ – OPTIONAL FINAL PRODUCT REQUIREMENTS – SCALLOP MEAT [TO BE COMPLETED]**

- **Varying colour (i.e light orange verses milk white):** In the spring, sea scallops have orange-colored roe that can bleed into the adductor muscle. This cosmetically different product known as "pumpkins" in the scallop industry, may not be preferred in some markets.

## APPENDIX X

**PROPOSED DRAFT PROCEDURE FOR THE INCLUSION OF ADDITIONAL SPECIES IN STANDARDS FOR FISH AND FISHERY PRODUCTS****(To be inserted in the Codex Procedural Manual)****(At Step 3 of the Procedure)**

The Codex Member proposing the inclusion of an additional species in an existing Codex standard shall provide the information listed hereafter, at the same time as the project document required by the Part 2-1 of the Elaboration procedure. This requirement only applies to all standards, within the remit of the Codex Committee on Fish and Fishery Products, for which a list of species has been established.

The information should enable the Commission to decide whether the request is consistent with the Codex Criteria for the Establishment of work priorities, and specifically: Is there a significant trade of the candidate species (and/or its processed products)? Is the species described precisely enough to assess its taxonomic relationship with the species already listed in the relevant Codex standard and to reliably identify its derived processed products? Are the sensory characteristics of these products undistinguishable from those of the species already covered by the standard?

**Evidentiary Dossier****1 - CANDIDATE SPECIES DESCRIPTION: BIOLOGICAL AND GENETIC DATA**

*(To be used for assessing the proposal against General criterion and specific criterion (d)).*

To be valid, information provided in the evidentiary dossier should have been considered by an internationally recognized scientific institution.

Species description includes:

- (a). scientific valid name from internationally recognized reference sources;
- (b). morphological and anatomical characteristics (eventually with a draft or a picture);
- (c). taxonomical position of the candidate species in relation to the taxon(s) listed in the Codex standard or to all the species listed in the standard, presented as a diagram or a list; the reference to the database for taxonomic classification used (for example FAO database or bibliographic references);
- (d). molecular data, achieved with recognized and appropriate methods (electrophoretic protein profile and/or specific DNA sequence).

**2 - INFORMATION ON EXISTING AND POTENTIAL RESOURCES**

*(To be used for assessing the proposal against Specific criteria (a), (b) & (c)).*

- (a). Fishing grounds: localization of the main ground on the FAO map “Major fishing area for statistical proposal”;
- (b). Yearly catches during the last 5 [10] years;
- (c). Status of the candidate species with respect to the CITES (Convention on International Trade of Endangered Species);
- (d). Marketing data on the candidate species aquaculture production: production yearly marketed for human consumption during the last 5 [10] years.

**3 - PROCESSING AND MARKETING**

*(To be used for assessing the proposal against Specific criteria (a), (b) & (c)).*

- (a). Data on world imports and exports of the raw species and derived processed products: yearly amount and value (during the last 5 years);
- (b). Data on candidate species processing (reporting separately products intended for animal feed): different types of marketed products, processes, yearly amount (during the last 5 years); percentage of these products susceptible to conform with the relevant Codex standard;
- (c). Trade denominations in use for exports of each type of products conforming to the relevant Codex standard.

#### 4. SENSORY EVALUATION

*(To be used for assessing the proposal against General Criterion).*

##### **Selection of 3 laboratories**

The laboratories, carrying out the sensory analysis, should be selected by the Codex member, requesting the inclusion with regard to the consumers' markets for the processed products. Among the three laboratories, one laboratory in a country importing the products from the country, which has requested the inclusion, and one laboratory in a country where a similar product is processed (same processing technique and recipe) using one representative species currently listed in the standard should be selected.

One laboratory shall act as co-ordinator of the test and report on the test results.

##### **Scope of the comparison**

- (a). A comparison might be limited to processed products from the candidate species and from, at most, 3 species on the list appended to the current Codex standard, provided that these species are the most prevalent in the processed products consumed in the importing country(ies).
- (b). All the samples should have been processed following the relevant specifications. The type of products should be selected among the most widely traded and as the less likely to confound the recognition of species difference by sensory evaluation.

##### **Implementation of the tests**

The tests should conform to the *Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories* – CAC - GL 31-1999<sup>1</sup>.

##### **Methods to be used**

The method(s) should be in conformity with the *General Criteria for the Selection of Methods of Analysis* or, where relevant, *General Criteria for the Selection of Single-Laboratory Validated Methods of Analysis*, laid out in the *Codex Principles for the Establishment of Codex Methods of Analysis*<sup>2</sup>.

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<sup>1</sup> [http://www.codexalimentarius.net/download/standards/359/CXG\\_031e.pdf](http://www.codexalimentarius.net/download/standards/359/CXG_031e.pdf)

<sup>2</sup> See Codex Procedural Manual – p. 73 (16<sup>th</sup> Edition – in English)

## APPENDIX XI

**DRAFT STANDARD FOR LIVE AND RAW BIVALVE MOLLUSC  
SECTION I-8.5 DETERMINATION OF BIOTOXINS**

(At Step 6 of the Procedure)

<i>Provision</i>	<i>Methodology</i>	<i>Principle</i>	<i>Type</i>
<i>Saxitoxin Group</i>	<i>AOAC International Mouse Bioassay</i>	<i>Bioassay</i>	<i>III</i>
	*	<i>Receptor Binding Assay</i>	<i>III</i>
	*	<i>Immunochemical</i>	<i>III</i>
	*	<i>LC-MS<sup>2</sup></i>	<i>III</i>
<i>Okadaic Acid Group</i>	*	<i>LC-MS<sup>2</sup></i>	<i>II</i>
	*	<i>Bioassay<sup>1,2</sup></i>	<i>III</i>
	*	<i>PP2A<sup>2</sup></i>	<i>III</i>
	*	<i>LC-FL</i>	<i>III</i>
	*	<i>ELISA<sup>2</sup></i>	<i>III</i>
<i>Domoic Acid Group</i>	<i>Quilliam LC-UVD method</i>	<i>LC-UV</i>	<i>II</i>
	*	<i>ELISA</i>	<i>III</i>
	*	<i>LC-MS</i>	<i>III</i>
	*	<i>LFIC<sup>2</sup></i>	<i>III</i>
<i>Brevetoxin Group</i>	*	<i>LC-MS<sup>2</sup></i>	<i>II</i>
	*	<i>ELISA<sup>2</sup></i>	<i>III</i>
	<i>APHA mouse bioassay</i>	<i>bioassay<sup>1</sup></i>	<i>III</i>
<i>Azaspiracid Group</i>	*	<i>LC-MS<sup>2</sup></i>	<i>II</i>
	*	<i>bioassay<sup>1</sup></i>	<i>III</i>

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

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

\* Official /recognized method title to be identified