codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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

ALINORM 04/27/18

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION
Twenty-seventh Session
Geneva, 28 June – 2 July 2004

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

Ålesund, Norway, 13 – 17 October 2003

Note: This document incorporates Circular Letter CL 2003/37-FFP

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JOINT OFFICE: Viale delle Terme di Caracalla 00100 ROME Tel.:3906.57051 www.codexallimentarius.net Email:codex@fao.org Facsimile:3906.5705.4593

CX 5/35 **CL 2003/37-FFP**
October 2003

TO: - Codex Contact Points
- Interested International Organizations

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

SUBJECT: **Distribution of the Report of the 26th Session of the Codex Committee on Fish and Fishery Products (ALINORM 04/27/18)**

A. MATTERS FOR ADOPTION BY THE 27th SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Draft Standards and Related Text at Step 8 of the Procedure

1. Draft Standard for Salted Atlantic Herring and Salted Sprat (para. 54, Appendix II)

2. Draft Model Certificate for Fish and Fishery Products (Sanitary Certificate) (para. 68, Appendix III)

3. Draft Amendment to the Standard for Quick Frozen Lobsters (para. 74, Appendix IV)

Governments wishing to propose amendments or comments on the above documents should do so in writing in conformity with the Guide to the Consideration of Standards at Step 8 (see Procedural Manual of the Codex Alimentarius Commission) to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 March 2004**.

Proposed Draft Code at Step 5/8 of the Procedure

4. Proposed Draft Code of Practice for Fish and Fishery Products (specific sections) (para. 113, Appendix V)

Governments wishing to propose amendments or comments on the above documents should do so in writing in conformity with the Guide to the Consideration of Standards at Step 8 (see Procedural Manual of the Codex Alimentarius Commission) to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 March 2004**.

Proposed Draft Standard at Step 5 of the Procedure

5. Proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family (para. 183, Appendix VI)

Governments wishing to submit comments on the implications which the Draft Amendment may have for their economic interests should do so in writing in conformity with the Procedure for the Elaboration of World-wide Standards at Step 5 to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 10 March 2004**.

B. REQUEST FOR COMMENTS AND INFORMATION

Proposed Draft Standards and Code at Step 3 of the Procedure

6. Proposed Draft Code of Practice for Fish and Fishery Products (specific sections) (para. 114, Appendix VIII)

7. Proposed Draft Standard for Live and Raw Bivalve Molluscs (para. 132, Appendix IX)

8. Proposed Draft Standard for Granular Sturgeon Caviar (para. 174, Appendix X)

Governments wishing to submit comments should do so in writing to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 30 March 2004.**

9. Proposed Draft Standard for Smoked Fish (para. 152, Appendix XI)

Governments wishing to submit comments should do so in writing to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy **before 31 January 2004.**

NOTE: The Draft Amendment to the Standard for Quick Frozen Fish Sticks at Step 7 (Appendix VII) is forwarded for consideration by the Committee on Food Labelling and endorsement of the method by the Committee on Methods of Analysis and Sampling.

SUMMARY AND CONCLUSIONS

The summary and conclusions of the 26th Session of the Codex Committee on Fish and Fishery Products are as follows:

Matters for adoption by the Commission or consideration by the Executive Committee:

The Committee:

- advanced to Step 8 the Draft Standard for Salted Atlantic Herring and Salted Sprat (para. 54, Appendix II);
- advanced to Step 8 the Draft Model Certificate for Fish and Fishery Products (sanitary certificate) (para. 68, Appendix III);
- advanced to Step 8 the Draft Amendment to the Standard for Quick Frozen Lobsters (para.74, Appendix IV);
- advanced the Proposed Draft Sections on Aquaculture and Quick Frozen Coated Fish Products in the Code of Practice for Fish and Fishery Products to Steps 5/8 (para. 113, Appendix V); and returned the other sections to Step 3 (para. 114, Appendix VIII);
- advanced to Step 5 the Proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family (para. 183, Appendix VI);
- agreed to discontinue work on the Proposed Draft Model Certificate for Fish and Fishery Products (other certificates) (para.70);
- recommended that the Executive Committee discuss whether to discontinue work on the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine Type Products (*Clupea bentincki)* or to propose other appropriate action (para. 7);

Other matters of interest to the Commission:

The Committee:

- agreed to retain at Step 4 the Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat (para. 145);
- agreed to return to Step 3 the Proposed Draft Standard for Live and Raw Bivalve Molluscs (para. 132, Appendix IX);
- agreed to return to Step 3 the Proposed Draft Standard for Granular Sturgeon Caviar (para. 174, Appendix X);
- agreed to circulate at Step 3 the Proposed Draft Standard for Smoked Fish (para. 152, Appendix XI);
- agreed to forward to the Committee on Food Labelling and to the Committee on Methods of Analysis and Sampling the relevant provisions concerning fish content in fish sticks (Draft Amendment to the Standard for Quick Frozen Fish Sticks at Step 7) (para. 196, Appendix VII);
- agreed to consider further at its next session the need for further work on the following subjects: 1) the review of the procedure for the inclusion of additional species (para. 188); and 2) a proposal for the amendment of the labelling section in the Standard for Canned Sardines and Sardine-Type Products (para. 198)

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INTRODUCTION

1) The Codex Committee on Fish and Fishery Products held its 26th Session in Ålesund, Norway from 13 to 17 October 2003, at the kind invitation of the Government of Norway. The Session was chaired by Dr Bjørn Røthe Knudsen, Regional Director of Norwegian Directorate of Fish and Fisheries and Aquaculture, Trondheim. The Session was attended by 130 delegates and Observers representing 44 Member States and 2 Observer Organizations. The complete list of participants is attached to this report as Appendix I.

OPENING OF THE SESSION

2) The Session was opened by State Secretary of Ministry of Fish and Fisheries Mrs. Janne Johnsen who welcomed the delegates and emphasized the need for preventing the food borne hazards which might be spread via seafood production. She drew the attention of the delegates to the fact that the World Trade Organization Agreements on Sanitary and Phytosanitary Measures and Technical Barriers to Trade were the basis for international food trade and that the Codex Alimentarius Commission played an important role in assuring the public health protection and facilitation of international food trade through the development of international standards. Noting the importance of the work of the Fish and Fishery Committee in this regard, she wished all success to the delegates.

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

3) The Committee adopted the Provisional Agenda as proposed.

Expert Consultation on Biotoxins

4) The Committee noted that there was a necessity to clarify the Scope of the FAO/WHO Expert Consultation on Biotoxins while developing the Code of Practice for Fish and Fishery Products (Agenda Item 6) and the proposed draft Standard for Live and Processed Bivalve Molluscs (Agenda Item 7), therefore agreed to establish an *Ad Hoc* Working Group[2] to this effect (see also paras.130 – 131).

Microbiological Risk Assessment on *Vibrio* spp

5) Following the request of the Committee on Food Hygiene to examine the discussion paper on the Risk Management Strategies for *Vibrio* spp. in Seafood and in order to better utilize the outcome of the above document in the preparation of the Code of Practice for Fish and Fishery Products (Agenda Item 6) and the proposed draft Standard for Live and Processed Bivalve Molluscs (Agenda Item 7), the Committee decided to form an *Ad Hoc* Working Group[3] (see also paras. 125 - 129).

MATTERS REFERRED TO THE COMMITTEE BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER CODEX COMMITTEES (Agenda Item 2)[4]

6) The Committee noted that a number of matters arising from the 26th Session of the Commission were for information purposes or would be discussed while considering the relevant Agenda Items. In addition the Committee noted the matters of interest to the Committee as follows:

Standard for Canned Sardines and Sardine-Type Products

7) The Committee noted that the 26th Session of the Commission had returned the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine Type Products (*Clupea bentincki)* due to lack of consensus on this matter. The Committee recalled that the discussion on the above standard and the inclusion of new species in this standard had a long history in the Committee and that there were no new elements put forward in order to resolve this issue, therefore it recommended that the Executive

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1 CX/FFP 03/1.

2 Canada, European Community, Germany, Ireland, Japan, New Zealand, Norway, United Kingdom and the United States of America.

3 Canada, European Community, Japan, Norway, Malaysia, Thailand, United Kingdom, and the United States of America.

4 CX/FFP 03/2; CX/FFP 03/2-Add.1; CX/FFP 03/2-Add.2; CX/FH 03/5-Add.3 (Discussion Paper on Risk Management Strategies for *Vibrio* spp. in Seafood); CRD 5 (comments of Brazil).

Committee as standards management body discuss whether to discontinue work on the amendment or to propose other appropriate action.

8) The Committee noted the suggestion of the Delegation of Morocco on the linkages between the Amendment to the Standard for Canned Sardines and Agenda Item 12 on the Procedure for Inclusion of Additional Species in Standards for Fish and Fishery Products. However the Committee recognized that these were separate issues from the procedural point of view.

Food Additives and Contaminants

Lead

9) The Committee noted the work underway as regards lead in fish and invited interested countries to provide relevant data to the Committee on Food Additives and Contaminants.

Methylmercury

10) The Representative of WHO informed the Committee about the re-evaluation of methylmercury performed by JECFA and indicated that WHO was developing a risk communication strategy which targeted consumers who eat large quantities of fish and sensitive subgroups of the population.

11) The Committee recalled that following the adoption of the Guideline Levels for methylmercury (1991) the Committee had initiated work on the development of a list of predatory fish as requested by the Commission. The Committee had informed the Executive Committee of the difficulties related to this work and the Executive Committee had requested the Committee on Food Additives and Contaminants to undertake a new risk analysis (1996). The 29th Session of the CCFAC had agreed to defer any decision until JECFA had performed the necessary risk assessment (1997). The Committee recalled that pending further advice, the development of the list of predatory fish had been suspended but had not been formally discontinued.

12) The Committee therefore agreed to ask the advice of the Executive Committee as to whether it should discontinue work on the establishment of a list of predatory fish and to give direction on how future work should proceed in the CCFFP and in the CCFAC in view of the new risk assessment of methylmercury.

Active chlorine

13) The Representative of WHO indicated that, following earlier discussion on the use of active chlorine, the Committee on Food Additives and Contaminants had agreed to elaborate a proposed draft Code of Practice for the Use of Active Chlorine and that WHO would consider and evaluate risk and health benefits of the use of active chlorine in food processing, taking into account both microbiological and chemical safety aspects when reviewing the WHO *Guidelines on Drinking Water Quality*.

Methods of Analysis and Sampling

14) The Committee noted that the Committee on Methods of Analysis and Sampling had not endorsed the methods for water activity (AOAC 978.18) and acid insoluble ash in the Standard for Dried Salted Anchovies. As no additional information was available at the present session, the Committee invited member countries to provide the clarification required for consideration by the next session of the CCMAS (March 2004).

15) The Committee considered the document on "The Use of the Analytical Result: Sampling, Relationship between the Analytical Result, the Measurement Uncertainty, Recovery Factors and the Provisions in Codex Standards" that highlighted the need to consider all these related factors in the development of specific provisions in Codex standards and the selection of methods of analysis.

16) The Delegation of the United Kingdom pointed out that uncertainty should always be considered and taken into account when establishing specific provisions in Codex standards. The Committee agreed that the concepts put forward in the document should be taken into account in future work on standards under consideration, such as bivalve molluscs that included biotoxin and microbiological limits. It also agreed that the Committee on Methods of Analysis and Sampling should continue its work to provide guidance for Commodity Committees in this area.

B. MATTERS ARISING FROM FAO AND WHO

Microbiological Risk Assessment of *Vibrio* Spp

17) The Representative of WHO informed the committee of the history and the following ongoing activities on microbiological risk assessment.

18) Based on the request of the CCFH, WHO and FAO initiated risk assessments for *Salmonella* spp. in broilers/eggs and *Listeria monocytogenes* in ready to eat foods in 2000. In 2001, work began on *Vibrio parahaemolyticus* in bloody clam, finfish eaten raw and oyster, *Vibrio vulnificus* in oyster, *Vibrio cholerae* in warm water shrimp for export market and *Campylobacter jejuni* in chicken.

19) With regards to risk assessment work on Vibrio spp, two JEMRA meetings (1st expert consultation in July 2001 in Geneva, focused on Hazard Characterization and Exposure assessment parts of the risk assessment, 2nd expert consultation in August 2002 in Bangkok, focused on Risk Characterization and replies to the questions passed by the CCFFP) were held to review the outputs from the expert drafting group.

20) Five risk assessments (RA) were currently in various states of completion.

Vibrio parahaemolyticus in oyster

21) The approach being taken is to use the United Stated FDA Draft Risk assessment on the Public Health Impacts of *Vibrio parahaemolyticus* in Raw Molluscan Shellfish model (FDA-VPRA) and further develop it to accommodate data inputs from other countries (New Zealand, Australia, Canada and Japan). The FDA-VPRA contains several key linkages between prevalence of V. *parahaemolyticus* in oysters and temperature, most notable temperature of harvest waters and of oysters throughout the post-harvest-retail – consumption continuum. The objective of the international risk assessment was to take the FDA-VPRA model developed for one particular scenario and extend it to consumers in other countries.

22) The model can be used to demonstrate the effect of mitigation strategies. For example the effect of thee possible post harvest mitigations can be evaluated in the Monte Carlo simulations:

- Reduced time to refrigeration (rapid cooling)
- Heat treatment.
- Freezing /frozen storage

23) The effects of these mitigation on the probability of illness will be shown when the Risk Assessment is finalized.

Vibrio vulnificus in oyster

24) The approach of extending the *V. parahaemolyticus* in oysters model in the FAO/WHO VPRA to model *V. vulnificus* greatly facilitate the risk assessment process. The FAO/WHO VPRA framework and many of the model inputs were applicable for modeling *V. vulnificus* in the United States oyster and sufficient data was available to conduct a useful risk assessment. Risk Characterization has been employed to evaluate the potential effectiveness of reducing *V. vulnificus* level in oysters that may be obtained with various mitigation strategies.

25) The RA demonstrated the predicted reduction of illness by introducing a process which achieve the end point criteria < 3 MPN/gram. The RA also illustrated the effective of time unrefrigerated on expected numbers of illness, and the reduction of illness from consumption of raw oysters harvested from growing area with salinities >30ppt in comparison to oysters harvested from moderate salinity growing area, regardless of temperature.

Vibrio parahaemolyticus in bloody clam

26) Bloody clam is believed to be a vehicle causing foodborne V. *parahaemolyticus* infection. However, no direct epidemiological evidence show the direct linkage between the consumption of bloody clam and V. *parahaemolyticus* infection. This risk assessment tries to estimate the risk caused by the consumption of in bloody clam based on data collected in Thailand.

***Vibrio parahaemolyticus* in finfish eaten raw**

27) In order to response to the risk management question with regards to the effect of washing fish with disinfected seawater or potable water after harvest or at preparation, the expert drafting group focused on one fish species, "horse mackerel" which is commonly eaten as "Sashimi" (sliced fish fillet) and reported as implicated food in V. *parahaemolyticus* food borne outbreaks in Japan and develop a quantitative risk assessment model.

Vibrio cholerae in warm water shrimp for export

28) A "Production to consumption" semi-quantitative risk assessment model was developed to estimate risk of cholera caused by the consumption of warm water shrimp for export. The risk of acquiring cholera through consumption of imported warm water shrimp is very low. However, further research to address the gaps in the data pointed out above need to be taken up.

29) All five risk assessments will be finalized soon, and will be peer reviewed by experts with different backgrounds, then edited and published as a technical document and an interpretative summary.

30) The Representative of WHO also informed the Committee about the response to the questions posed by this Committee. This response is based on the expert opinion of the participants of the Bangkok expert consultation and the work being done as part of the FAO/WHO VPRA.

Other matters

31) The Committee noted the information concerning the forthcoming FAO/WHO Expert Consultation on Safety Assessment of Genetically Modified Animals, Including Fish (Rome, 17-21 November 2003) and the FAO/WHO/OIE Expert Consultation on Non-Human Antibiotic Usage and Antibiotic Resistance (Rome, 1-5 December 2003).

32) The Representative of FAO indicated that an updated version of the FAO technical paper on *Assessment and Monitoring of Seafood Safety and Quality* had recently been published.

DRAFT STANDARD FOR SALTED ATLANTIC HERRING AND SALTED SPRATS (Agenda Item 3)[5]

33) The Committee recalled that the last Session of the Codex Alimentarius Commission had adopted the above Standard at Step 5 and that it had been circulated for comments at Step 6.

34) The Committee considered the draft Standard Section by Section and in addition to editorial corrections made the following changes.

Section 2.1 Product Definition

35) In order to leave an opportunity for member countries to ensure the necessary level of public health protection of their consumers regarding *Clostridium botulinum*, the Committee agreed to add an additional sentence to the end of paragraph to read:

> *"Countries where the products are to be consumed may allow this product in an uneviscerated state or may require evisceration, either before or after processing, since the margin of error in the control of Clostridium botulinum is small even when good practices are followed and the consequences are severe".*

Section 2.2 Process Definition

36) The Committee amended the second sentence of this section in order to clarify that not only temperature but also time should be sufficient in order to control the development of *Clostridium botulinum.*

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[5] ALINORM 03/18, Appendix IV; CX/FFP 03/3 (comments of Brazil, Iran); CX/FFP 03/3-Add.1 (comments of Canada, Israel, United States); CX/FFP 03/3-Add.2 (Risk Profile *Clostridium botulinum* in Salted Atlantic Herring and Sprat); CRD 5 (comments of Brazil); CRD 7 (comments of Norway); CRD 9 (comments of Denmark).

Section 2.2.2.1 Very Lightly Salted Fish

37) The Committee clarified that the lower limit of salt content in water phase should be above 1 g/100 g in water phase.

Section 2.2.3 Storage Temperatures

38) In order to ensure public health protection, the Committee clarified that very lightly salted fish must be kept frozen after processing.

Section 3.1 Fish

39) The Committee added an additional sentence to the end of this section in order to indicate that fish flesh should not be obviously infested by parasites.

Section 3.4 Decomposition

40) The Committee clarified that the products should not contain more than 10 mg of histamine per 100 g fish flesh.

Section 4 Food Additives

41) The Committee corrected the class name for ascorbic and citric acids.

42) The Committee noted that the General Standard for Food Additives (GSFA) included a level for propyl gallate in category 9.2.5 "Smoked, dried, fermented, and/or salted fish and fish products, including molluscs, crustaceans, and echinoderms" but agreed to delete this additive from the present list as its use was not technologically justified in salted Atlantic herring and salted sprats. It was noted that this would affect some of the products covered by the food category concerned in the GSFA. As the additives section had already been endorsed, the Committee agreed to forward this amendment to the Committee on Food Additives and Contaminants for endorsement.

Section 5 Hygiene

43) The Committee noted that physical foreign material (e.g pieces of glass) might cause public health problems, therefore added an additional Section 5.6 to this effect.

Section 6 Labelling

44) The Committee included a separate Section 6.2 on Labelling of Non-Retail Containers in order to be consistent with labelling provisions in other standards.

Section 7.1 Sampling Plan for Containers (Barrels)

45) In order to provide better guidance on sampling for quality and safety provisions, the Committee agreed to amend the wording of 7.1 (i) and to use the wording for sampling provisions of the standard on Quick Frozen Finfish. It also clarified sampling provisions for the determination of pathogenic microorganisms and parasites as well as for histamine in paragraphs 7.1 (ii) and (iii).

Section 7.4 Determination of Water Content

46) The Committee noted that the determination of water content should be performed according to AOAC 95046B. The Committee had an exchange of views on the need for this method, or whether it should be replaced by water activity. The Delegation of Norway clarified that a method for water content was necessary since the product is defined by the salt content in water phase and not in the fish flesh.

Section 7.7 Determination of Net Weight

47) The Committee decided to clarify the provisions for net weight calculation and inserted a paragraph to this effect.

Section 7.8 Determination of Drained Weight

48) The Committee agreed to delete Section 7.8 as the determination of net weight was sufficient according to current practice.

Section 8.1.2 Parasites

49) The Committee had an extensive discussion regarding the detection of visible parasites in relation to the defectiveness of product. Some delegations were of the view that products intended for further processing should be excepted from examination while others argued that the examination should cover both types, i.e. intended for further processing and direct consumption in the sample of the edible portion. The Committee decided to retain the current wording of Section 8.1.2 and added a new Annex clarifying the methodology of the determination of the presence of visible parasites.

Section 8.1.3 Odour and Flavour/taste

50) The Committee noted that personnel trained in sensory evaluation could feel a "burning sensation" which could be produced even by presence of low levels of histamine, therefore added this sensory feeling to the examples on decomposition. The burning sensation should be later confirmed by chemical analysis.

Section 9 Lot Acceptance

51) Bullet (iii) on the acceptance number was deleted as superfluous and references to sections in bullet (iv) (now bullet (iii)) were corrected.

Annexes

52) As regards Annex II, the Delegation of Germany informed the Committee that studies were underway on the treatments to kill nematodes but that substantial work was still needed in order to complete that section.

53) The Committee clarified the method of determination of salt content in Annex III and transferred the reference to Section 7.3. The reference to Annex IV was deleted as the method for determination of water was provided in Section 7.4 (see para. 46).

Status of the Draft Standard for Salted Atlantic Herring and Salted Sprat

54) The Committee agreed to advance the Draft Standard to Step 8 for final adoption by the 27th Session of the Codex Alimentarius Commission (see Appendix II).

CERTIFICATES FOR FISH AND FISHERY PRODUCTS (Agenda Item 4)

DRAFT MODEL CERTIFICATES FOR FISH AND FISHERY PRODUCTS (Agenda Item 4a)[6]

55) The Committee recalled that the Draft Model Certificate had been adopted at Step 5 by the 26th Session of the Commission and comments had been requested in CL 2003/30-FFP. The Committee considered the text section by section and made the following amendments and comments.

56) The Delegation of Italy, speaking on behalf of the member states of the European Union, drew the attention of the Committee to the EC comments in CRD 4, and in particular the need to address the issue of jurisdiction of the competent authority as regards vessels, such as factory vessels in order to ensure reliable certification systems. The Committee agreed that new substantial issues could not be introduced at this stage since the document was at Step 7 but that the question of certification and jurisdiction of the competent authority as regards vessels would require further work in the future.

Definitions

57) The Committee agreed to add a reference to the competent authority in the definition of "certifying bodies" for clarification purposes and made a similar change in section 5.2.4.

Section 5. Format and Use of Model Certificates

58) In section 5.1.1 Model Sanitary Certificates, the Committee agreed to replace "shipment" with "consignment" to reflect current practice.

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[6] ALINORM 03/18 - Appendix V, CL 2003/30-FFP, CX/FFP 03/4 (comments of Cote d'Ivoire, United States), CRD 1 (comments of Canada) , CRD 3 (comments of Australia), CRD 4 (comments of the EC), CRD 9 (comments of Denmark)

Section 5.2.1 Reference Number

59) The Committee agreed to replace "Reference Number" with "Identification number" as this reflected current practice, and the Annex was amended accordingly.

60) The Committee discussed extensively how to address the situation when more than one certificate was issued. The section was amended to indicate that the identification should be unique for each certificate, and should be authorized by the competent authority of the exporting country. It was further agreed that additional information required on a temporary basis might be incorporated as an addendum or an attestation, and that any addendum must have the same identification number as the primary certificate and the same signature.

Section 5.2.2 Country of Dispatch

61) The Committee agreed to delete the first phrase in square brackets and to clarify the responsibility of the competent authority in the country of dispatch.

Section 5.2.7 Lot identifier/date code

62) The Delegation of Iran proposed to refer to the identification of the container as an alternative to the lot in view of practical difficulties related to lot identification. However the current text was retained and the Committee noted that how inspection was carried out in practice would be the responsibility of each country.

Section 5.2.9 Attestation

63) The Committee amended the section to reflect that the attestation did not refer to the product itself but to the status of the establishment with the competent authority and to the existence of a HACCP and sanitary programme.

Section 5.2.12 Seal and signature

64) The Committee agreed that the section should be applicable both to printed and electronic certification, while stressing the need to minimize the risk of fraud.

Annex

65) The Committee amended the Annex as a result of the changes made in the previous sections and made some other editorial changes. The Committee agreed that the description and scientific names should be presented separately.

66) Following some discussion, the Committee recognized that the certifying body if different from the competent authority shall be officially recognized by the competent authority to issue certificates.

67) The Committee agreed to replace "official inspector" with "certifying officer" as this was consistent with the *Guidelines for Generic Official Certificate Formats and the Production and Issuance of Certificates*.

Status of the Draft Model Certificate for Fish and Fishery Products (Sanitary Certificate)

68) The Committee agreed to advance the Draft Model Certificate to Step 8 for final adoption by the 27th Session of the Codex Alimentarius Commission (See Appendix III).

PROPOSED DRAFT MODEL CERTIFICATE FOR FISH AND FISHERY PRODUCTS (OTHER CERTIFICATES) (Agenda Item 4b)[7]

69) The Chairman noted that several concerns had been expressed by member countries in the written comments on the elaboration of model certificates that required lot by lot certification for other purposes than sanitary inspection. The Committee agreed that the need for additional certificates in specific circumstances had been addressed in the framework of the Draft Model Sanitary Certificate discussed above and that there was no need for further work on other certificates.

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[7] ALINORM 03/18 - Appendix X, CX/FFP 03/5 (comments of Canada, United States), CX/FFP 03/5-Add.1 (United States: additional comments), CRD 3 (comments of Australia), CRD 4 (EC), CRD 5 (Brazil)

Status of the Proposed Draft Model Certificates (Other Certificates)

70) In view of the above discussion, the Committee agreed to discontinue work on the elaboration of Proposed Draft Model Certificates (Other Certificates).

DRAFT AMENDMENT TO THE STANDARD FOR QUICK FROZEN LOBSTERS (Agenda Item 5)[8]

71) The Committee recalled that the draft Amendment had been adopted at Step 5 by the 26th Session of the Commission and advanced to Step 6 of the Procedure.

72) The Delegation of El Salvador referring to its written comments pointed out that taxonomic studies demonstrated that the species *Pleuroncodes planipes* belonged to the *Galatheidae* family. It was marketed and labelled as " Squat Lobster" in some countries and FAO had carried out a study on this demersal resource in the coast of Central America. The Delegation proposed to include it in the Amendment to the Draft Standard for Quick Frozen Lobsters. This proposal was supported by several delegations.

73) Some delegations questioned the necessity of the inclusion of *Pleuroncodes planipes* in the Draft Amendment at quite a late stage of development. The Delegation of France pointed out that the mandate given to the Committee by Circular Letter 2003/3-FFP was limited to the inclusion of the species *Cervimunida johnii* and *Pleuroncodes monodon*. However the Committee was of the view that this was not an addition of new species but the extension of the standard to cover a new type of product named "Squat Lobster". The Committee agreed to the proposal of El Salvador to include the species *Pleuroncodes planipes* into the Standard for Quick Frozen Lobsters.

Status of the Draft Amendment to the Standard for Quick Frozen Lobsters

74) The Committee agreed to forward the Draft Amendment on the inclusion of squat lobster (species *Cervimunida johnii, Pleuroncodes monodon* and *Pleuroncodes planipes)* to Step 8 for adoption by the Commission (see Appendix IV).

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS (Agenda Item 6)[9]

75) The Committee recalled that several sections of the Code had been adopted by the Commission and that the other sections had been circulated for comments at Step 3 by CL 2003/6-FFP. Following the decision taken at the last session, a Working Group had been held prior to the session to consider the Proposed Draft Sections, especially aquaculture and bivalve molluscs.

76) Mr Alfred Bungay (Canada), Chair of the Working Group, presented its conclusions, that had been incorporated into the revised text by the Drafting Group consisting of Canada, France and the United Kingdom. The overall consistency of the sections had also been checked, including the terms related to "potential hazards" and "potential defects". The Committee noted that the Working Group had agreed on the following key points.

Aquaculture

- The scope was broadened to include all aquatic animals, except mammalian species, but excluding bivalve molluscs covered in section 7 of the Code. The definition for "aquaculture" was revised accordingly.
- It was acknowledged that the work of aquaculture activities be carried out in a responsible way not only in terms of their impact on human health, but equally any environmental consequences as well as ecological and fish health aspects. This has been achieved by the inclusion of a "Preamble" section that highlights these concepts upfront and makes reference to the FAO "Code of Conduct for

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8 ALINORM 03/18, Appendix VI, CL 2003/30-FFP, CX/FFP 03/6 (comments of El Salvador).

9 CL 2003/6-FFP, CX/FFP 03/7 (comments of Canada, Finland, Germany, Poland), CX/FFP 03/7-Add.1 (comments of United Kingdom, United States), CX/FFP 03/7-Add.2 (United States, EC); CRD 3 (Australia), CRD 5 (Brazil), CRD 6 (Report of the Working Group), CRD 9 (Denmark), CRD 8 (additional comments of the United States).

Responsible Fisheries". The introductory section has therefore been re-ordered for a more logical flow and there were consequential deletions of relevant texts.

- Other definitions were also added whilst some subsections, including relevant references to international codes, were revised.

Bivalve Molluscs

- Due to time constraints, the Working Group completed discussions up to and including Section 7.2 - Classification and Monitoring of Growing Areas and did not discuss the remaining text. The following key points were agreed:
- It was clarified that the scope covers live and raw bivalve molluscs as a principle and no specific changes were made in this respect due to lack of time.
- Several definitions and some subsections were revised as attached.
- There was a lengthy debate on the proposal to include "post harvest treated bivalve molluscs" and how they could be dealt with in this section. A definition for "Post Harvest Treated Bivalve Molluscs" was proposed and placed in square brackets for further discussion by the Committee.

77) The Committee expressed its thanks to the Working Group and the Drafting Group for their excellent work to facilitate the discussion of several complex issues. The Committee considered the revised text proposed by the Working Group (CRD 6) and made the following amendments and comments.

Section 2.2 Definitions - Aquaculture

78) The definition was amended to specify that reptiles and amphibians were excluded and consequential amendments were made where required. The Committee agreed that when fish was temporarily placed in an aquaculture establishment, it should be covered by the Code in order to control hazards to health. It was therefore agreed that aquaculture should cover the farming of aquatic animals "during part or the whole of their life cycle" as proposed by the Delegation of Malaysia.

79) The Committee agreed to replace "aquatic animals" with "fish" throughout the text to be consistent with the definition.

80) As regards "Good Aquaculture Practice", the Committee deleted the reference to animal welfare as this would be covered in the Preamble.

81) Following an extensive discussion on the definitions of "Chemicals" and "Residues" the Committee agreed to delete the examples in these definitions to prevent confusion with terms that were already defined, and to delete the definition of "Pollutants". In the defintion of "Veterinary Drugs", the reference to crustaceans was deleted for consistency with the Codex definition.

82) The Committee agreed with the proposals of the Delegation of Thailand to ensure consistency between the definitions of Extensive Farming, Semi-intensive Farming and Intensive Farming.

Section 6. Aquaculture Production

83) The Committee agreed with the inclusion of the Preamble proposed and added a reference to fish welfare in conjunction with fish health in the second paragraph.

Identification of Potential Hazards 6.2

84) The Committee agreed that water in closed recirculation systems is constantly "refreshed" rather than "purified" and the last sentence was amended accordingly.

85) In section 6.3.1 Feed Supply, the Committee agreed that the eighth bullet point should cover only products originating from fish and deleted the reference to rejects from animal slaughterhouses, that was covered in the ninth bullet point.

86) In section 6.3.2 Veterinary Drugs, the Committee agreed to retain the two last paragraphs without square brackets. It was clarified that when the drug level exceeded the MRL, slaughter should be postponed until fish complied with the MRL.

87) In section 6.3.2 and 6.3.5, the Committee agreed to replace "traceability" with "product tracing" as it was consistent with the adopted text in section 3.7 and the earlier decision of the Committee in this respect. Some delegations accepted this decision as regards the Code but pointed out that the issue of traceability/product tracing was still under consideration and that in general both terms should be used.

88) In section 6.3.6, the Committee deleted the last bullet point as the reference to the OIE texts was covered in the Preamble.

Section 2.3 Definitions – Bivalve Molluscs

89) The Committee agreed to correct the definition of "Growing Areas" for clarification purposes. In the definition of "Purification", the Committee deleted the reference to "tanks, floats or rafts" as it was not essential to the definition and current practice might differ from one country to another. In the definition of "Relaying" the Committee clarified that molluscs were removed to an acceptable growing or holding area in order to reduce contamination to an acceptable level for human consumption.

90) As related to the definition of "Post-Harvest Treatment', the Committee had an extensive discussion on the Scope and the use of such treatments. The Delegation of Canada, supported by other delegations, pointed out that in order to address biotoxin hazards, the Code should cover the bivalves intended both for direct consumption and for further processing.

91) The Observer from the EC expressed the view that the code should cover only live molluscs since they were received and dispatched live in the distribution centre and this was where inspection was carried out. The Observer also pointed out that products that had been subjected to post-harvest treatment should be considered as semi-processed and excluded from the Code.

92) Other delegations pointed out that the definition of "distribution centre" was different in other countries, that it received live molluscs but was not necessarily intended to dispatch only live molluscs, and that several treatments applied for food safety purposes did not affect the raw character of the molluscs.

93) The Delegation of the United States indicated that post-harvest treatment were applied to eliminate or reduce target organisms, and in particular *Vibrio vulnificus* that could not be controlled through the usual processes of water classification and control. Post harvest treatments had been considered as control measures in the framework of the FAO/WHO Expert Consultation on *Vibrio* spp. and were the only alternative to closing the growing area. The Delegation also pointed out that the sensory qualities of a raw bivalve were retained and that such products should be covered by the Code.

94) The Observer from the EC, at the request of the Delegation of the United States to include a "Post Harvest Treatment" to solve certain problems like the presence of *Vibrio vulnificus* in certain waters, stated that it was ready to discuss in depth when more data would be available, with the objective of giving a specific solution to a specific problem.

95) The Committee recognized that consensus could not be reached at this stage and agreed that the title should refer to "live and raw bivalve molluscs" with "raw" in square brackets, as well as the definition of "Post-Harvest Treatment". The Committee agreed that Section 2.3 and 7 should be returned to Step 3 for further comments with additional text prepared by the Delegation of the United States concerning the rationale for post-harvest treatment, in conjunction with the flow diagram (7.1). The Committee also agreed to refer to "dispatch center" rather than "distribution center".

96) The Committee noted that due to time constraints, it would not be possible to finalize all other sections of the Code and agreed to consider Section 10. Processing of Quick Frozen Coated Fish Products and the related definitions. It was recalled that the section had been developed by the Delegations of Germany and the United States and that several aspects were related to Section 8 covering frozen fish.

Section 2.6 Definitions - Quick Frozen Coated Fish Products

97) The Committee agreed to clarify the definition of "Sawing" and agreed on the other definitions. The Committee agreed that the Section should be restricted to coated fish products at this stage, since coated molluscs could be considered in the future and coated shrimps would be covered in the section on shrimps and prawns.

Section 10. Processing of Quick Frozen Coated Fish Products

98) The Committee corrected the description of potential hazards and defects throughout the text in order to ensure consistency within the section and with the rest of the Code.

Section 10.2.1 Hazards

99) The Committee agreed to include additional text concerning the control of microbial growth and toxin formation from *Staphylococcus aureus* and *Bacillus cereus*, as proposed by the Delegation of Canada and amended after some discussion.

Section 10.3.1 Raw Material Reception

100) The title of section 10.3.1 was amended to read "Reception" and the first sentence was deleted since the section did not apply only to raw material reception. In Section 10.3.1.3 Packaging Materials, the Committee agreed to add a recommendation concerning the examination of pre-printed labelling for accuracy.

Section 10.3.2 Storage

101) The Committee agreed to replace the current text of 10.3.2.1 Fish (Frozen Storage) with a reference to section 8.1.3 and to add a new section 10.3.2.2.on Chilled storage that referred to section 8.1.2.

102) The Committee agreed to include a new section 10.3.3 Frozen Fish Blocks/Fillet Tempering (after 10.3.2 Storage of Raw Material) to provide technical guidance concerning the tempering of blocks, as proposed by the Delegations of Canada and New Zealand.

Section 10.3.3 Unpacking

103) The Committee clarified that the last bullet point applied in case the production process was interrupted.

Section 10.3.4 Production of Fish Core

104) In Section 10.3.4.1 Sawing, the Committee agreed that saw dust should be collected in special containers if it was used for further processing. A new section was added (after Sawing) on the Application of Additives and Ingredients and the corresponding box was included in the flow chart. In section 10.3.4.2 Forming, the technical guidance was amended to cover mechanical forming of fish mixtures.

Section 10.3.5 Separation of Pieces

105) A new bullet point was added to indicate that broken, misshapen or out of specification pieces should be removed from production.

Section 10.3.7 Pre-frying

106) The Delegation of Japan expressed the view that the text should address the time and not only the temperature of frying. After some discussion, and noting that pre-frying was a very short process, the Committee agreed to add a reference to the temperature of the oil in the second bullet point. The Committee also agreed to refer to the products of fat degradation rather that oxidation as it was more general and would also cover polymerization.

Section 10.3.8 Re-freezing

107) The Committee noted that when coated products were made with fresh fish this step was not "re-freezing" but "final freezing" and amended the title accordingly.

Section 10.3.9 Packing and Labelling

108) A reference to section 8.2.1 Weighing was added as this was also relevant. The Committee amended the second bullet point to refer to other detection methods (in addition to metal detectors).

Section 10.3.10

109) A reference to section 8.1.3 Frozen Storage was added and the paragraphs that were already covered in that section were deleted to avoid duplication.

Section 10.3.11 Transport of End Product

110) The Committee added the thawing of frozen products as a potential defect

Flow Chart

111) As a result of the above amendments, the Committee added the following steps to the flow chart: tempering; raw material, fish blocks, off-cuts or sawdust; and application of additives and ingredients.

Appendices

112) The Committee had an exchange of view on the opportunity of retaining the Appendices containing optional requirements. Several delegations expressed the view that these requirements were useful as a reference in trade and the Committee agreed that they should be retained and completed as required.

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

113) The Committee agreed to advance Sections 2.2 and 2.6 of the Definitions, Section 6. Aquaculture and Section 10. Quick Frozen Coated Products to Step 5 with the recommendation that the Commission omit Steps 6 and 7 and adopt them at Step 8 (see Appendix V).

114) The Committee agreed to return to Step 3 Section 7. Live and Raw Bivalve Molluscs as indicated above, and the other sections that had not been discussed at the current session. It was agreed that the section on shrimps and prawns would be replaced by the revised text provided by the United Kingdom at the last session and in its written comments (see Appendix VIII).

115) The Committee agreed that Canada, France and the United Kingdom would consider the sections at Step 3 and the comments received in order to prepare a revised text for consideration by the next session, if required.

PROPOSED DRAFT STANDARD FOR LIVE AND PROCESSED BIVALVE MOLLUSCS (Agenda Item 7)[10]

116) The Chairperson recalled that the proposed draft Standard had been considered at the 25th Session of the Committee and that several important issues such as the Scope, targeted pathogens, products tracing/traceability and levels and determination of biotoxins were unresolved, therefore he proposed not to discuss the proposed draft Standard section by section but to concentrate discussion on these matters which would provide guidance for further elaboration of the standard.

117) The Delegation of Italy, speaking on behalf of the Member States of the EU present at the current Session, drew the attention of the Committee to the fact that the Scope should be consistent with the relevant section of the Code considered under Agenda Item 6 and limited to live and raw bivalve molluscs. The wording "raw" should therefore be kept in square brackets in the Standard until agreement on this matter was reached in the Code. The Delegation also pointed out that the use of the term "product tracing/traceability" should be consistent with concepts elaborated by other Codex Committees.

118) Several delegations supported the view that the Scope of the proposed Draft Standard should be limited to live and raw bivalve molluscs and noted that the work on processed bivalve molluscs products could be carried out at a later stage. Some delegations were of the view that square brackets around the word "raw" were not necessary.

119) The Committee agreed to limit the Scope to live and raw bivalve molluscs intended for direct human consumption or further processing, therefore amended the title and the wording in the Scope accordingly and put the word "raw" in the title in square brackets.

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[10] ALINORM 03/18, Appendix VII; CX/FFP 03/8 (comments of Canada, New Zealand and the United States); CX/FFP 03/8-Add.1 (comments of Chili, and Israel); CRD 3 (comments of Australia); CRD 2 (comments of European Community) and CRD 9 (comments of Denmark).

120) The Committee clarified the wording of the Scope in order to make it clear that all bivalve molluscs were covered except scallop adductor muscle for which a separate standard was being elaborated. As a consequence of this decision the third sentence containing the reference to Quick Frozen Scallop Muscle Adductor Meat was deleted.

121) The Committee decided to take out the wording regarding traceability/product tracing from the Scope and to move it to a proper place at a later stage.

122) The Committee decided to amend the second sentence of Section 2.1 on Product Definition to read "Raw bivalve molluscs are products that are no longer alive immediately prior to consumption but were alive immediately prior to the commencement of processing or to shucking, freezing or other treatment that did not eliminate the sensory characteristics of live product" in square brackets. As a consequence of previous decisions, the wording of the rest of Section 2.1 was deleted.

123) The Committee agreed that the reference containing wording in relation to processed products, especially canned products, should be taken out from the proposed Draft Standard.

124) The Committee noted the information provided by the Delegation of Thailand that limits for biotoxins such as Azaspiracid (AZP), Yessotoxins have not been reported in tropical waters, therefore decided to put Sections 5.3 (iv) to 5.3 (ix) in square brackets until more information on risk assessment on these issues from the Joint FAO/WHO Expert Consultation became available.

Discussion Paper on Risk Management Strategies for *Vibrio* spp. in Seafood

125) The Committee noted the report of the *Ad Hoc* Working Group presented by Dr G. P. Hoskin prepared in reply to the request of the Codex Committee on Food Hygiene. It expressed appreciation to the Working Group and to the FAO/WHO Expert Consultation for their excellent response to the CCFFP questions and agreed to the following.

126) The codes and standards developed by the Committee on Fish and Fishery Products address hazards in standards and provide guidance on their controls in codes. The codes typically emphasize the need to avoid hazards as well as provide some information on mitigation. This information tends to be general in nature due to the variability and complexity of the products and their movement from harvest through to final product production. However the development of the Code of Practice for Bivalve Molluscs and the Standard for Bivalve Molluscs makes use of information in vibrios newly available from risk profiles and risk assessments. In particular, the four risk management questions posed by the CCFFP to the Joint FAO/WHO Expert Consultation as well as the information in the risk profile from the Committee on Food Hygiene are of great value to the Committee and will be further considered by the Committee during its work on the Code and Standard for bivalve molluscan shellfish. There will be further discussion in the Committee with respect to reducing the risk in raw molluscs from pathogens not controlled by the traditional harvest water criteria and traditional use of post-growing water treatment by relaying or depuration.

127) The Committee noted that the Risk Management document addresses *V. parahaemolyticus* in depth, but does not explore other marine vibrios that may be pathogenic.

128) The Committee further noted that questions facing risk managers include the effectiveness of mitigation procedures, the need to find and adopt the most relevant testing methods, the need for risk managers to establish tolerances, and the need to know which products present significant hazards from any particular source.

Examples include:

- Do *V. parahaemolyticus* from tropical latitudes include pathogenic strains such as the notably pathogenic O3:K6 strain in temperate marine populations?
- Should products from open ocean fisheries be examined at import for *V. parahaemolyticus* or *V. cholerae*? The risk profile did cite cases from products apparently from open ocean fisheries such as tuna.
- What is the risk from naturally occurring *V. cholerae* in tropical latitudes?

- What is the risk from *V. parahaemolyticus*, and other marine vibrios, on products intended for further processing, including cooking, compared with products intended for raw, or lightly cooked, consumption? Could or should risk managers set a different tolerance to be applied to each product based on its intended use?
- More information is needed by risk managers if they are to use total limits for vibrios (e.g., use of a tolerance of 0, 100, or 1000 cfu/g *V. parahaemolyticus*) to control the risk from pathogenic strains, such as *tdh* + strains. Would the risk be different for products from tropical latitudes compared with temperate latitudes?
- How effective is the use of disinfected potable water wash or chlorinated water wash on fish/shrimp and other non-bivalve molluscan species of seafood in reducing bacterial loads?
- How do these processes, that are intended to reduce bacterial loads, compare to temperature control processes intended to prevent increases in bacterial numbers?

129) The Committee agreed that further specific advice and cooperation might be required from the Committee on Food Hygiene on risk management questions in the future.

Biotoxins

130) The Committee noted the request to clarify the Scope for an FAO/WHO Expert Consultation pertaining to marine algal biotoxins. It thanked the *Ad Hoc* Working Group for their excellent work and agreed that the following items should be addressed:

Provisions of Scientific Advice for the Establishment of Safe Upper Limits:

- Review of toxicological information and provisional scientific advice to define which toxins belong in which toxin group, and recommendations for the establishment of upper safety limits for the following toxin groups: PSP-, DSP-, ASP-, AZP- and NSP-toxins, and YTXs and PTXs.
- Provide advice on management of new toxins and newly discovered analogues of existing toxins where either;
    i. There is no epidemiological evidence of illness resulting, or
    ii. Where epidemiological evidence exists.

Provide guidance on the application of different methods of analysis concerning each toxin group:

- Bioassays, analytical instrumental methods (HPLC, LC-MS...), immunological methods, other rapid methods – which methods should be considered reliable for each toxin group to ensure safety of product.
- Recommend choice of reference method in case of conflicting results
- Discuss needs for standards and reference materials
- Suggest management of analytical results, concerning precision, standard deviation, acceptance levels etc

Monitoring:

- Provide guidance on which part of the seafood (shellfish or other) should be used for analysis (whole meat, different edible parts, digestive organs...)
- Provide guidance on sampling methods; suggest minimum representative sampling (size of sample, number of samples, different depths, frequency etc)
- Provide guidance on use of phytoplankton monitoring (strengths and weaknesses) as part of a shellfish biotoxin control program.
- Provide guidance on indicator organisms for the different toxin groups

Geographic Distribution:

- Provide information on the existence of biotoxin forming marine algae in various geographical regions of the world.

131) The Committee noted that results from the FAO/WHO Expert Consultations would be communicated by the Representatives of FAO/WHO and that these results would provide the basis for further Committee's actions in this regard.

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

132) The Committee agreed to attach the revised version of the Proposed Draft Standard to this report for circulation and government comments at Step 3 of the Procedure (see Appendix IX).

PROPOSED DRAFT STANDARD FOR QUICK FROZEN SCALLOP ADDUCTOR MUSCLE MEAT (Agenda Item 8)[11]

133) The Committee recalled that the Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat had been discussed at the 24th Session. The Committee had clarified the Scope and amended the proposed draft Standard in order to avoid overlap with the proposed draft Standard for Bivalve Molluscs, however there was extensive debate regarding the provisions for moisture content, additives and biotoxins on which agreement was not reached. The Chairperson drew the attention of the Committee to the fact that due to time constraints and the presence of unresolved fundamental questions it would not be possible to proceed with consideration of the proposed draft Standard Section by Section therefore proposed to concentrate discussion on the above unresolved issues.

Moisture content

134) The Delegation of Canada introduced the document prepared in order to address the problem of moisture content and polyphosphates in scallop adductor muscle meat and invited the Committee to consider the proposed conclusions which included three options:

- provide upper moisture limits according to GMP and give consideration that moisture/protein ration value might replace the percentage value;
- in case it was not possible to establish one acceptable moisture limit the following criteria might be considered by countries in developing a moisture content limit:
    a. species
    b. harvest practice
    c. seasonality
    d. geographical location and other criteria that relate to amount of water uptake occurring during processing in accordance with GMP.
- Retain the current moisture content for further discussion.
- Delete the provisions on maximum moisture content from the standard

135) While considering these options several delegations recognized difficulties in this area due to existing natural differences among member countries existing in scallop species, harvesting practices, geographical conditions, GMPs etc and expressed the view that more work was necessary to overcome these variations.

136) The Delegation of the United Kingdom drew the attention of the Committee to the fact that this discussion was quite similar to the discussion on fish content in fish sticks in relation to GMP. The Delegation indicated that if water was added over a trigger limit it should be labelled, as this issue was very important for consumers.

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[11] ALINORM 03/18 Appendix VIII; CX/FFP 03/9 (comments of Chile, Jordan and United States); CX/FFP 03/9-Add.1 (Discussion Paper on the Moisture Content and Phosphates in Scallops); CRD 3 (comments of Australia).

137) The Chairperson noted that different moisture content existed in various countries and that any limit discussed at the Committee either should be kept in Section 3.3.2 in square brackets or the Committee should find ways to proceed such as addressing this issue in a code of practice or elaborating GMPs that would be used as a basis for national legislation.

138) Some delegations pointed out that this matter could be progressed further while using M/P ratio.

139) The Committee recognized that this issue required in depth consideration, therefore decided to leave Section 3.3.2 on moisture content unchanged and requested the Delegation of Canada together with Australia, France, Germany, Japan and Thailand to work further on moisture content especially in conjunction with the work on GMPs.

Additives

140) It was proposed that this controversial issue on the use of additives should be left to national authorities to decide, however the Committee was of the view that this was a deviation from Codex objectives.

141) The Committee noted that the existing provisions of the proposed draft Standard did not allow the use of food additives, however in some countries the use of food additives such as polyphosphates and other additives was common practice. Some delegations noted that polyphosphates were allowed in other fish standards therefore in order to be consistent with these standards they suggested to allow the use of these additives.

142) The Secretariat clarified that ascorbyl esters and EDTA were already allowed in the General Standard for Food Additives, therefore it might be useful to include them in the proposed Draft Standard and ask for comments from member governments in the future.

143) The Committee decided to amend the Section on Food Additives by inserting wording in square brackets that "polyphosphates are allowed in these products (to be further elaborated)" and requested comments on the use of actual compounds and their proposed levels.

Parasites

144) The Committee noted that visible parasites were quality defects for these products and it had the greatest negative impact on consumer acceptance, therefore accepted the proposal of the Delegation of the United States and inserted the wording that "the presence of visible parasites on the near surface of the scallop adductor muscle shall not exceed 20% of individuals in the sample". The wording regarding their determination was added in Section 7 on Sampling, Examination and Analysis as a new Section 7.8 (Parasites).

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

145) The Committee decided to retain the proposed draft Standard at Step 4 until the issue of moisture content was resolved, for further consideration.

PROPOSED DRAFT STANDARD FOR SMOKED FISH (Agenda Item 9)[12]

146) The Chairperson recalled that the document on the Proposed Draft Standard for Smoked Fish prepared by the Delegation of Denmark (CRD 10) had not been available for government comments before the Session, therefore it was not possible to consider it in more detail.

147) Some delegations suggested to include the use of liquid smoke in the Scope as this type of technology alone or in combination was currently used in some countries. The Delegation of the Netherlands offered their assistance in elaborating this Section.

148) The Delegation of Israel proposed to consider the use of antimicrobial food additives, such as acetic acid to prevent contamination by *Listeria*.

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[12] CX/FFP 03/10 –Add.2 (Document on the control of *Clostridium botulinum* prepared by the US); CRD 10 (Proposed Draft Standard for Smoked Fish).

149) The Committee noted that the document on the control of *Clostridium botulinum* prepared by the United States provided major control options for control of botulism in smoked products, therefore it might be a useful matrix in further elaboration of the proposed draft Standard.

150) The Representative of WHO informed the Committee that the FAO/WHO Risk Assessment on *Listeria monocytogenes* in Ready-to-Eat Foods would be published by the end of this year and that it contained a section on smoked fish, therefore it might be useful in further elaboration of the Standard.

151) The Secretariat informed the Committee that the Committee on Food Hygiene was developing proposed draft Guidelines for Control of *Listeria monocytogenes* in Foods in order to provide specific control strategies for this microorganism and that this document might also be useful for the work on smoked fish.

Status of the Proposed Draft Standard for Smoked Fish

152) The Committee agreed to attach the proposed draft Standard for Smoked Fish (CRD 10) to this report for comments at Step 3 (see Appendix XI). The Delegation of Denmark assisted by interested countries would revise the document for circulation and consideration at the next session of the Committee.

PROPOSED DRAFT STANDARD FOR GRANULAR STURGEON CAVIAR (Agenda Item 10)[13]

153) The Committee recalled that its last session had agreed to undertake the elaboration of a standard for granular sturgeon caviar to be developed by the Russian Federation, and that this had been approved as new work by the 26th Session of the Commission.

154) The Delegation of the Russian Federation presented the Proposed Draft and expressed its thanks to the delegations of Germany and Iran that had provided comments on the initial draft. The Delegation highlighted the main quality and safety provisions included in the text, especially the list of species covered, sensory criteria, the need for safety limits and specific labelling provisions. The Committee expressed its appreciation to the Delegation of the Russian Federation for its work in the development of a comprehensive standard.

Title

155) The Committee had an extensive discussion on the title. The Delegation of the Russian Federation, supported by several delegations, proposed to amend the title to read "caviar" instead of "sturgeon caviar" as caviar was only prepared from sturgeon species. Other delegations expressed the view that caviar could be prepared from other species and that the current title should be retained. The Committee noted that different production practices existed in various countries and could not come to a consensus on this question. It therefore agreed to retain the reference to "sturgeon" in the title in square brackets for further discussion.

Definitions

156) The Committee agreed to amend the definition of "2.1.1 Granular caviar" to "Fish egg" since the product cannot yet be described as caviar at that stage, and to clarify the definition further, as proposed by the Delegation of France. Some consequential amendments were also made throughout the text.

157) The Committee noted some comments on the definition of the caviar lot, primary package and secondary package but did not come to a conclusion.

158) The Committee deleted the following definitions that were already covered in other Codex texts: Potable Water, Aquaculture, Decomposition (Code of Practice for Fish and Fishery Products); and "Food Additive" (Procedural Manual). The Committee also deleted the definition of "biological species" as it was not necessary in the rest of the text and "foreign admixtures" as the usual term was foreign matter.

159) In the definition of "Primary Package" a reference to "other suitable containers" was added as packages were not limited to metal or glass cans. The relevant changes were made throughout the text.

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[13] CX/FFP 03/11, CX/FFP 03/11-Add.1 (comments of France, Israel, Switzerland, United States, EC), CRD 9 (comments of Denmark)

Section 2.2 Product Definition

160) The Committee agreed that it was not necessary to include the list of species as there was consensus that all species in the *Acipenseridae* family should be covered. The current list was therefore replaced with a statement to the effect that the product was prepared from eggs of fish of the *Acipenseridae* family and hybrids of these species.

Section 2.3 Process Definition

161) In section 2.3.1, the Delegation of Brazil pointed out that in case of re-packaging, there should be no mixing of products of different quality, in addition to "different species", and the Committee amended the text accordingly, with an additional reference to different "lots" in square brackets, as proposed by the Observer from the EC. Some editorial changes were also made to the paragraph. The Committee amended section 2.3.2 to clarify the types of contamination concerned.

162) The Committee recognized that freezing of the product was used in some specific cases and agreed to delete the last sentence accordingly.

Section 2.4 Handling Practice

163) Some delegations asked for clarification on the "maturation stage IV" and the Delegation of the Russian Federation indicated that it would provide a paper with additional explanations for consideration by the next session. The Committee also made some editorial changes in the second indent.

164) The Committee discussed whether the reference to "living sturgeon fish" should be replaced with "freshly slaughtered" and the Committee agreed to refer only to "sturgeon fishes" as proposed by the Delegation of Sweden, in this section and in section 3.1 Raw Material.

Section 4.Food Additives

165) The Committee noted that in accordance with the format of Codex Standards, a section on food additives should be included and invited countries to provide comments in this respect. The Secretariat indicated that currently the additives allowed in the General Standard for Food Additives included only colorants (Caramel Class III and IV, Fast Green FCF) in Food Category 9.3.3 "Salmon substitutes, caviar, and other fish roe products".

Section 5. Contaminants

166) The Delegation of Iran, supported by other delegations, pointed out that caviar was consumed in very small quantities and that the establishment of maximum limits for contaminants would not be justified.

167) The Observer from the EC pointed out that any maximum limits for contaminants or microbiological limits should be based on an evaluation by JECFA or JEMRA as food safety provisions in Codex standards should be based on a scientific risk assessment. Several delegations recalled that there was no contaminant section in the standards for fish and fishery products, and that it was not necessary in the present standard.

168) After some discussion, the Committee agreed to delete the current Table and to include general recommendations to the effect that the provisions for pesticides and contaminants should comply with the levels established by the Codex Alimentarius Commission, as was used in other commodity standards.

Section 6. Food Hygiene

169) The Committee agreed to delete the microbiological values and to replace the section with the general Food Hygiene provisions included in the Procedural Manual, as proposed by the Delegation of the United States, in square brackets.

Section 7. Food Labelling

170) The Committee noted some proposals for amendment but as it was not possible to discuss them due to time constraints, the current section was retained for further comments and consideration at the next session.

Section 8. Sampling, Examination and Analysis

171) The Committee agreed to delete section 8.1.2 as it duplicated section 8.1.1.

Section 9. Definition of Defects

172) The Committee added a new section 9.4 Extraneous Material indicating that membranes and fat clusters should be absent from finished granular caviar.

Status of the Proposed Draft Standard for Granular Sturgeon Caviar

173) The Committee recognized that although significant progress had been made in the consideration of the standard, some substantial issues remained to be addressed and further discussion would be necessary at the next session.

174) The Committee agreed to return the Proposed Draft Standard, as amended at the present session, to Step 3 for further comments (see Appendix X). The Committee agreed that the Delegation of the Russian Federation, with the assistance of interested countries, would redraft the text in the light of the comments received for consideration at the next session.

PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR SALTED FISH AND DRIED SALTED FISH (Agenda Item 11)[14]

175) The Committee recalled that at its 25th Session it had agreed that there was a need for inclusion of a specific method for determination of the water content in the whole fish for salted and dried salted fish covered by Codex STAN 167-1989 and that a new procedure for the preparation of sample in the current method was proposed.

176) The Delegation of Norway suggested to make small amendments in Section 7.4 Determination of Water Content and pointed out that the proposed amendments provided a more standardized methodology that would be easier to use.

177) The Committee noted the proposals of the Delegation of Denmark and agreed to clarify in the first and second sentences of the first paragraph of Section 7 that fish must be placed in store at a temperature of +1° - +4° C and that the analysis must be performed as soon as possible after the fish has been sampled.

178) The Committee deleted the second and fourth paragraphs of this section as these dealt with problems that were outside the scope of the method.

179) The Committee changed the title of Section 6 to read “Control analysis of whole fish”.

180) Replying to the question of the Delegation of Canada regarding the presence of skin and bones in the sample, the Delegation of Norway clarified that bones were considered to be part of samples.

181) The Delegation of Canada informed the Committee that an AOAC Method 937.07 existed for the determination of water in fish, which was very similar to the one under the discussion and that consideration should be given as to whether it could be proposed as an alternative.

182) The Committee noted the proposal of the Delegation of Portugal that there was a need for in depth collaboration on this issue and agreed that the Delegation of Norway in cooperation with Portugal and Canada would prepare a paper outlining problems that might arise in this regard.

Status of the Proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish

183) The Committee agreed to forward the proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish to the 27th Session of the Commission for adoption at Step 5 (see Appendix VI).

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[14] ALINORM 03/18 Appendix IX; CRD 7 (comments of Norway); CRD 9 (comments of Denmark).

DISCUSSION PAPER ON THE INCLUSION OF ADDITIONAL SPECIES IN CODEX STANDARDS ON FISH AND FISHERY PRODUCTS (Agenda Item 12)[15]

184) The Committee recalled that its last session had considered a discussion paper prepared by the Delegation of France that analysed the current provisions concerning the inclusion of species and related labelling requirements, and proposed several options concerning their revision. The Committee had agreed that the paper should be revised to concentrate on the possible revision of the current procedure for the inclusion of species.

185) The Delegation of France, while introducing the document, recalled the status and purpose of the procedure and pointed out that the current criteria were not discriminating enough. The Delegation recalled that standards had been grouped and simplified when revised and that the essential quality factors did not include detailed provisions allowing to characterize the species or group of species concerned. This resulted in potential confusion for the consumer, especially as the same product, such as *Sprattus sprattus* and *Clupea harengus* could be covered by different standards, such as Salted Atlantic Herring and Salted Sprat and Canned Sardines, according to their mode of presentation. The Delegation therefore proposed to revise the following criteria: taxonomic and species authentication information; biological and economical information; technological information; sensory evaluation; and to add a new step related to the "risk of confusion".

186) The Committee expressed its appreciation to the Delegation of France for this comprehensive paper that would allow further consideration of these complex issues. Several delegations expressed support for further work on the revision of the procedure in order to take into account new technologies and methods of analysis as well as the evolution of the market. The Committee agreed that the next stage was to identify how the current procedure should be actually amended in order to decide on specific new work at the next session.

187) The Representative of FAO presented to the Committee an advance copy of a FAO Fisheries Technical Paper entitled « Application of modern analytical techniques to ensure seafood safety and authenticity » (*Iciar Martinez et al.*); this document provides an overview of analytical techniques available on one hand for detection and characterization of pathogenic organisms in seafood products, on the other hand for fish species authentication and in some case determination of origin. Besides, FAO compiled common names of 1462 marine species used in member countries (Excel file provided on CD-ROM). FAO proposed to continue this work and called upon collaboration of member countries for completing and correcting the list. Moreover, it would be worth enriching this list with scientific data based upon analytical results of electrophoresis or DNA sequencing of authentic samples; this implies cooperation of scientific institutions. From the FAO point of view, such a list of common names could be useful for preparing and implementing a new inclusion procedure and, more generally, for further work on species identification and for preparation or revision of Codex standards.

188) The Committee invited the Delegation of France, with the assistance of FAO and interested countries (Germany, Morocco, Portugal, Spain, Switzerland, United Kingdom), to prepare an outline of a proposed draft amendment to the current procedure for consideration at the next session.

DISCUSSION PAPER ON FISH CONTENT IN FISH STICKS (Agenda Item 13)[16]

189) The Committee recalled that the 29th Session of the Committee on Food Labelling (CCFL) had agreed in principle on a declaration of fish content in fish sticks (Draft Amendment to the Standard for Quick Frozen Fish Sticks) and asked the CCFFP to define fish content and the corresponding methodology. The Committee had considered this question at its earlier sessions and had agreed at the last session that the Delegation of the United Kingdom should revise the discussion paper on the definition and method for fish content.

190) The Delegation of the United Kingdom presented the discussion paper that outlined its national experience with the use of chemical analysis to determine fish content. The document included the position

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15 CX/FFP 03/13, CX/FFP 03/13-Add.1 (Technical paper prepared by FAO)

16 CX/FFP 03/14, CRD 3 (comments of Australia)

of Canada and the United States that had also participated in the drafting and proposed some options for consideration by the Committee in order to reply to the question of the CCFL.

191) As regards the relationship between the declaration of fish content and the current work of the Committee on Food Labelling on quantitative declaration of ingredient (QUID), the Secretariat indicated that the CCFL had agreed on the specific Draft Amendment currently at Step 7 as it was consistent with the provisions of the General Standard for the Labelling of Prepackaged Foods (Section 5.1.1). The amendment to the Standard to include QUID declaration was still under discussion at Step 3.

192) The Delegations of New Zealand and South Africa expressed their concern with the use of proposed method as some species had a naturally low protein content and the nitrogen conversion factors were not defined for all species that were used in fish sticks. It would be necessary to establish a database on the nitrogen content of all relevant species, otherwise the results of the methods could create problems in trade. The Delegation of the United Kingdom however pointed out that since the factors are used as trigger levels for further investigation, it may be possible to use a single factor as there are only small differences between the factors of the different white fish species.

193) After some further discussion, the Committee agreed that the amendment to CODEX STAN 166-1989 should read as follows:

6.1.3 "The proportion of fish content should be declared on the label"

194) In reply to a question from the Delegation of France, the Delegation of the United Kingdom clarified that the proportion of fish was expressed as the ingoing percentage of fish at the time of manufacture.

195) The Committee agreed to recommend that AOAC Method 996.15 be used as the routine method to check fish content. The method of analysis as outlined in CX/FFP 02/13 could also be used in cases where this method is applicable to the species to be examined.

Status of the Draft Amendment to the Standard for Quick Frozen Fish Sticks

196) The Committee agreed to submit the proposed text of section 6.1.3 and the corresponding method of analysis (section 7.4) to the Committee on Methods of Analysis and Sampling for endorsement of the methods and to the Committee on Food Labelling in order to allow the finalization of the draft amendment (see Appendix VII) .

OTHER BUSINESS, FUTURE WORK AND THE DATE AND PLACE OF NEXT SESSION (Agenda Item 14)[17]

197) The delegation of Spain expressed its reservation as the Spanish version of the report was not available to delegates.

Amendment to the Labelling Section in the Codex Standard for Canned Sardines and Sardine-Type products

198) The Delegation of Morocco referring to its written comments drew the attention of the Committee to the fact that essential problems related to labelling in the application of the Codex Standard for Canned Sardines were not solved and this created confusion for consumers as different species may be labelled in the same way.

199) The Committee agreed that the Delegation of Morocco would prepare a discussion paper outlining their proposals for amendment to the Standard for consideration at the next session of the Committee.

Date and place of Next Session

200) The Delegation of South Africa informed the Committee that the Government of South Africa was willing to co-host the 27th Session of the Committee in Cape Town, South Africa from 28 February to 4 March 2005, subject to further discussions and confirmation by the host Governments and the Codex Secretariat.

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[17] CX/FFP 03/15 (document prepared by Morocco).

SUMMARY STATUS OF WORK

Subject Matter	Step	Action by	Document Reference in ALINORM 04/27/18
Draft Standard for Salted Atlantic Herring and Salted Sprat	8	Governments 27th CAC	para. 54 Appendix II
Draft Model Certificate for Fish and Fishery Products (sanitary certificate)	8	Governments 27th CAC	para. 68 Appendix III
Draft Amendment to the Standard for Quick Frozen Lobsters	8	Governments 27th CAC	para. 74 Appendix IV
Proposed Draft Code of Practice for Fish and Fishery Products (aquaculture and quick frozen coated fish products)	5/8	Governments 27th CAC	para. 113 Appendix V
Draft Amendment to the Standard for Quick Frozen Fish Sticks	7[18]	CCFL/CCMAS	para. 196 Appendix VII
Proposed Draft Amendment to the Standard for Salted Fish and Dried Salted Fish	5	Governments 27th CAC	para. 183 Appendix VI
Proposed Draft Standard for Quick Frozen Scallop Adductor Muscle Meat	4	27th CCFFP	para. 145
Proposed Draft Code of Practice for Fish and Fishery Products (other sections)	3	Governments 27th CCFFP	para. 114 Appendix VIII
Proposed Draft Standard for Live and Raw Bivalve Molluscs	3	Governments 27th CCFFP	para. 132 Appendix IX
Proposed Draft Standard for Granular Sturgeon Caviar	3	Governments/Russia 27th CCFFP	para. 174 Appendix X
Proposed Draft Standard for Smoked Fish	3	Governments/Denmark 27th CCFFP	para. 152 Appendix XI
Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (*Clupea bentincki*)		CCEXEC (discontinuation)	para. 7
Proposed Draft Model Certificate for Fish and Fishery Products (other certificates)		CCEXEC (discontinuation)	para. 70
Other questions (discussion papers):			
Revision of the Procedure for the Inclusion of Species		France/Governments 27th CCFFP	para. 136
Amendment of the Standard for Canned Sardines and Sardine-Type Products		Morocco 27th CCFFP	para. 199

[18] At Step 7 in the Committee on Food Labelling

LIST OF PARTICIPANTS
LISTE DES PARTICIPANTS
LISTA DE PARTISIPANTES

CHAIRPERSON / PRÉSIDENT / PRESIDENTE

Bjørn Røthe Knudtsen
Regional Director
National Food Control Authority
Statens Hus
7734 Steinkjer, Norway
Phone: +47 74 168154
Fax: +47 74 168339
E-mail: b-roe-k@online.no

ARGENTINA/ARGENTINE

Dr. Gustavo Luis Pérez Harguindeguy
Coordinador de Pesca
Servicio Nacional de Sanidad y Calidad Argroalimentaria
Paseo Colon 367 – 6° Piso
1063 Buenos Aires
República Argentina
Phone: +54-11 4331 6040/49 Int. 1604/10/12
Fax: +54-11 4342 6209
E-mail: pescasenasa@inea.com.ar

AUSTRALIA / AUSTRALIE

Ms.Jennifer Barnes
Manager – International Policy & Co-ordination
Australian Quarantine & Inspection Service
Agriculture, Fisheries and Forestry – Australian
GPO Box 858
Canberra ACT 2601, Australian
Phone: +61 2 6272 3509
Fax: +61 2 6271 6522
E-mail: jenny.barnes@aqis.gov.au

Prof. Felicia Kow
Head, Post-Harvest Technology
Faculty of Fisheries and Marine Environment
Australian Maritime College
P O Box 21 Beaconsfield
Tasmania 7270 Australia
Phone: +61 3 6335 4473
Fax: +61 2 6383 4766
E-mail: f.kow@fme.amc.edu.au

Mr. Ted Loveday
Managing Director
Seafood Services Australia
PO Box 2188, Ascot
Queensland, L007, Australia
Phone: +61 428 323 663
Fax: +61 7 3633 6776
E-mail: tedloveday@seafoodservices.com.au

BELGIUM / BELGIQUE / BÉLGICA

Dr. Vicky Lefevre
Federal Agency for the Safety of the Food Chain
DG Control Policy
Direction Transformation and Distribution of foodstuff
WTC III – Boulevard Simon Bolivar 30
1000 Brussels, Belgium
Phone: +32 2 208 4739
Fax: +32 2 208 4743
E-mail: vicky.lefevre@favv.be

BRAZIL / BRÉSIL / BRASIL

Guilherme Antonio da Costa Júnior
Fish and Fishery Product Inspection Service – Director
Esplanada Dos Ministérios
Ministério da Agricultura Pecuária e do Abastecimento
Ed. Anexo Ala A, Sala 445 - Brasília, Brazil
Phone: +55 61 2182775
Fax: +55 61 2182778
E-mail: guilherme@agricultura.gov.br
ggguilherme@hotmail.com

Rodrigo Carvalho
Technical Assessor - Brazilian Shrimp Farmers
Association –ABCC-Brazil
Rua D. Maria Carolina, 205, Sala 104
Boa Viageu, Recife-Pe. CeP 51020-220
Phone: +55 81 34675326/55 81 3327 1398
Fax: +55 81 34675326
E-mail: abccam@uol.com.br
rodrigo@mcraquacultura.com.br

BRUNEI DARUSSALAM
Mr. Sabri Haji Mohd. Taha
Senior Fisheries Officer
Postharvest Development and Quality Assurance Divison
Department of Fisheries
3rd, Floor, MIPR Building; Jalan Menteri Besar
Berakas BB3910, Brunei Darussalam
Phone: +673 2 770234
Fax: +673 2 382069
E-mail: sabri_taha@fisheries.gov.bn

Ms. Desimawati Haji Metali
Assistant Fisheries Officer
Department of Fisheries
Ministry of Industry and Primary Resources
Brunei Darussalam
Phone: +673 2 383067
Fax: +673 2 382069
E-mail:dmetal99@hotmail.com

CANADA / CANADÁ

Ms. Mary Ann Green
(Head of delegation)
Director
Fish, Seafood and Production Division
Canadian Food Inspection Agency
159 Cleopatra Drive
Nepean, Ontario K1A 0Y9, Canada
Phone: +613 221 7136
Fax: +613 228 6648
E-mail: greenma@inspection.gc.ca

Mr. Vance McEachern
National Manager
International Programs and Intergovernmental Liaisons
Fish, Seafood and Production Division
Canadian Food Inspection Agency
159 Cleopatra Drive
Nepean, Ontario K1A 0Y9, Canada
Phone: +613 221 7022
Fax: +613 228 6648
E-mail: mceachernv@inspection.gc.ca

Mr. Alfred J. Bungay
National Manager
Quality Management Program
Fish, Seafood and Production Division
Canadian Food Inspection Agency
159 Cleopatra Drive
Nepean Ontario K1A 0Y9, Canada
Phone: +613 221 7026
Fax: +613 228 6648
E-mail: abungay@inspection.gc.ca

Mr. Dominic Cheung
Senior Program Officer,
International Programs & Intergovernmental Liaison
Fish, Seafood and Production Division
Canadian Food Inspection Agency
159 Cleopatra Drive
Nepean, Ontario, K1A 0Y9, Canada
Phone: +613 221 7124
Fax: +613 228 6648
E-mail: cheungd@inspection.gc.ca

CHILE / CHILI

Ing. Ruth Alarcon
Encargada normas Codex
Servicio Nacional de Pesca
Victoria 2832, Valparaiso, Chile
Phone: +56 32 819202/56 32 819203
Fax: +56 32 819200
E-mail: ralarcon@sernapesca.cl

CHINA / CHINE

Ms. Yu Xiujuan
Director of Division - Fishery Bereau
Ministry of Agriculture P.R.China
No 11 Nongzhanguan Nanli, 100026
Beijing, P.R.China
Phone: +8610 641 92938
Fax: +8610 641 92961
E-mail: yuxiujuan@agri.gov.cn

Ms. Xu Zhuqing
Associate Professor
Chinese Academy of Fishery Sciences
Secretary general of national Technical Commission of Fishery Standardization in China
150, Nan Qingta, Rongding Rd. Haidian District
Beijing, P.R.China
Phone: +86 10 686 72898
Fax: +86 10 686 76685
E-mail: skyzbb@vip.sina.com

Ms. Liu Qiaorong
Assistant Director
Fishery Product Certification Center
Chinese Institute of Fishery Sciences
150, Nan Qingta, Rongding Rd. Haidian District
Beijing, P.R. China
Phone: +86 10 686 73907
Fax: +86 10 686 71130
E-mail: effpq@sina.com

Ms. Wang Lianzhu
Associate Professor
Chinese Academy of Fishery Sciences
National Center for Supervision & Test of Aquatic Products
No 106 Nanjing Road, 266071
Qingdao, P.R.China
Phone: +86 532 582 1813
Fax: +86 532 582 5917
E-mail: wanglz@ysfri.ac.cn

DENMARK / DANEMARK / DINAMARCA

Ms. Thyra Bjergskov
Counsellor
M.Sc. Food Science and Technology
Danish Veterinary and Food Administration
Division for Food Safety , FA2
Mørkhøj Bygade 19
2860 Søborg, Danmark
Phone: +45 33 956000/6487
Fax: +45 33 956001
E-mail: tbj@fdir.dk

EL SALVADOR

Don Jorge López
Investigador
Subcomité del Codex Alimentarius sobre Pescado y Productos Pesqueros de El Salvador
Ospesca, Bulevar Orden de Malta
San Salvador, El Salvador
Phone: +503 2371430
Fax: +503 2371430
E-mail: joeony@salnet.net

Enrique Alberto Portillo Peña
Jefe de Delegacion
Encargado de negociación de la Cámara de la Pesca
Subcomité del Codex Alimentarius sobre Pescado y
Productos Pesqueros de El Salvador
Centro de Oficinas La Sultana
Numero 201, Bulevard Los Proceres
San Salvador, El Salvador
Phone: +503 2340302
Fax: +502 2431360
E-mail: bufeteportillo@hotmail.com

FINLAND / FINLANDE / FINLANDIA

Ms Auli Vaarala
Senior Adviser
Food Control, Meat and Fish Hygiene Unit,
National Food Agency
P.O.Box 28
00581 Helsinki, Finland
Phone: +358 9 3931559
Fax: +358 9 3931594
E-mail: auli.vaarala@elintarvikevirasto.fi

FRANCE / FRANCIA

Yves Douzal
Chef de délégation
Ministère de l'Agriculture
Direction des pêches maritimes et de l'Aquaculture
3, place de Fontenoy
75007 Paris, France
Phone: +33 1 49558272
Fax: +33 1 49558200
E-mail: yves.douzal@agriculture.gouv.fr

Frédérick Bousquie
Laboratoire Etudes Technico-Reglementaires
Département Valorisation des produits de la mer
Centre de Nantes
Rue de l'lle d'Yeu, BP 21105
44311 Nantes Cedex 3
France
Phone: +33 2 40374152
Fax: +33 2 40374071
E-mail: frederick.bousquie@ifremer.fr

Geneviève Morhange
Direction Generale de la Concurrence,
De la Consommation et de la répression des Fraudes
Ministère de l' Economie
59 bd Vincent Auriol 75013
Paris, France
Phone: +33 1 44972916
Fax: +33 1 44973048
E-mail: genevieve.morhange@dgccrf.finances.gouv.fr

Alexandre Kempff
Ministère de l'Agriculture
Directior des pêches maritimes et de l'Aquaculture
3, place de Fontenoy
75007 Paris, France
Phone: +33 1 49558272
Fax: +33 1 49558200
E-mail: alexandre.kempff@agriculture.gouv.fr

Pierre Commère
Secrétaire Général
Association des entreprises de produits
Alimentaires élaborés (ADEPALE)
44, rue d' Alésia, 75682 Paris Cedex 14, France
Phone: +33 1 43 91 44 59
Fax: +33 1 53 91 44 70
E-mail: pcommere@adepale.org

Sonia Litman
C.I.T.P.P.M.
44, rue d' Alésia, 75682 Paris Cedex 14, France
Phone: +33 1 53 91 44 65
Fax: +33 1 53 91 44 70
E-mail: slitman@citppm.org

GERMANY / ALLEMAGNE / ALEMANIA

Dr. Markus Brill
Bundesministerium für Verbraucherschutz,
Ernährung und Landwirtschaft - Referat 621
Rochusstr. 1, 53123 Bonn
Phone: +49 228 5293821
Fax: +49 228 5294410
E-mail: markus.brill@bmvel.bund.de

Dr. Kristina Ravelhofer-Rotheneder
Bundesministerium für Verbraucherschutz,
Ernährung und Landwirtschaft - Referat 328
Rochusstr. 1, 53123 Bonn
Phone: +228 529 3923
Fax: +228 529 4944
E-mail: 328@bmvel.bund.de

Prof. Dr. Jörg Oehlenschläger
Wissenschaftlicher Director
Bundesforschungsanstalt für Fischerei
Palmaille 9
22767 Hamburg
Phone: +49 40 38905151
Fax: +49 40 38905262
E-mail: joerg.oehlenschlaeger@ibt.bfa-fisch.de

Dr. Reinhard Schubring
Wissenschaftlicher Angestellter
Bundesforschungsanstalt für Fischerei
Palmaille 9, 22767 Hamburg
Phone: +49 40 38905181
Fax: +49 40 38905262
E-mail: reinhard.schubring@ibt.bfa-fisch.de

Dr. Mathias Keller
Geschäftsführer des Bundesmarktverbandes der deutschen
Fischindustrie und des Fischgroßhandels e.V.
Große Elbstraße 133 - 22767 Hamburg
Phone: +49 40 381811
Fax: +49 40 3898554
E-mail: bvfisch@t-online.de

Dr. Ralf Peter Pund
Federal Institutt for Risk Assessment
Germany
Phone: +49 1888 421
E-mail: r.pund@bfr.bund.de

Petra Weigl
Head of Quality Management and Prod.dev.
Pickenpack, Hussmann & Hahn Seafood
Luener Rennbahn 9
21338, Lueneburg, Germany
Phone: +49 4131 097431
Fax: +49 4131 987431
E-mail: p.weigl@pickenpack.de

HUNGARY / HONGRIE / HUNGRÍA

Mr. János Gábor
Chief counsellor
Ministry of Agriculture and Regional Development
Department for Game Management and Fisheries
H-1055 Kossuthl ter 11, Hungary
Phone: +36 3014862
Fax: +36 3014781
E-mail: gaborj@posta.fvm.hu

ICELAND / ISLANDE /ISLANDIA

Halldór Zoëga
Directorate of Fisheries
Ingolfsstraeti 1
101 Reykjavik, Iceland
Phone: +354 5697900
Fax: +354 5697990
E-mail: halldor@fiskistofa.is

Garðar Sverrisson
Directorate of Fisheries
Ingolfsstraeti 1
101 Reykjavik, Iceland
Phone: +354 5697900
Fax: +354 5697950
E-mail: gardars@fiskistofa.is

INDIA / INDE

Mr. M.K.R. Nair
Fisheries Development Commissioner
Ministry of Agriculture
(Department of Animal Husbandry & Dairying)
242-C, Krishi Bhavan, New Delhi -110001, India
Phone: +11 23386379/26106912
Fax: +91 11 23384030
E-mail: m.k.r.nair@lycos.com

Mr. Anand Kishore
Deputy Director - Export Inspection Council of india
(Ministry of Commerce & Industry. Govt. Of India)
NDYMCA Cultural Centre Building (3rd Floor)
1, Jai Singh Road., New Delhi - 110001, India
Phone: +91 11 23748188-89
Fax: +91 11 23748024
E-mail: eic@eicindia.org

INDONESIA / INDONÉSIE

Mr. Otto Riadi
Indonesian Embassy
Gange Rolvs g 5 - 0273 Oslo , Norrway
Phone: +47 22 441121

IRAN, THE ISLAMIC REPUBLIC OF / IRAN, RÉPUBLIQUE ISLAMIQUE DE / IRÁN, REPÚBLICA ISLÁMICA DEL

Mr. Yazdan Moradi
Director General
Production and Utilization Division
Iranian Fisheries Organization
Shilat, Iran
Phone: +98 21 8740472
Fax: +98 21 8740470
E-mail: ymorady@yahoo.com

Mr. Hamid Reza Shahmohammadi
Director - Fisheries Industries
Iranian Fisheries organization (Shilat)
No 250 Fatemi-e-Gharbi Str., Tehran, Iran
Phone: +98 21 694 2584/6943333/6944444
Fax: +98 21 6941367/6941369
E-mail: h-r-shahmo@yahoo.com

Dr. Ahmed Ghoroghi
Head of Biotechnology Dep.
Iranian Fisheries Research Organization (IFRO)
POBox 14155-6116
Tehran, Iran
Phone: +98 21 6945144
Fax: +98 21 6420732
E-mail: ghoroghiahmad@yahoo.com

IRELAND / IRLAND / IRLANDIA

Mr. Paul Ward
Sea Fishery Officer
Dep. Communications
Marine and Natural Resources
Bessboro Road,
Mahon, Cork, Ireland
Phone: +353 87 8211727
Fax: +353 21 4515121
E-mail: paul.ward@dcmnr.gov.ie

Mr. David Lyons
Contracts Manager
Service Contracts Division
Food Safety Authority of Ireland
Abbey Court - Lr. Abbey Street
Dublin 1, Ireland
Phone: +353 1 8171320
Fax: +353 1 8172301
E-mail: dlyons@fsai.ie

ISRAEL

Dr. Herbert Singer
Director of the Veterinary Department
Ministry of Health
Food & Nutrition Services
Haabach St. N° 12, Tel Aviv, 64739,
P:O:B: 20301, Tel Aviv 61203, Israel
Phone: +972 3 627 0120
Fax: +972 3 562 5769
E-mail: herbert.zinger@fcs.health.gov.il

ITALY / ITALIE / ITALIA

Dr. Ciro Impagnatiello
Ministero Della Politiche Agricole E Forestali
VIA XX Settembre 20
00187 Roma, Italy
Phone: +39 6 46656512
Fax: +39 6 4880273
E-mail: c.impagnatiello@politicheagricole.it

Dr. Pier Luigi Feliciangeli
Ministero Della Salute - Direzione Generale
00100 Roma, Italy
Phone: +39 6 5994 6943
Fax: +39 6 5994 6657
E-mail: pl.feliciangeli@sanita.it

JAPAN / JAPON /JAPÓN

Dr. Takeshi Mikami
Commissioner -
Food Safety Commission, The Cabinet Office
2-13-10 Prudential Tower 6th Floor
Nagata-cho, Chiyoda-Ku, Tokyo 100-8989, Japan
Phone: +81 3 52519218
Fax: +81 3 35912237

Dr. Hiroshi Umeda
Deputy Director - Risk Assessment Division
Food Safety Commission Secretariat, The Cabinet Office
2-13-10 Prudential Tower 6th Floor
Nagata-cho, Chiyoda-Ku, Tokyo 100-8989, Japan
Phone: +81 3 52519218
Fax: +81 3 35912237
E-mail: hiroshi.umeda@op.cao.go.jp

Mr. Toshihide Matsue
Section Chief
Information and Emergency Response Division
Food Safety Commission Secretariat, The Cabinet Office
2-13-10 Prudential Tower 6th Floor
Nagata-cho, Chiyoda-Ku , Tokyo 100-8989, Japan
Phone: +81 3 52519218
Fax: +81 3 35912237
E-mail: toshihide.matsue@op.cao.go.jp

Mr. Kenji Urakami
Section Chief - Standards and Evaluation Division
Department of Food Safety
Pharmaceutical and Food Safety Bureau
Ministry of Health, Labour and Welfare
1-2-2 Kasumigaseki, Chiyoda-ku
Tokyo 100-8916, Japan
Phone: +81 3 35952341
Fax: +81 3 35014868
E-mail: uragami-kenji@mhlw.go.jp

Mr. Jun Imamura
Deputy Director
Fisheries Processing Industries and Marketing Division
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907, Japan
Phone: +81 3 35024190
Fax: +81 3 35081357
E-mail: jun_imamura@nm.maff.go.jp

Mr. Naoki Takatori
Technical Adviser - Quality Division
Japan Fisheries Association
1-9-13 Akasaka, Minatoku
Tokyo, 107-0052, Japan
Phone: +81 3 35856985
Fax: +81 3 35822337
E-mail: takatori@suisankai.or.jp

Mr. Tadashi Imai
Technical Adviser - Japan Fish Traders Association
1-23 Kandakaji-cho, Chiyoda-ku
Tokyo, 101-0054, Japan
Phone: +81 3 52802891
Fax: +81 3 52802892

Mr. Koji Kamata
Technical Adviser
Quality System Consulting Division
Japan Frozen inspection Corporation
2-4-6 Shibadaimon, Minato-ku
Tokyo, 105-0012, Japan
Phone: +81 3 34381983
Fax: +81 3 34382747
E-mail: k_kamata@jffic.or.jp

KENYA

Mr. Mathias Wafula
Deputy Director of Fisheries - Fisheries Department
Ministry of Livestock and Fisheries Development
P.O.Box 58187
Nairobi, Kenya
Phone: +254 20 374 2349+
Fax: +254 20 374 4530
E-mail: mwafula@hotmail.com

KOREA, REPUBLIC OF /
CORÉE, RÉPUBLIQUE DE /
COREA, REPÚBLICA DE

Mr. Lee Tae Seek
Director
National Fisheries Research & Development Institute
408-1, Shirang-ri - Kijang-gun, Busan, Korea
Phone: +82 51 720 2610
Fax: +82 51 7202619
E-mail: tslee@nfrdi.re.kr

Mr. Kim, Hak-Gi
Assistant Director -
Ministry of Maritime Affairs and Fisheries
139 chungjeong –No 3, Seodaemun-gu
120, 715 Republic of Korea
Phone: +82 2 3148 6922
Fax: +82 2 3148 6924
E-mail: hakgikim@hanmail.net

Dr. Kim Hong Soo
Inspector
Ministry of Maritime Affairs and Fisheries
192-7 Ilsan2 – dong, Goyang City
Kyeonggi-do, Republic of Korea
Phone: +82 31 9762754
Fax: +82 31 9762956
E-mail: kont87@honmir.com

LIBYAN ARAB JAMAHIRIYA / JAMAHIRIYA ARABE LIBYENNE / JAMAHIRIYA ÁRABE LIBIA

Dr. Toufik Mehdi Hassan
National Center For Food and DrugControl
PO. Box 12531
Tripoli, Libya
Phone: +218 21 480 9134
Fax: +218 21 480 9134
E-mail: Tawfik_H@hotmail.com

MALAYSIA / MALAISIE / MALAISIA

Ms. Badariah Mohd Ali
Head of Section
Fish Quality Control Section
Department of Fisheries
Level 8-9, Wisma Tani
Jalan Sultan Salahuddin
50628 Kuala Lumpur, Malaysia
Phone: +603 2617 5623
Fax: +603 2691 0227
E-mail: badariah01@hotmail.com

Ms. Thalathiah Haji Saidin
Head of Section
Aquaculture (Marine) Section
Department of Fisheries
Level 8-9, Wisma Tani
Jalan Sultan Salahuddin
50628 Kuala Lumpur, Malaysia
Phone: +603 2617 5616
Fax: +603 2698 0227
E-mai: thalathiah@hotmail.com

MOROCCO /MOROC / MARRUECOS

Mme Zakia Driouich
Head of Delegation
Ministere des Pêches Maritimes
BP. 476 Agdal Rabat Maroc
Direction des Industries de la Pêche
Chef de Division Normalisation
Phone: +212 37688272
Fax: +212 37688294
E-mail: driouich@mpm.gov.ma

Mr. Najib Mikou
Directeur du Dévelopment
Etablissment Autonome de Contrôle et de Coordination des Exportations
Département de L'Agriculture
Maroc
Phone: +212 22302802
Fax: +212 22302567
E-mail: mikou@eacce.org.ma

Mr. Majid Joundy
Union Nationale de la Conserve de poisson, Président
7 Rue el Yarmouk, Longchamp
Casablanca, Maroc
Phone: +212 22 365743
Fax: +212 22 365106/6154
E-mail: unicop@casanet.reb.ma

MEXICO /MEXIQUE / MÉXICO

Ing. Andrés Antonio Seefoó Ramos
Jefe de Delegación
Subdirector de Tecnología de Capturas
Instituto Nacional de la Pesca
Secretaría de Agricultura, Ganaderia,
Desarrollo Rural, Pesca y Alimentación
Phone: +52 971 714 5003/0386
Fax: +52 971 714 5003/0386
E-mail: y_aseefoo@yahoo.com

Dr. Ramon Pacheco Aguilar
Director de la División de Tecnología
de Alimentos de Origen Animal
Centro de Investigación en
Alimentación y Desarrollo A. C.
Carr. A la Victoria KM 0.6
Hermosillo, Sonora, Mexico 83000
Phone: +52 662 280 0421
Fax: +52 662 280 0421
E-mail: rpacheco@cascabel.ciad.mx

MOZAMBIQUE

Ms. Luísa Arthur
Head of Fish Inspection Department
Ministry of Fisheries
P.O.Box 1723
Maputo, Mozambique
Phone: +258 1 309605
Fax: +258 1 309605, 320335
E-mail: luisaarthur@hotmail.com

Ms. Ana David Timana
Fisheries Inspection Department
Ministry of Fisheries
P.O.Box 1723 , Maputo, Mozambique
Phone: +258 1 309605
Fax: +258 1 309605
E-mail: lipmap@virconn.com
adtimana@yahoo.com.br

NETHERLAND / PAYS-BAS /PAÍSES BAJOS

Drs. G. L. Roessink
Senior Scientific Officer
Food and Consumer Safety Authority
Inspectorate for Health Protection
PO Box 202 - 7200 EA Zutphen
Phone: +31 575 588100
Fax: +31 575 588200
E-mail: gerard.roessink@vwa.nl

NEW ZEALAND / NOUVELLE-ZÉLANDE / NUEVA ZELANDIA

Mr. Jim Sim
Head of Delegation
Principal Advisor (Shellfish) - Animal Products Standards
New Zealand Food Safety Authority
PO Box 2835, Wellington, New Zealand
Phone: +64 4 4632609
Fax: +64 4 4632643
E-mail: jim.sim@nzfsa.govt.nz

Ms. Stella Stacey
(Non-Government Observer)
Quality Manager
Independent Fisheries Limited
Staunton Street
Christchurch, New Zealand
Phone: +64 3 3842344
Fax: +64 3 3844650
E-mail: stella.stacey@indfish.co.nz

NORWAY / NORVEGE / NOURUEGA

Mr. Geir Valset
(Head of Delegation)
Senior Adviser - Department of Seafood
Directorate of Fisheries
PO Box 185 - Sentrum
5804 Bergen,, Norway
Phone: +47 55 238000
Fax: +47 55 238090
E-mail: geir.valset@fiskeridir.no

Mr. Ivar A. Helbak
Senior Advisor - Ministry of Fisheries
PO Box 8118 Dep
0032 Oslo, Norway
Phone: +47 22 246420
Fax: +47 22 249585
E-mail: ivar.helbak@fid.dep.no

Mr. Gunnar Tertnes
Acting Director General
Department of Seafood
Directorate of Fisheries
PO Box 185 - Sentrum
5804 Bergen, Norway
Phone: +47 55 238000
Fax: +47 55 238090
E-mail: gunnar.tertnes@fiskeridir.no

Ms. Marit Fallebø
Head of Section - Department of Seafood
Directorate of Fisheries
PO Box 185 - Sentrum
5804 Bergen, Norway
Phone: +47 55 238000
Fax: +47 55 238090
E-mail: marit.fallebo@fiskeridir.no

Ms. Gunn Harriet Knutsen
Head of Section - Department of Seafood
Directorate of Fisheries
PO Box 185 - Sentrum
5804 Bergen, Norway
Phone: +47 55 238000
Fax: +47 55 238090
E-mail: gunn-harriet.knutsen@fiskeridir.no

Ms. Anita Olsen
Specialist Executive Officer
Department of Seafood - Directorate og Fisheries
PO Box 185 – Sentrum,
5804 Bergen, Norway
Phone: +47 55 238000
Fax: +47 55 238090
E-mail: anita.olsen@fiskeridir.no

Mr. Sverre O. Roald
Regional Director of Fisheries and Aquaculture
Directorate of Fisheries, Møre og Romsdal Region
PO Box 1323, Sentrum
6004 Ålesund, Norway
Phone: +47 70 101200
Fax: +47 70 101201
E-mail: sverre-ola.roald@fiskeridir.no

Mr. Trygg Barnung
Head of Laboratory
Directorate of Fisheries, Møre og Romsdal Region
PO Box 1323, Sentrum
6004 Ålesund, Norway
Phone: +47 70 101200
Fax: +47 70 101201
E-mail: trygg.barnung@fiskeridir.no

Mr. Dan V. Aarsand
Head of Section of Inspection and Control
Directorate of Fisheries, Rogaland Region
PO Box 43
4291 Kopervik, Norway
Phone: +47 52 845600
Fax: +47 52 845601
E-mail: dan-viggo.aarsand@fiskeridir.no
Mr. Bjørn Tore Lunestad
Principal Scientist
National Institute of Nutrition and Seafood Research
PO Box 176 - Sentrum
5804 Bergen, Norway
Phone: +47 55 905100
Fax: +47 55 905299
E-mail: bjorn.tore.lunestad@nutr.fiskeridir.no

Mr. Tore Aune
Professor
Norwegian School of Veterinary Science
Department of Food Safety and Infection Biology
PO Box 8146 Dep
0033 Oslo, Norway
Phone: +47 22 964500
Fax: +47 22 964850
E-mail: tore.aune@veths.no

Mr. Henrik Stenwig – Observer
Managing Director Fishfeed
Norwegian Seafood Federation
PO Box 5471 – Majorstuen
0305 Oslo, Norway
Phone: +47 23 088742
Fax: +47 23 088731
E-mail: henrik.stenwig@fhl.no

Mr. Webjørn Barstad
The Norwegian Fishing vessel owners association
P.O.Box 67 Sentrum
6001 Ålesund
Phone: +47 70 101460
Fax: +47 70 101480
E-mail: webjorn@fiskebatreder.no

Jorulf Straume
General Manager
Norwegian Seafood Federation
FHL insustri & export
PO Box 514 Sentrum
6001 Ålesund, Norway
Phone: +47 70 124560
Fax: + 47 70 123002

PHILIPPINES / FILIPINAS

Ms. Lilia Pelayo
Officer in Charge
Post-harvest Fisheries Research and
Development Divison
National Fisheries Research and Development Institute
Bureau of Fisheries and Aquatic Resources
860 Arcadia Building, Quezon Avenue, Quezon City
Philippines
Phone: +632 372 5043/373 7452
Fax: +632 372 5048/374 6490
E-mail: llpelayo@edsamail.com.ph

PORTUGAL

Pedro Dargent
Director do Departamento da Indústria Transformadora
e dos Mercados
Ministério da Agricultura, Do Desenvolvimento
Rural e das Pescas, Edificio DGPA
Avenida Brasilia
1449 – 030 Lisboa, Portugal
Phone: +351 21 303 5809
Fax: +351 21 303 5701
E-mail: pdargent@dg-pescas.pt

**RUSSIA FEDERATION /
FÉDÉRATION DE RUSSIE /
FEDERACIÓN DE RUSIA**

Ms. Filippova Svetlana V.
Chief
Laboratory of Fish and Fishery Products Standards
VNIRO, 17, V. Krasnoselskaya Str.
107140, Moscow, Russia
Phone: + 264990

Ms. Sytova Marina V.
Senior Scientist
Russian federation
12 Rozhdestvensky Bul.
103031, Moscow, Russia
Phone: +7095 9288313
Fax: +7095 9288313
E-mail: sitova@fishcom.ru

Mr. Riazasntsev Iouri B.
Senior Scientist
VNIRO, 17, V. Krasnoselskaya Str.
107140, Moscow, Russia
Phone: +264 17 85
Fax: +264 90 21

**SOUTH AFRICA / AFRIQUE DU SUD /
SUDÁFRICA**

Mr. Michael J. Young
Head of Delegation
Manager – Food & Associated Industries
Regulatory Affairs and Consumer Protection
SA Bureau of Standards
PO Box 615
Rondebosch, 7701 South Africa
Phone: +27 21 6895511
Fax: +27 21 6896128
E-mail: youngmj@sabs.co.za

Mr. Terry Bennett
Group Technical manager
Irvin & Johnson Ltd
PO Box 1628
Cape Town 8000, South Africa
Phone: +27 21 402 9232
Fax: +27 21 402 9276
E-mail: terryb@ij.co.za

Mr. Pieter Truter
Technical Coordinator
Food & Associated Industries
Regulatory Affairs and Consumer Protection
SA Bureau of Standards
PO Box 615
Rondebosch 7701, South Africa
Phone: +27 21 689 5511
Fax: +27 21 689 6128
E-mail: truterpj@sabs.co.za

Dr. Michael Graz
Group Quality Manager
Irvin and Johnson Ltd.
PO Box 4804
8000 Cape Town, South Africa
Phone: +27 21 440 7955
Fax: +27 21 447 0601
E-mail: michaelg@ij.co.za

SPAIN / ESPAGNE / ESPAÑA

D. Jesús Carrión Marcos
Jefe de Area de Comercialización Pesquera
Sub. Gral. de Comercializacìón Pesquera
Secretaria General de Pesca Maritima
M° de Agricultura, Pesca y Alimentación
C/Corazón de María, 8-Piso 5°
28002 Madrid, Spain
Phone: +34 91 3473689
Fax: +34 91 3478445
E-mail: jcarrion@mapya.es

D°. Milagros Nieto Martinez
Jefe de Servicio de la S.G. Coordinacion de Alertas
Alimentarias y Programación del Control Oficial. AESA
Ministerio de Sanidad y Consumo
C/Alcala No 56,
28071 Madrid, Spain
Phone: +34 91 3380686
Fax: +34 91 3380238
E-mail: mnietom@msc.es

Jose Maria Aller Fernandez
Asociation National Industrias de Elaboracion de Productos del Mar
C/Alcala, No 76, 2° IZQ
28009 Madrid, Spain
Phone: +34 91 4352179
Fax: +34 91 5781260
E-mail: prodmar@fiab.es

SWEDEN / SUÉDE / SUECIA

Mrs. Kerstin Jansson
Deptuy Director
Ministry of Agriculture, Food and Fisheries
SE-10333 Stockholm, Sweden
Phone: +46 8 4051168
Fax: +46 8 206496
E-mail: kerstin.jansson@agriculture.ministry.se

SWITZERLAND / SUISSE /SUIZA

Dr. Roland Charrière
Chief of Division
Federal Office of Public Health
Food Safety Unit.
CH-3003 Berne, Switzerland
Phone: +41 31 323 3104
Fax: +41 31 3229574
E-mail: roland.charriere@bag.admin.ch

TANZANIA, UNITED REPUBLIC OF / TANZANIE, RÉPUBLIQE –UNIE DE / TANZANÍA, REPÚBLICA UNIDA DE

Mr. G. F. Nanyaro
Assistant Director of Fisheries Division
Ministry of Natural Resouirces and Tourism
PO Box 2462
Dar es Salaam, Tanzania
Phone: +255 22 2122930
Fax: +255 22 2110352
gfnanyaro@yahoo.com

THAILAND / THAÏLANDE / TAILANDIA

Dr. Sitdhi Boonyaratpalin
Head of Delegation
Director General - Department of Fisheries
Ministry of Agriculture and Cooperatives
Phaholyothin Road, Chatuchak
Bangkok, 10900, Thailand
Phone: +662 562 0523
Fax: +662 562 0593
E-mail: sirilakt@fisheries.go.th

Ms. Usa Bamrungbhuet
Standards Officer
National Bureau of Agricultural
Commodity and Food Standard
Ministry of Agriculture and Cooperatives
Rajadamnern Nok. Avenue
Bangkok, 10200, Thailand
Phone: +662 280 3883
Fax: +662 629 9654
E-mail: usa@acfs.go.th / usa_bam@hotmail.com

Dr. Waraporn Prompoj
Chief - International Cooperation Group
Department of Fisheries
Ministry of Agriculture and Cooperatives
Phaholyothin Road, Chatuchak
Bangkok, 10900, Thailand
Phone: +66 2 5620529/30 - Fax: +66 2 5620529/30
E-mail: prompoj@inet.co.th

Ms. Krissana Sukhumparnich
Senior Food Technologist
Fish Inspection and Quality Control Division
Department of Fisheries
Kaset-klang, Chatuchak, Bankkok 10900, Thailand
Phone: +66 2 5580150-5
Fax: +66 2 5580136
E-mail: kriss@dof.thaigov.net

Mr. Wichien Chantayasakorn
Thai Frozen Foods Association
6th Fl., Sathorn Thanee Bldg. Sathorn RD., Bangrak
Bangkok, Thailand
Phone: +66 2 2355622 to 4
Fax: +66 2 2355625
E-mail: thai-frozen@thai-frozen.or.th

Mr. Chanawat Wongsrichanalai
Vice President & Chairman of Seafood Packer Group
Thai Food Processors' Association
170/21-22 9th Floor, Ocean Tower Building I
New Ratchadapisek Rd., Klongtoey
Bangkok 10110, Thailand
Phone: +662 261 2684 - Fax:+662 261 2996
E-mail: seafood@thaifood.org

Ms. Nuttha Prathuangsuksri
Secretary of Seafood Packers Group
Thai Food Processors' Association
170/21-22 9th Floor, Ocean Tower Building I
New Ratchadapisek Rd., Klongtoey
Bangkok 10110, Thailand
Phone: +662 261 2684/2685 - Fax:+662 261 2996/2997
E-mail: seafood@thaifood.org

UGANDA / OUGANDA

Edward Bulega Nsimbe
Principal Fisheries Inspector
Department of Fisheries Resources
PO Box 4, Entebbe, Uganda
Phone: +256 41 322027/75 699347
Fax: +256 41 320496
E-mail: efbnsimbe@yahoo.com

UNITED KINGDOM / ROYAUME-UNI / REINO UNIDO

Dr. Mark Woolfe
Head of Delegation
Food Labelling & Standards Division
Food Standards Agency
Room 123, Aviation House
125 Kingsway, London WC2B 6NH, United Kingdom
Phone: +44 (0) 20 7276 8176
Fax:+44 (0) 20 7276 8193
E-mail: mark.woolfe@foodstandards.gsi.gov.uk

Miss Pendi Najran
Food Labelling & Standards Division
Food Standards Agency
Room 115B, Avíatíon House
125 Kingsway
London WC2B 6NH, United Kingdom
Phone: +44 (0) 20 7276 8157
Fax: +44 (0) 20 7276 8193
E-mail: pendi.najran@foodstandards.gsi.gov.uk

UNITED STATES OF AMERICA / ETATS-UNIS D' AMÉRIQUE / ESTADOS UNIDOS DE AMERICA

Mr. Philip C. Spiller
Head of Delegation
Director - Food and Drug Administration
Office of Seafood, HFS-400
5100 Paint Branch Parkway
College Park, MD 20740 , USA
Phone: +301 946 2300
Fax: +301 436 2601
E-mail: pspiller@cfsan.fda.gov

Government Advisors

Mr. Syed A. Ali
Staff Officer - U.S. Codex Office
Food Safety and Inspection Service
U.S. Department of Agriculture
1400 Independence Avenue, SW
Washington, DC 20250, USA
Phone: +202 205 7760
Fax: +202 720 3157
E-mail: syed.ali@fsis.usda.gov

Mr. Timothy E. Hansen
Director
Division of Programs and Enforcement Policy
Office of Seafood, HFS-416
Food and Drug Administration
19625 Isalnder Street
Olney, MD 20832, USA
Phone: +301 436 1405
Fax: +301 436 2599
E-mail: thansen@cfsan.fda.gov

Dr. George P. Hoskin
Director - Division of Science and Applied Technology
Office of Seafood, (HFS-425)
Food and Drug Administration
5100 Paint Branch Parkway
College Park, MD 20740, USA
Phone: +301 436 1402
Fax: +301 436 2601
E-mail: ghoskin@cfsan.fda.gov

Melissa Ellwanger
Consumer Safety Officer|
Office of Seafood (HFS-416)
Food and Drug Administration
5100 Paint Branch Parkway
College park, Maryland 20740, USA
Phone: +301 436 1401 - Fax: +301 436 2601
E-mail: mellwanger@cfsan.fda.gov

Non-Government Advisors

Mr. George E. Berkompas
Senior Scientist
Head of Inspection
National Food Processors Association
Center for Northwest Seafood
1600 South Jackson Street
Seattle, WA 98144, USA
Phone: +206 323 3540
Fax: +206 323 3543
E-mail: gberkompas@nfpa-food.org

Mr. Robert Collette
Vice President of Science and Technology
National Fisheries Institute
1901 North Fort.Myer Drive, Suite 700
Arlington, VA 22209, USA
Phone: +703 524 8880
Fax: +703 524 4619
E-mail: bcollette@nfi.org

Mr. Gregory J. Morrow
General Counsel
Contessa Food Products, Inc.
222 West Sixth Street
San Pedro, Ca. 90731, USA
Phone: +310 832 8000
Fax: +310 521 5937
E-mail: gmorrow@contessa.com

Mr. Randy Rice
Alaska Seafood Marketing Institute
311 North Franklin Street, Suite 200
Juneau, AK 99801 - 1895, USA
Phone: +907 465 5560
Fax: +907 465 5572
E-mail: rrice@alaskaseafood.org

Ms. Martha Wiberg
Manager, Quality & Regulatory Affairs
Gorton's Seafood
128 Rogers Street, Gloucester, Maine 01930, USA
Phone: +978 281 7349
Fax: +978 281 5416
E-mail: martha.wiberg@gortons.com

Dr. Gleyn E. Bledsoe
PhD, CPA
Professor, Washington State University
Biological Systems Engineering
MS646120, Pullman, WA. 99164-6120, USA
Phone: +509 335 8167
Fax: +509 335 2722
E-mail: gleyn@wsu.edu

VIET NAM

Mr. Dinh Thanh Phuong
Director of NAFIQAVED Branch II
Vietnam Ministry of Fisheries
Ksc House, 31 Ngu Hanh Son St.
Danang City, Vietnam
Phone: +84 511 836155/950473/836761
Fax: +84 511 836154
E-mail: naf2@dng.vnn.vn

Nr. Ngo Van Dam
Director of NAFIQAVED Branch V
Vietnam Ministry of Fisheries
171 Phan Ngoc Nien St., Ward 6
Camau City, Vietnam
Phone: +84 780 835169
Fax: +84 780 830062
E-mail: nafiv@hcm.vnn.vn

Mrs. Vo Thi Thu Huong
Officer of Science & Technology Department
Vietnam Ministry of Fisheries
10, Nguyen Cong Hoan Street, Ba Dinh District
Hanoi City, Vietnam
Phone: +84 4 8354157
Fax: +84 4 8317221

INTERNATIONAL ORGANIZATIONS
ORGANISATIONS INTERNATIONALES
ORGANIZACIONES INTERNACIONALES

I.A.F.I. (International Association of Fish Inspectors)

Cliff Morrison
Young Bluecrest Seafoods Ltd
Ross House, Grimsby
N.E. Lincs , DN31 3SW, United Kingdom
Phone: +44 1472 585950
Fax: +44 1472 585363
E-mail: cliff_morrison@youngsbluecrest.com

COUNCIL OF MINISTERS OF
THE EUROPEAN UNION (EU COUNCIL)

Kari Töllikkö
Principal Administrator
Council of the European Union
Rue de la loi 175
B-1048, Brussels, Belgium
E-mail: kari.tollikko@consilium.eu.int
Phone: +32 2 285 7841
Fax: +32 2 245 6198
E-mail: kari.tollikko@consilium.eu.int

EUROPEAN COMMISSION/COMMISSION
EUROPÉNNE/COMISIÓN EUROPEA

Ms. Cristina Laso Sanz
European Commission
Health and Consumer Protection Directorate-General
Rue Froissart. 101, B – 1049 Brussels, Belgium
Phone: +32 2 2965735
Fax: +32 2 262792
E-mail: cristina.laso-sanz@cec.eu.int

Mr. Paolo Caricato
Veterinary Administrator - European Commission
Health and Consumer Protection Directorate-General
Rue Belliard 232 , 4/106, B – 1049 Brussels, Belgium
Phone: +32 2 2993202
Fax: +32 2 2969062
E-mail: paolo.caricato@cec.eu.int.

FAO

Dr. Henri Loreal
Fishery Industry Officer
Fish Utilization and Marketing Service
Fishery Industry Division
FAO – Viale delle Terme di Caracalla
00100 Rome, Italy
Phone: +39 06 57056490
Fax: +39 06 57055188
E-mail: henri.loreal@fao.org

WHO

Dr. Hajime Toyofuku
Department of Food Safety - World Health Organization
Avenue Appia 20
CH-1211, Geneve 27, Switzerland
Phone: +41 22 791 3556
Fax: +41 22 792 4807
E-mail: toyofukuh@who.int

JOINT FAO/WHO SECRETARIAT

Dr. Selma H. Doyran
Food Standards Officer
Joint FAO/WHO Food Standards Programme
FAO - Via delle Terme di Caracalla, 00100 Rome, Italy
Phone: +39 06 570 55826 - Fax: +39 06 570 54593
E-mail: selma.doyran@fao.org

Dr. Jeronimas Maskeliunas
Food Standards Officer
Joint FAO/WHO Food Standards Programme
Viale delle Terme di Caracalla, 0100 Rome, Italy
Phone: +39 6 570 53967 - Fax: +39 6 570 54593
E-mail jeronimas.maskeliunas@fao.org

Dr. Anne Breton
Associate Professional Officer
Joint FAO/WHO Food Standards Programme
Viale delle Terme di Caracalla, 0100 Rome, Italy
Phone: +39 6 570 56210
Fax: +39 6 570 54593
E-mail anne.breton@fao.org

DRAFT STANDARD FOR SALTED ATLANTIC HERRING AND SALTED SPRAT
(At Step 8 of the Procedure)

1. SCOPE

The standard applies to salted Atlantic herring (*Clupea harengus*) and sprat (*Sprattus sprattus*)[1]. Fish products produced by use of added natural or artificial enzymic preparations, acids and/or artificial enzymes are not covered by this standard.

2. DESCRIPTION

2.1 PRODUCT DEFINITION

The product is prepared from fresh or frozen fish. The fish is salted as whole fish or as headed or nobbed or headed and gutted or gibbed or filleted (skin-on or skin-off) fish. Spices, sugar and other optional ingredients may be added. Countries where the product are to be consumed may allow this product in an uneviserated state or may require evisceration , either before or after processing, since the margin of error in the control of Clostridium botulinum is small even when good practices are followed and the consequences are severe. The product is either intended for direct human consumption or for further processing.

2.2 PROCESS DEFINITION

The fish after any suitable preparation shall be subjected to a salting process and shall comply with the conditions laid down hereafter. The salting process including the temperature and time should be sufficiently controlled to prevent the development of *Clostridium botulinum* or fish should be eviscerated prior to brining.

2.2.1 Salting

Salting is the process of mixing fish with the appropriate amount of food grade salt, sugar spices and all optional ingredients and/or of adding the appropriate amount of salt-solution of the appropriate concentration. Salting is performed in watertight containers (barrels etc.).

2.2.2. Types of salted fish

2.2.2.1 Very lightly salted fish

The salt content in the fish muscle is above 1 g/100 g in water phase and below or equal to 4 g/100 g or less in water phase.

2.2.2.2 Lightly salted fish

The salt content in the fish muscle is above 4 g/100 g in water phase and below or equal to 10 g salt/100 g in water phase.

2.2.2.3 Medium salted fish

The salt content in the fish muscle is above 10 g salt/100 g water phase and below or equal to 20 g salt/100 g in water phase.

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[1] For the purpose of the standard, fish includes herring and sprats

2.2.2.4 Heavily salted fish

The salt content of the fish muscle is above 20 g salt /100 g in water phase.

2.2.3 Storage temperatures

The products shall be kept frozen or refrigerated at a time/temperature combination which ensures their safety and quality in conformity with Sections 3 and 5. Very lightly salted fish must be kept frozen after processing.

2.3 PRESENTATION

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

2.3.1 meets all requirements of this standard, and

2.3.2 is adequately described on the label to avoid confusing or misleading the consumer.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 FISH

Salted Atlantic herring and salted sprats shall be prepared from sound and wholesome fish which are of a quality fit to be sold fresh for human consumption after appropriate preparation. Fish flesh shall not be obviously infested by parasites.

3.2 SALT AND OTHER INGREDIENTS

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

3.3 FINAL PRODUCT

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

3.4 DECOMPOSITION

The products shall not contain more than 10 mg of histamine per 100 g fish flesh based on the average of the sample unit tested

4. FOOD ADDITIVES

Only the use of the following additives is permitted.

	Maximum level in the final product
Acidity regulators	
300 Ascorbic acid	GMP
330 Citric acid	GMP
Antioxidants	
200 – 203 Sorbates	200 mg/kg (expressed as sorbic acid)
Preservatives	
210 – 213 Benzoates	200 mg/kg (expressed as benzoic acid)

5. HYGIENE AND HANDLING

5.1 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1985, Rev.3, 1997) and other relevant Codex texts such as codes of practice and codes of hygienic practice, as follows;

(i) the Recommended International Code of Practice for Salted Fish (CAC/RCP 26-1979);

(ii) the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9-1976);

(iv) the Recommended International Code of Practice for Frozen Fish (CAC/RCP 16-1978)

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

5.3 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.

5.4 PARASITES

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

5.5 HISTAMINE

NO SAMPLE UNIT SHALL CONTAIN HISTAMINE THAT EXCEEDS 20 MG PER 100G FISH MUSCLE.

5.6 FOREIGN MATERIAL

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

6. LABELLING

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

6.1 NAME OF THE FOOD

6.1.1 The name of the product shall be …-salted herring or …- salted sprat in accordance with the law and custom of the country in which the product is sold, in a manner not to mislead the consumer.

6.1.2 In addition the label shall include other descriptive terms that will avoid misleading or confusing the consumer.

6.2 LABELLING OF NON-RETAIL CONTAINERS

Information specified above should be given either on the container or in accompanying documents, except that the name of the food, lot identification, and the name of and address of the manufacturer or packer or importer 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 accompanying documents.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 SAMPLING PLAN FOR CONTAINERS (BARRELS)

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

A sample unit is the individual fish or the primary container.

(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 Codex Alimentarius Commission.

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

(iv) Sampling of lots for histamine will be in accordance with the Draft General Guidelines on Sampling (under development by the Committee on Methods of Analysis and Sampling)

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 7.8 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 SALT CONTENT

Determination of salt content is performed according to the method in the Codex Standard for Salted Fish and Dried Salted Fish of *Gadidae* Family of Fishes – CODEX STAN 167 –1989, Rev.1-1995

7.4 DETERMINATION OF WATER CONTENT

Determination of water content is performed according to AOAC 950.46B (air drying)

7.5 DETERMINATION OF THE VIABILITY OF NEMATODES: SEE ANNEX I

7.6 DETERMINATION OF HISTAMINE

AOAC 977.13

7.7 DETERMINATION OF NET WEIGHT

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

Remove the herring from the container (barrel) and put it on an appropriate sieve. Allow to drain for 5 min and remove adhering salt crystals. Weigh the herring and calculate net weigh.

8. DEFINITION OF DEFECTIVES

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

8.1.1. Foreign matter

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

8.1.2 Parasites

The presence of readily visible parasites in a sample of the edible portion of the sample unit detected by normal visual inspection of the fish flesh (see Annex III).

8.1.3 Odour and flavour/taste

Fish affected by persistent and distinct objectionable odours or flavours indicative of decomposition (such as sour, putrid, fishy, rancid, burning sensation, etc.) or contamination by foreign substances (such as fuel oil, cleaning compounds, etc.).

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 Section 7; and

(ii) 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; and

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

ANNEX I

VIABILITY TEST FOR NEMATODES (modified method according to Reference 1)

Principle:

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

Equipment:

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

Chemicals:

- Pepsin 2000 FIP-U / g
- Hydrochloric acid

Solution:

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

Procedure:

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

The digestion solution is decanted through a sieve and the content of the sieve rinsed with water.

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

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

Attention:

When checking for viable nematodes in salted or sugar salted products, reanimation time of nematodes can last up to two hours and more.

Remarks:

Several other methods exist for the determination of viability of nematodes (e.g. ref. 2, 3).

The described method has been chosen because it is easy to perform and combines isolation of nematodes and viability test within one step.

References:

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

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

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

ANNEX II

Treatment procedures sufficient to kill living nematodes

- e.g. freezing to - 20° C for not less than 24 h in all parts of the product
- the adequate combination of salt content and storage time (To be elaborated)
- or by other processes with the equivalent effect (To be elaborated)

ANNEX III

Determination of the presence of visible parasites

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

2. Notwithstanding paragraph 1, the verification of the presence of parasites in intermediate entire fishery products in bulk intended for further processing could be carried out at a later stage.

DRAFT MODEL CERTIFICATE FOR FISH AND FISHERY PRODUCTS
(At Step 8 of the Procedure)

INTRODUCTION

Certification is one method that can be utilized by regulatory agencies of importing and exporting countries to compliment the control of their inspection system for fish and fishery products. To help facilitate international trade, the numbers and types of certificates should be limited and could be promoted through international (Codex) model certificates. Notwithstanding, alternatives to the use of official and officially recognized certificates[1] should be considered wherever possible, in particular where the inspection system and requirements of an exporting country are assessed as being equivalent to those of the importing country. The establishment of bilateral or multilateral agreements, such as mutual recognition agreements may provide the logical basis for discontinuing with the issuance of certificates.

SCOPE

The model certificates apply to fish and fishery products presented for international trade that meet food safety, wholesomeness and conformity to food production requirements of the importing country. Animal and plant health matters are not covered. Where administratively and economically feasible, certificates may be issued in an electronic format provided that the relevant authorities of both the importing and exporting country are satisfied with the security of the certification system.

Certificates should adequately describe one or several lots or batches of product's compliance with regulatory requirements based on regular inspections by the inspection service. Additional examinations, analytical results, evaluation of quality assurance procedures or product specifications may also be attested to.

DEFINITIONS

Certification[2] is the procedure by which official certification bodies or officially recognized certification bodies provide written or equivalent assurance that fish and fishery products or their control systems conform to requirements. Certification of fish and fishery products may be, as appropriate, based on a range of inspection activities which may include continuous on-line inspection, auditing of quality assurance systems, and examination of finished products.

Certifying Bodies are official certification bodies and officially recognized bodies by the competent authority

Certifying officers[3]**:** employees of certifying bodies authorized to complete and issue certificates
.

Inspection[2] is the examination of fish and fishery products or systems for control of fish and fishery products, raw materials, processing, and distribution including in-process and finished product testing, in order to verify that they conform to requirements.

Inspection system[4] means official and officially recognized inspection systems.

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1 For the purpose of this document, "certificates" shall mean "official certificates" and "officially recognized certificates"

2 *Principles for Food Import and Export Inspection and Certification* (CAC/GL 20-1995)

3 *Guidelines for Generic Official Certificates Formats and the Production and Issuance of Certificates (CAC/GL 38-2001)*

Official inspection systems and official certification systems[2] are systems administered by a government agency having jurisdiction empowered to perform a regulatory or enforcement function or both.

Officially recognized inspection systems and officially recognized certification systems [2] are systems which have been formally approved or recognized by an government agency having jurisdiction.

Official Certificates[3] are certificates issued by an official certification body of an exporting country, in accordance with the requirements of the importing or exporting country.

Officially Recognized Certificates[3] are certificates issued by an officially recognized certification body of an exporting country, in accordance with the conditions of that recognition and in accordance with the requirements of the importing or exporting country.

Requirements are the criteria set down by the competent authorities relating to trade in fish and fishery products covering the protection of public health, the protection of consumers and conditions of fair trading.

GENERAL CONSIDERATIONS CONCERNING THE PRODUCTION AND ISSUANCE OF CERTIFICATES

4.1 It is recommended that the production and issuance of the certificates for fish and fishery products should be carried out in accordance with the principles and appropriate sections of the:

- Guidelines for Generic Official Certificate Formats and the Production and Issuance of Certificates (CAC/GL 38-2001);
- Principles for Food Import and Export Inspection And Certification (CAC/GL 20-1995);
- Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems (CAC/GL 26-1997);
- Guidelines for the Development of Equivalence Agreements Regarding Food Import and Export Inspection and Certification Systems (CAC/GL 34-1999);
- Proposed Draft Revised Code of Ethics for International Trade in Foods (under revision by the CCGP).

4.2 The selection of the appropriate language(s) of certificates should be based on adequacy for the importing country's purpose, comprehension by the certifying officer and minimizing unnecessary burden on the exporting country.

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4 *Guidelines for the Development of Equivalence Agreements Regarding Food Import and Export Inspection and Certification Systems* (CAC/GL 34-1999)

THE FORMAT AND USE OF MODEL CERTIFICATES

5.1 FORMAT

5.1.1 **Model Sanitary Certificate (ANNEX I)** - The format of the model sanitary certificate should be considered when developing a certificate to attest that fish and fishery products contained in a consignment were produced in establishments that are under the control of and produced to the laws and requirements of the exporting country, or under conditions cited in equivalence or compliance agreements.

5.2 USE

Each field of the Model Sanitary Certificate must be filled in or else, marked in a manner that would prevent alteration of the certificate. The Model Certificate should contain and be completed as follows:

5.2.1 **Identification Number** should be unique for each certificate and should be authorized by the competent authority of the exporting country. Should additional information be required on temporary basis, this may be incorporated as an addendum or an attestation. If there is an addendum, it must have the same identification number as the primary certificate and the signature of the same certifying officer signing the sanitary certificate.

5.2.2 **Country of Dispatch** for the purposes of the model certificate, designates the name of the country of the competent authority which has the competence to verify and certify the conformity of the production establishments.

5.2.3 **Competent authority** is the competent official organisation empowered to execute various functions. Its responsibility may include the management of official systems of inspection or certification at the regional or local level.

5.2.4 **Certifying Bodies** are official certification bodies and bodies officially recognized by the competent authority. .

5.2.5 **State or type of processing** describes the state in which the fish and fishery product is presented (i.e. fresh, frozen, canned , etc.) and/or the processing methods used (i.e. smoked, breaded, etc.).

5.2.6 **Type of packaging** could be cartons, boxes, bags, cases, drums, barrels, pallets, etc.

5.2.7 **Lot identifier / Date code** is the lot identification system developed by a processor to account for their production of fish and fishery product thereby facilitating traceability of the product in the event of public health investigations and recalls.

5.2.8 **Means of transport** should describe the flight/train/truck/container number, as appropriate and the name of the air carrier, vessel, etc.

5.2.9 **Attestation** is a statement confirming the product or batches of products originate from an establishment that is essentially in good regulatory standing with the Competent Authority in that country and that the products were processed and otherwise handled under a competent HACCP and sanitary programme..

5.2.10 **Original Certificate** should be identifiable and this status should be displayed appropriately with the mark "ORIGINAL" or if a copy is necessary, this certificate should be marked as "COPY" or terms of this effect. The term "REPLACEMENT" is reserved for use on certificates where, for any good and sufficient reason (such as damage to the certificate in transit), a replacement certificate is issued by the certifying officer.

5.2.11 **Page numbering** should be used where the certificate occupies more than one sheet of paper.

5.2.12 **Seal and signature** should be applied in a manner that minimizes the risk of fraud

ANNEX I

DRAFT MODEL SANITARY CERTIFICATE
COVERING FISH AND FISHERY PRODUCTS
(At Step 8 of the Procedure)

(***LETTERHEAD or LOGO***)

Identification number: _____

Country of Dispatch:
Competent Authority:
Certifying Body:

I. Details identifying the fishery products

Description of product	Species (scientific name)	State or type of processing	Type of packaging	Lot Identifier/ date code	Number of packages	Net weight
				Sum :		

Temperature required during storage and transport: _____ °C

II. Provenance of the fishery products

Address(es) and/or the Registration number(s) of production establishment(s) authorized for exports by competent authority:

_____

Name and address of consignor: _____

_____

III. Destination of the fishery products

The fishery products are to be dispatched from: _____
(Place of dispatch)

to: _____
(Country and place of destination)

by the following means of transport: _____

Name of consignee and address at place of destination: _____

_____

IV. Attestation

The undersigned certifying officer hereby certifies that:

1) The products described above originate from (an) approved establishment(s) that has been approved by, or otherwise determined to be in good regulatory standing with the competent authority in the exporting country and

2) have been handled, prepared or processed, identified, stored and transported under a competent HACCP and sanitary programme consistently implemented and in accordance with the requirements laid down in Codex Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003)

Done at _____ on _____ 20___
(Place) (Date)

(*SEAL*)

_____ _____
(Signature of certifying officer) (Name and official position)

Tel:
Fax:
E-mail: (optional)

ALINORM 04/27/18
APPENDIX IV

DRAFT AMENDMENT TO THE STANDARD FOR QUICK FROZEN LOBSTERS[1]
(At Step 8 of the Procedure)

(CODEX STAN 95 - 1981, Rev 1 - 1995)

1. SCOPE

This standard applies to quick frozen raw or cooked lobsters, rock lobsters, spiny lobsters and slipper lobsters.[2] **Furthermore it applies to quick frozen raw or cooked squat lobsters (red and yellow).**

2. DESCRIPTION

2.1. The product is prepared from lobsters from the genus *Homarus* of the family *Nephropidae* and from the families *Palinuridae* and *Scyllaridae*. It may also be prepared from *Nephrops norvegicus* provided it is presented as Norway lobster. **For squat lobsters the product is prepared from species of *Cervimunida johnii, Pleuroncodes monodon* and *Pleuroncodes planipes* of the family *Galatheidae*.**

2.1.2 The pack shall not contain a mixture of species.

2.2 PROCESS DEFINITION

The water used for cooking shall be of potable quality or clean seawater.

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.

Quick frozen lobsters 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:

2.3.1.1 meets all requirements of this standard;

2.3.1.2 is adequately described on the label to avoid confusing or misleading the consumer.

2.3.2 The lobster may be packed by count per unit of weight or per package or within a stated weight range.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 LOBSTERS

The product shall be prepared from sound lobsters which are of a quality fit to be sold fresh for human consumption.

3.2 GLAZING

If glazed, the water used for glazing or preparing glazing solutions shall be of potable quality or shall be clean sea-water. Potable water is fresh-water fit for human consumption. Standards of potability shall not be less

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1 Amendments are highlighted

2 Hereafter referred to as lobster.

than those contained in the latest edition of the WHO "International Guidelines for Drinking Water Quality". Clean sea-water is sea-water which meets the same microbiological standards as potable water and is free from objectionable substances.

3.3 OTHER INGREDIENTS

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

3.4 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

Only the use of the following additives is permitted.

ADDITIVE	MAXIMUM LEVEL IN THE FINAL PRODUCT
Moisture/Water Retention Agents	
451(i) Pentasodium triphosphate 451(ii) Pentapotassium triphosphate 452(i) Sodium polyphosphate 452(iv) Calcium polyphosphates	10 g/kg expressed as P_2O_5, singly or in combination (includes natural phosphate)
Preservatives	
221 Sodium sulphite 223 Sodium metabisulphite 224 Potassium metabisulphite 225 Potassium sulphite 228 Potassium bisulphite (for use in the raw product only)	100 mg/kg in the edible part of the raw product, or 30 mg/kg in the edible part of the cooked product, singly or in combination, expressed as SO_2
Antioxidants	
300 Ascorbic acid 301 Sodium ascorbate 303 Potassium ascorbate	GMP

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 When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission , the product:

(i) shall be free from microorganisms or substances originating from microorganisms in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission;

(ii) shall not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission.

5.3 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997) and the following relevant Codes:

(i) The Recommended International Code of Practice for Lobsters (CAC/RCP 24-1978);

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

(iii) The sections on the Products of Aquaculture in the Proposed Draft International Code of Practice for Fish and Fishery Products (under elaboration).[3]

6. LABELLING

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

6.1 THE NAME OF THE FOOD

The product shall be designated:

(i) Lobster if derived from the genus *Homarus*;

(ii) Rock Lobster, Spiny Lobster or Crawfish if derived from species of the family *Palinuridae*;

(iii) Slipper Lobster, Bay Lobster or Sand Lobster if derived from species of the family *Scyllaridae*;

(iv) Norway Lobster if derived from the species *Nephrops norvegicus*.

(v) Squat Lobster if derived from the species *Cervimunida johnii, Pleuroncodes monodon* and *Pleuroncodes planipes*

6.1.1 There shall appear on the label, reference to the form of 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.

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

6.1.3 Products shall be designated as cooked or raw as appropriate.

6.1.4 If the product has been glazed with sea-water, a statement to this effect shall be made.

6.1.5 The term "quick frozen", shall also appear on the label, except that the term "frozen" may be applied in countries where this term is customarily used for describing the product processed in accordance with subsection 2.2 of this standard.

6.1.6 The label shall state that the product should be maintained under conditions that will maintain the quality during transportation, storage and distribution.

6.2 NET CONTENTS (GLAZED PRODUCTS)

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

6.3 STORAGE INSTRUCTIONS

The label shall include terms to indicate that the product shall be stored at a temperature of -18°C or colder.

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 food, lot identification, and the name and address of the manufacturer or packer 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.

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[3] The Proposed Draft Code of Practice, when finalized, will replace all current Codes of Practice for Fish and Fishery Products

7. SAMPLING, EXAMINATION AND ANALYSES

7.1 SAMPLING

(i) Sampling of lots for examination of the product shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CODEX STAN 233-1969). In the case of shell on lobster the sample unit is an individual lobster. In the case of shell-off lobster the sample unit shall be at least a 1 kg portion of lobster from the primary container. **In the case of squat lobster the sampling unit shall be at least 1 kg portion.**

(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 Codex Alimentarius Commission.

7.2 SENSORY AND PHYSICAL EXAMINATION

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and using procedures elaborated in Sections 7.3 through 7.6, Annex A and the *Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31 - 1999).*

7.3 DETERMINATION OF NET WEIGHT

7.3.1 Determination of net weight of 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.

7.3.2 Determination of Net Weight of Products Covered by Glaze

(Alternate Methods)

(1) As soon as the package is removed from frozen temperature storage, open immediately and place the contents under a gentle spray of cold water until all ice glaze that can be seen or felt is removed. Remove adhering water by the use of paper towel and weigh the product.

(2) The pre-weighed glazed sample is immersed into a water bath by hand, until all glaze is removed, which preferably can be felt by the fingers. As soon as the surface becomes rough, the still frozen sample is removed from the water bath and dried by use of a paper towel before estimating the net product content by second weighing. By this procedure thaw drip losses and/or re-freezing of adhering moisture can be avoided.

(3) (i) As soon as the package is removed from frozen temperature storage, place the product in a container containing an amount of fresh potable water of 27°C (80°F) equal to 8 times the declared weight of the product. Leave the product in the water until all ice is melted. If the product is block frozen, turn block over several time during thawing. The point at which thawing is complete can be determined by gently probing the block.

(ii) Weigh a dry clean sieve with woven wire cloth with nominal size of the square aperture 2.8 mm (ISO Recommendation R565) or alternatively 2.38 mm (U.S. No. 8 Standard Screen.)

(a) If the quantity of the total contents of the package is 500 g (1.1 lbs) or less, use a sieve with a diameter of 20 cm (8 inches).

(b) If the quantity of the total contents of the package is more than 500 g (1.1 lbs) use a sieve with a diameter of 30 cm (12 inches).

(iii) After all glaze that can be seen or felt has been removed and the lobsters separate easily, empty the contents of the container on the previously weighed sieve. Incline the sieve at an angle of about 20° and drain for two minutes.

(iv) Weigh the sieve containing the drained product. Subtract the mass of the sieve; the resultant figure shall be considered to be part of the net content of the package.

7.4 DETERMINATION OF COUNT

When declared on the label, the count shall be determined by counting all lobsters or tails in the primary container and dividing the count of lobster by the average deglazed weight to determine the count per unit weight.

7.5 PROCEDURE 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 lobster, until no hard core or ice crystals are left.

7.6 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 by prior experimentation.

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

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

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

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

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 lobster 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 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 other sharp instrument without unduly affecting the appearance of the lobster .

8.2 FOREIGN MATTER

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

Lobster affected by persistent and distinct objectionable odours or flavours indicative of decomposition or rancidity, or feed.

8.4 DISCOLOURATION

Distinct blackening of more than 10% of the surface area of the shell of individual whole or half lobster, or in the case of tail meat and meat presentations distinct black, brown, green or yellow discolourations singly or in combination, of the meat affecting more than 10% of the declared weight.

9. LOT ACCEPTANCE

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

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

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

(iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;

(iv) the Food Additives, Hygiene and Labelling requirements of Sections 4, 5 and 6 are met.

"ANNEX A": SENSORY AND PHYSICAL EXAMINATION

1. Complete net weight determination, according to defined procedures in Section 7.3 (de-glaze as required).
2. Examine the frozen lobster for the presence of deep dehydration. Determine the percentage of lobster affected.
3. Thaw using the procedure described in Section 7.5 and individually examine each sample unit for the presence of foreign and objectionable matter.
4. Examine product count and weight declarations in accordance with procedures in Section 7.4.
5. Assess the lobster for odour and discolouration as required.
6. In cases where a final decision regarding the odour/flavour cannot be made in the thawed state, a small portion of the sample unit (100 to 200 g) is prepared without delay for cooking and the odour/flavour confirmed by using one of the cooking methods defined in Section 7.6.

APPENDIX V

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

(Sections at Step 5/8)

SECTION 2. DEFINITIONS

2.2 AQUACULTURE

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

Intensive farming means raising fish under conditions of complete control over such factors as external complete diet nutrient inputs and operation practices, where growth is completely dependent on external provision of nutritionally complete high quality diet.

Official Agency Having Jurisdiction means the official authority or authorities charged by the government with the control of food hygiene (sometimes referred to as the competent authority) as well as/or with sanitation in aquaculture;

Pesticide means any substance intended for preventing, destroying, attracting, repelling or controlling any pest including unwanted species of plants or animals during the production, storage, transport, distribution and processing of food, agricultural commodities, or animal feeds or which may be administered to animals for the control of ectoparasites. The term normally excludes fertilisers, plant and animal nutrients, food additives, and veterinary drugs;

Pesticide Residue means any specified substance in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities;

Residues means any foreign substances including their metabolites, which remain in fish prior to harvesting as a result of either application or accidental exposure.

Semi-intensive farming means raising fish under conditions of partial control over dietary nutrient inputs by including external fertilizer and/or supplementary diet nutrient inputs, whereby fish growth is dependent upon the consumption of endogenously supplied live food organism and externally supplied feed as supplementary source of dietary nutrients.

Stocking density is the amount of fish stocked per unit of area or volume

Veterinary Drug means any substance applied or administered to any food-producing animal, such as meat or milk-producing animals, poultry, fish or bees, whether used for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behaviour;

Withdrawal Time is the period of time necessary between the last administration of a veterinary drug to fish, or exposure of these animals to a veterinary drug, and harvesting of them to ensure that the concentration of the veterinary drug in their edible flesh intended for human consumption, complies with the maximum permitted residue limits..

2.6 QUICK-FROZEN COATED FISH PRODUCTS

Batter liquid preparation from ground cereals, spices, salt, sugar and other ingredients and/or additives for coating. Typical batter types are: non-leavened batter and leavened batter.

Breading dry breadcrumbs or other dry preparations mainly from cereals with colorants and other ingredients used for the final coating of fishery products. Typical breading types are: free-flowing breading, coarse breading, flour-type breading.

Coating covering the surface of a fishery product with batter and/or breading.

Pre-frying frying of breaded and battered fishery products in an oil bath in a way so that the core remains frozen.

Sawing cutting (by hand or fully mechanised) of regular shapes QF fish blocks into pieces suitable for later coating.

SECTION 6 - AQUACULTURE PRODUCTION

Preamble

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

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

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

This Section of the Code applies to industrialised and commercial aquaculture production, producing all aquatic animals, except mammalian species, aquatic reptiles and amphibians for direct human consumption, but excluding bivalve molluscs covered in section 7 of the code, hereafter referred to as "fish"] (1) that are intended for direct human consumption. Such intensive or semi-intensive aquaculture systems use higher stocking densities, stock from hatcheries, use mainly formulated feeds and may utilise medication and vaccines. This Code is not intended to cover extensive fish farming systems that prevail in many developing countries or integrated livestock and fish culture systems. This section of the code covers the feeding, growing, harvesting and transport stages of aquaculture production. Further handling and processing of fish are covered elsewhere in the code.

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

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

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

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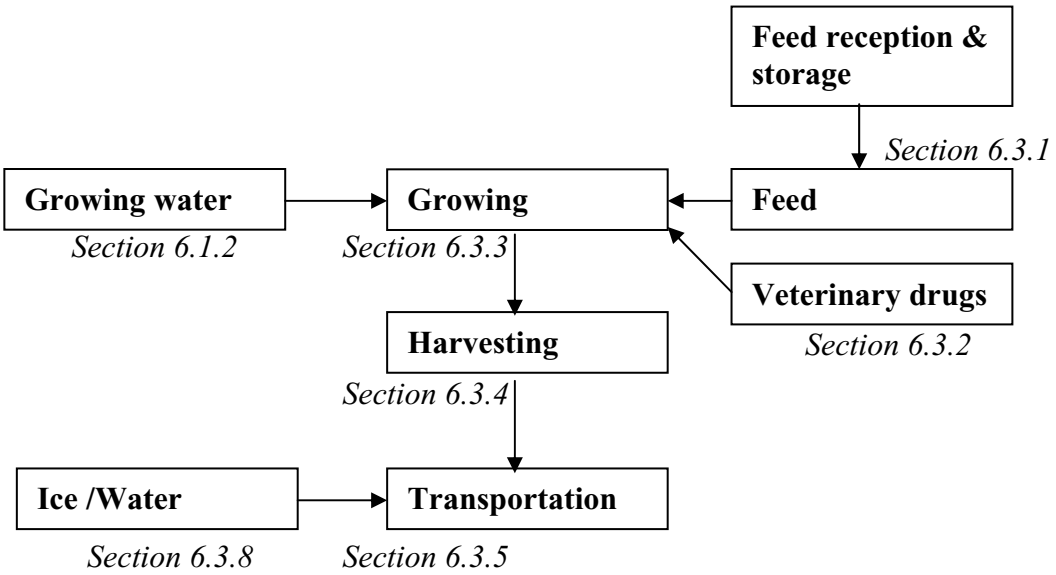


Figure 6.1 Example of a flow chart for aquaculture production

6.1 GENERAL

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

6.1.1 Site selection

- The siting, design and construction of fish farms should follow principles of good aquaculture practice, appropriate to species.
- The physical environment with regard to temperature, current and depth should also be checked since different species have different environmental requirements.
- Fish farms should be located in areas where the risk of contamination by chemical, physical or microbiological hazards is minimal and where sources of pollution can be controlled.
- Soil for the construction of earthen ponds should not contain such concentrations of chemicals and other substances, which may lead to the presence of unacceptable levels of contamination in fish.
- Ponds should have separated inlets and discharge canals, so that water supplies and effluent are not mixed.
- Water inlets and outlets to ponds should be screened to prevent the entrance of unwanted species.
- Fertilizers, liming materials or other chemicals and biological materials, should be used in accordance with good aquaculture practice.
- All sites should be operated in an environmentally acceptable way as to not impact human health.

6.1.2 Growing Water Quality

- The water in which fish are raised should be suitable for the production of products which are safe for human consumption.
- Fish farms should not be sited where there is a risk of contamination of the water in which fish are reared.
- Appropriate design and construction of fish farms should be adopted to ensure control of hazards and prevention of water contamination.

6.1.3 Source of Fry and Fingerlings

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

6.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Consumption of fish and fishery products is associated with a variety of human health hazards. Broadly the same hazards are present in aquaculture products as in corresponding varieties caught in the wild (Section 4.1). The risk of harm from a particular hazard might be increased, under some circumstances, in aquaculture products compared with fish caught in the wild - for instance the presence of residues of veterinary drugs. High stocking densities, compared with the natural situation, might increase the risk of cross-infection of pathogens within a population of fish. On the other hand, farmed fish can also present a lower risk of harm. In systems where the fish receive artificial feeds, the risks associated with transmission of hazards through the food consumed by the fish could be reduced. For example, infection with nematode parasites is absent from, or very much reduced in, farmed salmon compared with salmon caught in the wild. Raising fish in cages in the marine environment poses few hazards and low risks. In closed recirculation systems hazards are even further reduced. In those systems, the water is constantly refreshed and reused and water quality is controlled within safe measures.

6.2.1 Hazards

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

6.2.2 Defects

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

6.3 PRODUCTION OPERATIONS

6.3.1 Feed Supply

Feeds used in aquaculture production should comply with the Codex 'Draft Code of Practice of Good Animal Feeding' (under development in the Ad Hoc Intergovernmental Task Force on Animal Feeding).

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

Potential Defects: *Decomposed feeds, fungal spoilage*

Technical Guidance:

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

6.3.2 Veterinary Drugs

Potential Hazards: *Rresidues of veterinary drugs*

Potential Defects: *Unlikely*

Technical Guidance:

- All veterinary drugs for use in fish farming should comply with national regulations and international guidelines (in accordance with the Recommended International Code of Practice for Control of the Use of Veterinary Drugs (CAC/RCP 38-1993) and the Codex Guidelines for the Establishment of a regulatory programme for control of veterinary drug residues in foods (CAC/GL 16-1993)).
- Prior to administrating veterinary drugs, a system should be in place to monitor the application of the drug to ensure that the withdrawal time for the batch of treated fish can be verified.
- Veterinary drugs or medicated feeds should be used according to manufacturers' instructions, with particular attention to withdrawal periods.
- Products should be registered with the appropriate national authority.
- Products should only be prescribed or distributed by personnel authorised under national regulations.
- Storage and transport conditions should conform to the specifications on the label.
- Control of diseases with drugs should be carried out only on the basis of an accurate diagnosis
- Records should be maintained for the use of veterinary drugs in aquaculture production.Pre-slaughter control is a method of controlling drug residues in fish. If the average drug concentration in tested fish is above the MRL, (or in some countries, by an industry imposed lower level), slaughter of the batch has to be postponeduntil the fish complies with the MRLA post slaughter control should reject all fish that do not comply with the requirements set for veterinary drug residues by the Codex Alimentarius.

6.3.3 Growing

Potential Hazards: *Microbiological pathogens and chemical contamination*

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

Technical Guidance:

- Source of postlarvae, fries and fingerlings should be controlled to assure healthy stock.
- Stocking densities should be based on culture techniques, fish species, size and age, carrying capacity of the fish farm, anticipated survival and desired size at harvesting.
- Dead or diseased fish should be disposed in a sanitary manner that will discourage the spread of disease and investigate cause of death.
- Good water quality should be maintained by using stocking and feeding rates that do not exceed the carrying capacity of the culture system.
- Growing water quality should be monitored regularly, so as to identify potential hazards and defects.
- The fish farm should have a management plan that includes a sanitation programme, monitoring and corrective actions, defined fallowing periods, appropriate use of agrochemicals, verification procedures for fish farming operations and systematic records should be kept.
- Equipment such as cages and nets should be designed and constructed to ensure minimum damage during the growing stage.

6.3.4 Harvesting

Potential Hazards: *Unlikely*

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

Technical Guidance:

- Appropriate harvesting techniques should be applied to minimise physical damage and stress.
- Live fish should not be subjected to extremes of heat or cold or sudden variations in temperature.
- Fish should be free from excessive mud and weed soon after being harvested by washing it with clean seawater or fresh water under suitable pressure.
- Fish should be handled in a sanitary manner according to the guidelines in Section 4 of the Code..
- Harvesting should be rapid so that fish are not exposed unduly to high temperatures.

6.3.5 Holding and Transportation

Potential Hazards: *microbiological pathogens and chemical contamination*

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

Technical Guidance:

- Quality defects can occur in fish that are subjected to stress.
- Fish should be transported without undue delay.
- Equipment for the transport of live fish should be designed for rapid and efficient handling without causing physical damage or stress.
- Records for transport of fish should be maintained to ensure full product tracing.
- Fish should not be transported with other products which might contaminate them.

6.3.6 Storage and transport of live fish

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

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

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

Technical Guidance:

- Only healthy and not damaged fish should be chosen for storage and transport of live fish. Damaged, sick and dead fish should be removed before introduction to the holding or conditioning tanks.
- Holding tanks should be checked regularly during storage and transportation. Damaged, sick and dead fish should be removed immediately when found. (2)
- Clean water utilised to fill holding tanks, or to pump fish between holding tanks, or for conditioning fish, should be similar in properties and composition to the water from where the fish was originally taken to reduce fish stress.
- Water should not be contaminated with either human sewage or industrial pollution. Holding tanks and transportation systems should be designed and operated in a hygienic way to prevent contamination of water and equipment.
- Water in holding and conditioning tanks should be well aerated before fish is transferred into them.
- Where seawater is used in holding or conditioning tanks, for species prone to toxic algae contamination, seawater containing high level of cell concentrations should be avoided or filtered properly.

- No fish feeding should occur during storage and transport of live fish. Feeding will pollute water of holding tanks very quickly.
- Material of holding and conditioning tanks, pumps, filters, piping, temperature control system, intermediate and final packaging or containers should not be harmful to fish or present hazards to humans.
- All equipment and facilities should be cleaned and disinfected regularly and as needed.

6.3.7 Live fish stored and transported at ambient temperature

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

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

Technical Guidance:

- Depending on the source of water, requirements of the species and time of storage and/or transport, it could be necessary to re-circulate the water and filter it through mechanical and/or biofilters.
- Water intake of holding tanks on board of vessels should be located so as to avoid contamination from vessel's sewage, waste and engine cooling discharge. Pumping of water should be avoided when the vessel comes into harbour or sailing through waters near sewage or industrial discharges. Equivalent precautions should be adopted for water intake on land.
- Facilities for storing and transportation (holding tanks) of live fish should be capable to:
  - maintain the oxygenation of water in the holding tanks through either, continuous water flow, direct oxygenation (with oxygen or air bubbling), or regularly and as needed changing of the water of the holding tank;
  - maintain the temperature of storage and transport, for species sensitive to temperature fluctuations. It may be necessary to insulate the holding tanks and install a temperature control system;
  - keep water in reserve which might be needed in case the holding tank should drain. The volume in fixed facilities (storage) should be at least of the same volume of the total holding tanks in operation. The volume in land transport facilities should be at least capable to compensate water for evaporation, leakage, purges, filter cleaning and eventual mixing of water for control purposes;
- It could be necessary to separate fish in individual tanks or tie them in ways that prevent damage, particularly, in the case of species that exhibit phenomena like cannibalism, strong territoriality or hyperactivity when under stress (an alternative method is reduction of temperature see 6.3.8).

6.3.8 Live fish stored and transported at low temperatures

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

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

Technical Guidance:

- Conditioning of the fish at low temperatures should be done according to the characteristics of the species (minimum temperature, cooling rate, water/humidity requirements, packaging conditions). Conditioning is a biological operation to reduce the metabolic rate of the fishminimising the stress to them.
- The level of temperature to be reached should be in accordance with the species, transport and packaging conditions. There is a range of temperature in which fish do not exhibit or have reduced physical activity. The limit is attained at the temperature at which the metabolic rate of the fishis minimised without causing adverse effects to them (basal metabolic rate).

- When performing conditioning, only anaesthetics and procedures accepted by the regulations should be utilised.
- Conditioned fish should be packed without delay in proper insulated containers.
- Remaining water or water for use with packaging material for conditioned fish should be clean, of similar composition and pH to the water the fish was taken from, but to the temperature of storage.
- Water absorbent pads, shredded wood, wood shavings or sawdust and tying material that may be utilised for packaging conditioned fish should be clean, first use, free of possible hazards and be wet right at the time of packaging.
- Conditioned and packed fish should be stored or transported under conditions that assure proper temperature control.

SECTION 10 - PROCESSING OF QUICK-FROZEN COATED FISH PRODUCTS

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 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.

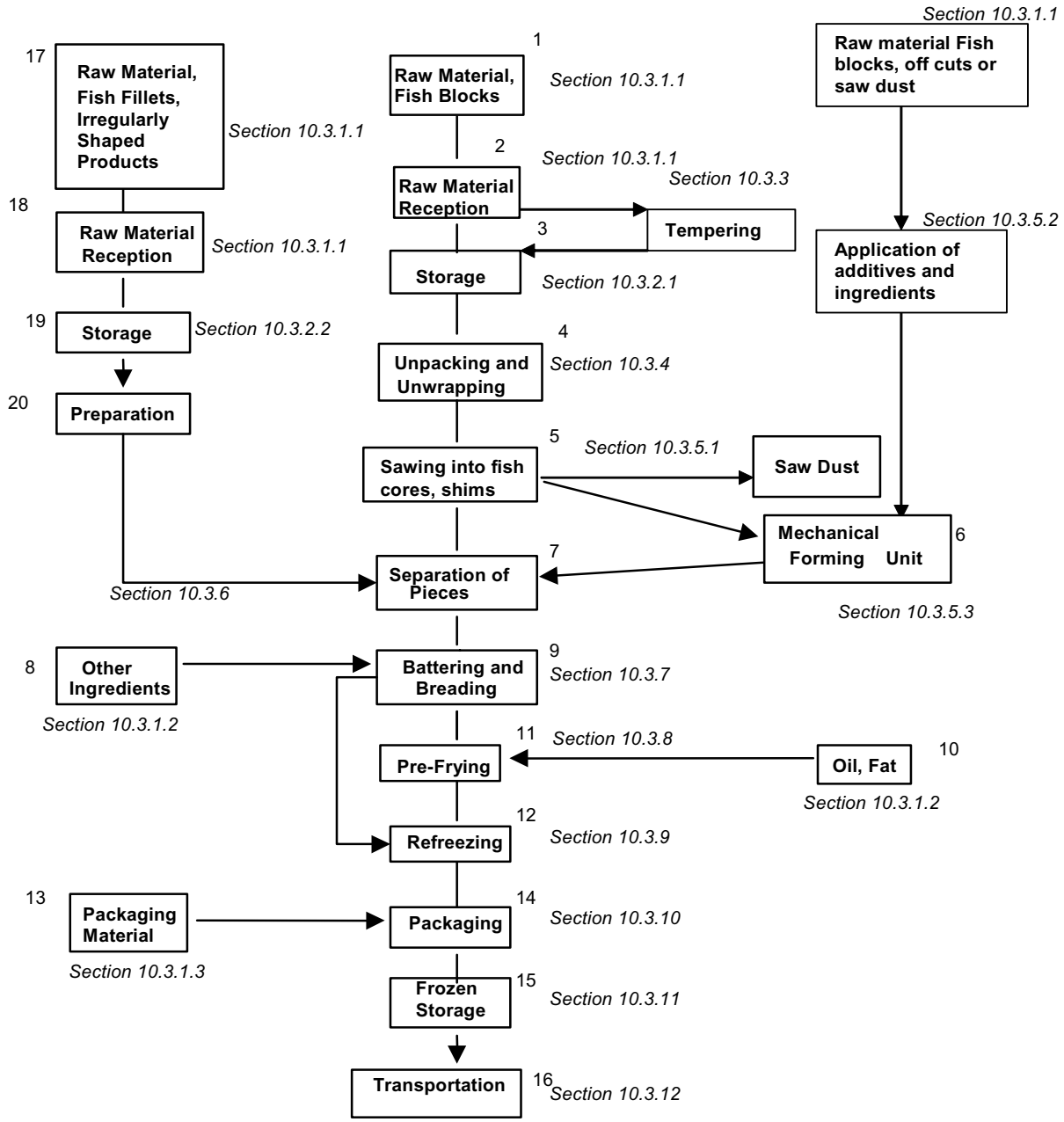


Figure 10.1 Example of a flow chart for the processing of coated fish products

10.1 GENERAL ADDITION TO PRE-REQUISITE PROGRAMME

- conveyor systems used to transport uncoated and coated fish should be designed and constructed to prevent damaging and contamination of the products;
- shims sawn for formed fish production and held for tempering should be kept at temperatures that will prevent deterioration of the essential quality of the product;
- if the whole process is run continuously an adequate number of processing lines should be available to avoid interruptions and batch-wise processing. If the process has to be interrupted, intermediate products have to be stored under deep-frozen conditions until being further processed;
- pre-frying baths, freezing cabinets used for re-freezing should be equipped with permanent temperature and belt speed control device;
- the proportion of sawdust should be minimised by using appropriate sawing equipment;
- sawdust should be kept well separated from fish cores used for coated products, should be temperature controlled, not stay too long at ambient temperature and should be stored preferably in frozen state prior to further processing into suitable products.

10.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Refer also to Section 5.3.3 and Appendix XI.

This Section describes the main hazards and defects specific to QF coated fish and shellfish.

10.2.1 Hazards

Refer also to Section 5.3.3.1.

The production and storage of batter for application to fish portions, fillets, etc., may involve either rehydratation of a commercial batter mix or preparation from raw ingredients. During the preparation of this batter and its use, the potential hazard for the possible growth and toxins production of *Staphylococcus aureus* and *Bacillus cereus* must be controlled.

10.2.2 Defects

Potential defects are outlined in the essential quality, labelling and composition requirements described in the relevant Codex Standard for Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets – Breaded or in Batter (CODEX STAN. 166-1989).

End product specifications outlined in Appendix XI describe optional requirements specific to QF coated fishery products.

10.3 PROCESSING OPERATIONS

Refer to figure 10.1 for an example of a flow chart for coated fish product processing.

10.3.1. Reception

10.3.1.1 Fish

Potential Hazards: *chemical and biochemical contamination,histamine ;*

Potential Defects: *tainting, block irregularities, water and air pockets, packaging material, foreign matter, parasites, dehydratation, decomposition;*

Technical Guidance:

- Temperatures of all incoming lots should be recorded;
- Packaging material of frozen products should be examined for dirt, tearing and evidence of thawing;
- Cleanliness and suitability of the transport vehicle to carry frozen fish products should be examined;
- Use of temperature recording devices with the shipment is recommended;

- Representative samples should be taken for further examination for possible hazards and defects;

10.3.1.2 Other Ingredients

Potential Hazards: *chemical, biochemical and microbiological contamination*
Potential Defects: *mould , colour deviations, filth, sand*
Technical Guidance:

- breading and batter should be inspected for broken packaging material, signs of rodent and insect infestations and other damage such as dirt on packaging materials and wetness;
- cleanliness and suitability of the transport vehicle to carry food products should be examined;
- representative samples of the ingredients should be taken and examined to ensure that the product is not contaminated and meets specifications for use in the end product;
- ingredients should be shipped on transportation vehicles that are suitable for handling food products and ingredients. Vehicles that have previously hauled potentially unsafe or hazardous material should not be used for hauling food products or ingredients.

10.3.1.3 Packaging Materials

Potential Hazards: *foreign matter*
Potential Defects: *tainting of products*
Technical Guidance:

- packaging material used should be clean, sound, durable, sufficient for its intended use and of food grade material;
- for pre-fried products it should be impermeable for fat and oil;
- cleanliness and suitability of the transport vehicle to carry food packaging material should be examined.
- pre-printed labelling and packaging material should be examined for accuracy

10.3.2 Storage of Raw Material, Other Ingredients and Packaging Materials

10.3.2.1 Fish (Frozen Storage)

Refer to Section 8.1.3

10.3.2.2 Fish (chilled storage)

For storage of nonfrozen fish, refer to section 8.1.2.

10.3.2.3 Other Ingredients and Packaging Materials

Potential Hazards: *biological, physical and chemical contamination*
Potential Defects: *loss of quality and characteristics of ingredients, rancidity*
Technical Guidance:

- all other ingredients and packaging material should be stored in a dry and clean place under hygienic conditions;
- all other ingredients and packaging material should be stored appropriately in terms of temperature and humidity;
- a systematic stock rotation plan should be developed and maintained to avoid out of date materials;
- ingredients should be protected from insects, rodents and other pests;
- defective ingredients and packaging material should not be used.

10.3.3. Frozen Fish Block/Fillet tempering

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect dimension due to sawing of over softened fish flesh (applies to fish sticks)*

Technical Guidance:

- Depending on the use of the fish, the tempering of frozen fish blocks/fillets should be carried out in a manner which will allow the temperature of the fish to rise without thawing.
- Tempering block/fillets of frozen fish in chilled storage is a slow process that usually requires at least 12 hours or more
- Over softening of the outer layers is undesirable (poor performance during sawing) and should be avoided. It could be avoided if facilities used for tempering are maintained at a temperature of 0 – 4° C and if fish blocks/fillets are stacked in layers.
- microwave tempering is an alternate method but should also be controlled to prevent softening of outer layers.

10.3.4 Unwrapping, Unpacking

Potential Hazards: *Microbiological contamination*

Potential Defects: *remaining undetected packaging material, contamination by filth*

Technical Guidance:

- during unwrapping and unpacking of fish blocks care should be given not to contaminate the fish;
- special attention has to be given to cardboard and/or plastic material partly or fully embedded in the blocks;
- all packaging material should be disposed of properly and promptly.
- Protect wrapped, unwrapped and unpacked fish blocks when cleaning and sanitizing processing lines during breaks and between shifts if the production process is interrupted.

10.3.5 Production of Fish Core

10.3.5.1 Sawing

Potential Hazards: *foreign material (metal or plastic parts of saws)*

Potential Defects: *irregularly shaped pieces or portions*

Technical Guidance:

- sawing instruments should be kept in clean and hygienic conditions;
- saw-blades must be inspected regularly, to avoid tearing of the product and breakage;
- saw dust must not collect on the saw-table and must be collected in special containers if used for further processing;
- sawn shims used to form irregularly shaped fish cores by mechanical pressure should be kept in clean, hygienic conditions until further manufacturing.

10.3.5.2. Application of additives and Ingredients

Also refer to Section 8.4.3

Potential Hazards: *foreign material, microbiological contamination*

Potential Defects: *Incorrect addition of additives*

Technical Guidance:

- The temperature of the product in the mixing process should be adequately controlled to avoid the growth of pathogenic bacteria.

10.3.5.3 Forming

Potential Hazards: *foreign material (metal or plastic from machine) and/or microbiological contamination (fish mixture only)*

Potential Defects: *poorly formed fish cores, cores subject to too much pressure (mushy, rancid)*

Technical Guidance:

Forming of fish cores is a highly mechanised method of producing fish cores for battering and breading. It utilises either hydraulic pressure to force shims (sawn portions of fish blocks) into moulds that are ejected onto the conveyor belt or mechanical forming of fish mixtures.

- forming machines should be kept in hygienic conditions;
- formed fish cores should be examined closely for proper shape, weight and texture.

10.3.6 Separation of Pieces

Potential Hazards: *Unlikely*

Potential Defects: *adhering pieces or portions*

Technical Guidance:

- the fish flesh cores cut from the blocks or fish fillets or other irregular shaped QF fish material must be well separated from each other and should not adhere to each other;
- fish cores that are touching each other going through the wet coating step should be removed and placed back on the conveyor in order to get a uniform batter coat and a uniform breading pick-up;
- cored fish should be monitored for foreign material and other hazards and defects before coating.
- Remove from production any broke, misshape or out of specification peaces.

10.3.7 Coating

In industrial practice the order and the number of coating steps may differ and may therefore deviate considerably from this scheme.

10.3.7.1 Wet Coating

Potential Hazards: *Microbiological contamination*

Potential Defects: *Insufficient cover or excessive cover of coating*

Technical Guidance:

- fish pieces must be well coated from all sides;
- surplus liquid, which should be reused, must be re-transported under clean and hygienic conditions;
- surplus liquid on fish pieces should be removed by clean air;
- viscosity and temperature of hydrated batter mixes should be monitored and controlled within certain parameters to effect the proper amount of breading pick-up;
- to avoid microbiological contamination of the hydrated batter, appropriate means should be adopted to ensure that significant growth does not take place, such as temperature control, dumping liquid contents and regular or scheduled clean-ups and/or sanitation during the manufacturing shift.

10.3.7.2 Dry Coating

Potential Hazards: *microbiological contamination*

Potential Defects: *insufficient coating or excessive coating*

Technical Guidance:

- dry coating must cover the whole products and should stick well on the wet coating;
- surplus coating is removed by blowing away with clean air and/or by vibration of conveyors and must be removed in a clean and hygienic way if further use is intended;
- flow of breading from the application hopper should be free, even and continuous;
- coating defects should be monitored and be in accordance to Codex Standard for Frozen Fish Fingers, Fish Portions and Fish Fillets – Breaded or in Batter (Codex Standard 166-1989);
- the proportion of breading and fish core should be in accordance to Codex Standard for Frozen Fish Fingers, Fish Portions and Fish Fillets – Breaded or in Batter (Codex Standard 166-1989).

10.3.8 Pre-Frying

There are some variations in industrial production for the frying process in so far that QF coated products are completely fried including fish core and re-frozen later. For this case alternative hazards and defects have to be described and not all statements in this section apply. In some regions it is common practice to manufacture raw (not pre-fried) coated fish products.

Potential Hazards: *Unlikely*

Potential Defects: *over-oxidised oil, insufficient frying, loosely adhering coating, burnt pieces and portions*

Technical Guidance:

- frying oil should have a temperature between approx. 160°C and 195°C;
- coated fish pieces should remain in frying oil for sufficient time depending on the frying temperature to get a satisfying colour, flavour, and structure to adhere firmly to the fish core, but core should be kept frozen throughout the whole time;
- frying oil has to be exchanged when colour becomes too dark or when concentration of fat degradation products exceeds certain limits;
- remains from coating which concentrate at the bottom of the frying bath have to be removed regularly to avoid partial dark coloration on coated products caused by upwelling of oil;
- excessive oil should be removed from coated products after pre-frying by a suitable device.

10.3.9 Re-freezing- Final Freezing

Potential Hazards: *foreign material*

Potential Defects: *Insufficient freezing leads to sticking of units together or to walls of freezing equipment and facilitates mechanical removal of breading/batter*

Technical Guidance:

- re-freezing to -18°C or lower of the whole product should take place immediately after pre-frying;
- products should be allowed to stay sufficient time in freezer cabinet to assure core temperature of products of -18°C or lower;
- cryogenic freezers should have sufficient compressed gas flow to effect proper freezing of the product;
- processors that utilise blast freezers may package the product in the consumer containers before freezing.

10.3.10 Packing and Labelling

Refer to Section 8.2.3 "Labelling", Section 8.4.4 "Wrapping and Packing" and Section 8.2.1. “Weighing”.

Potential Hazards: *Microbiological contamination*

Potential Defects: *Under- or over-packing, improper sealed containers, wrong or misleading labelling*

Technical Guidance:

- packaging should be made without delay after refreezing under clean and hygienic conditions. If packaging is made later (e.g. batch processing) re-frozen products should be kept under deep frozen conditions until being packed;
- packages should be checked regularly by weight control, end products should be checked by a metal detector and/or other detection methods if applicable;
- packaging of cartons or plastic bags to master shipping containers should be done without delay and under hygienic conditions;
- both consumer packages and shipping containers should be appropriately lot coded for product tracing in the event of a product recall.

10.3.11 Storage of End Products

Also refer to Section 8.1.3.

Potential Hazards: *Unlikely*

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

Technical Guidance:

- all end products should be stored at frozen temperature in a clean, sound and hygienic environment;
- severe fluctuations of storage temperature (greater than 3°C) has to be avoided;
- too long storage time (depending on fat content of species used and type of coating) should be avoided;
- products should be properly protected from dehydration, dirt and other forms of contamination;
- all end products should be stored in the freezer to allow proper air circulation.

10.3.12 Transport of End Product

Also refer to Section 3.6.” Transportation” and Section 17 “ Transport” under elaboration

Potential Hazards: *Unlikely*

Potential Defects: *thawing of frozen product*

Technical Guidance:

- during all transportation steps deep-frozen conditions should be maintained -18°C (maximum fluctuation ± 3°C) until final destination of product is reached;
- cleanliness and suitability of the transport vehicle to carry frozen food products should be examined;
- use of temperature recording devices with the shipment is recommended.

PROPOSED DRAFT AMENDMENTS IN THE STANDARD FOR SALTED FISH AND DRIED SALTED FISH OF THE GADIDAE FAMILY OF FISHES
(At Step 5 of the Procedure)

7. SAMPLING, EXAMINATION AND ANALYSES

Section 7.1 Sampling is extended with one paragraph.

New

(iii) Each sampled fish is packed in a plastic bag which is sealed with tape.

The sampled fish(es) must be cooled or refrigerated from the time of sampling to the time of analysis.

The analysis must be performed within 48 hours after the fish has been sampled.

Section 7.4 Determination of Salt Content is moved to Section 7.5, and Section 7.4 is renamed Determination of Water Content in Whole Fish by Cross Section Method.

New

Section 7.4 **Determination of Water Content in Whole Fish by Cross Section Method**

1 Principle

The fish is cut in sections as described in method. The sections are cut in smaller bits to a collected sample. The water content of the collected sample is determined by drying. Examinations and experience have shown that the water content of this collected sample is closed to the "true" water content of the fish.

2 Equipment

- Soft brush
- Basins (steel, glass, porcelain)
- Scissors
- Band saw
- Knife
- Weight, 1 g precision
- Analytical weight (4 decimals)
- Oven. 103-105°C
- Desiccator

3 Preparation of sample

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

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

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

4 Procedure

(i) The sampling of the fish is described in the enclosed figure.

A) Wet salted fish is sliced in sections by knife

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

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

2) The next cut is a 40 mm section.

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

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

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

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

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

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

(iii) The basins containing the sample are weighted.

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

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

(vi) The basins are weighted.

5. Calculation of results

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

W_1 = Weight of fish and basins before drying, g.

W_2 = Weight of fish and basins after drying, g.

W_s = Weight of tared basins, g

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

$$\text{Water content, g/100g} = \frac{100*(W_1-W_2)}{(W_1 - W_s)}$$

The result is reported with 1 decimal, together with the length and the weight of the analysed fish.

6. Control analysis of whole fish

As a reference method should be used which include drying of the whole fish.

7. Comments

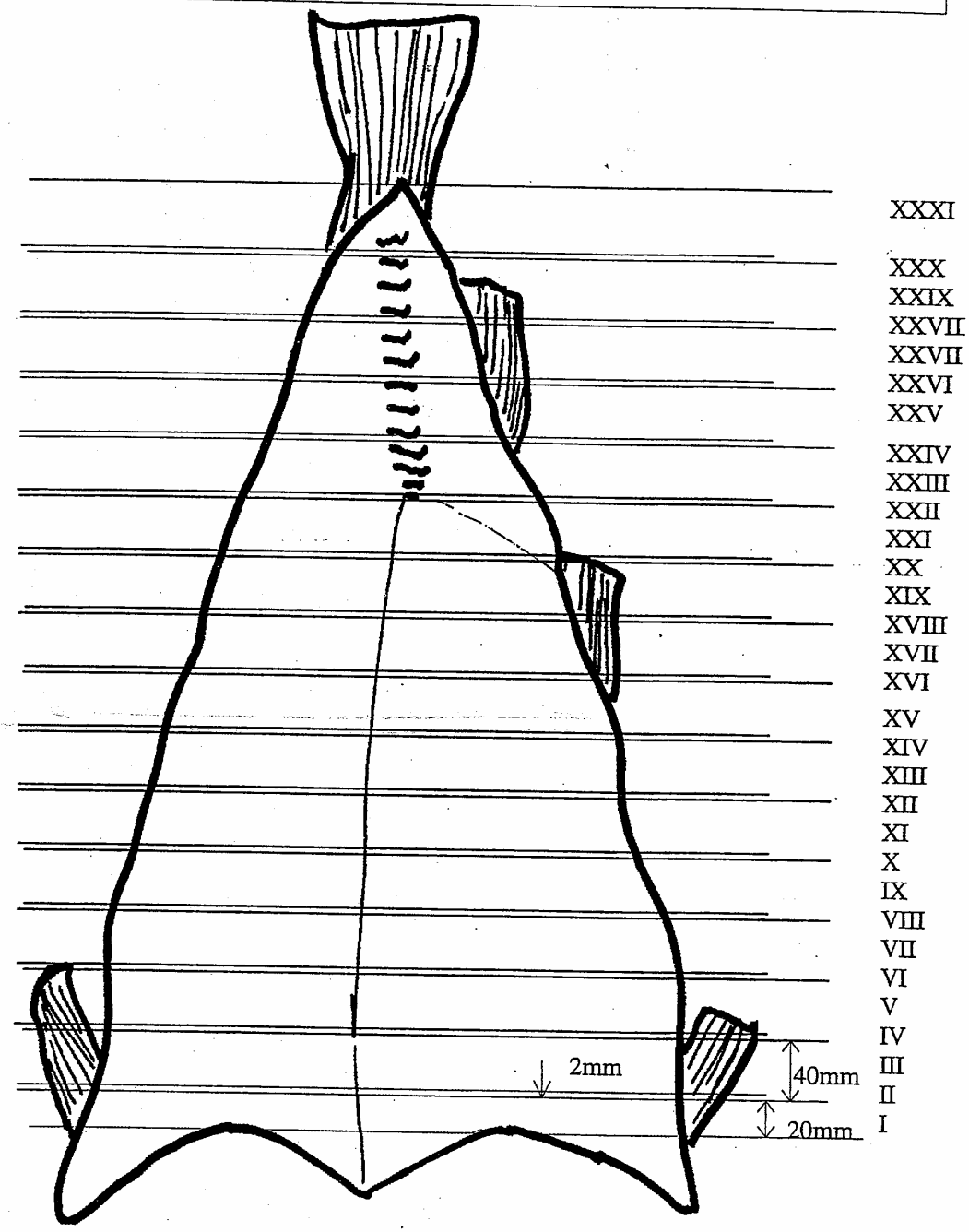
The fish must be placed at a temperature +1 - +4 ° C in a store packed in plastic bags before analysis. The analysis must be performed as soon as possible after the fish has been sampled.

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

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

FIGURE(New)

Sampling procedure.



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

Amendments in section 7.5:

Delete old 7.4.3, replace it with new 7.5.3.

New

7.5 **Determination of Salt Content**

3. Preparation of sample

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

If only the salt content is to be determined the entire fish should be subjected to a systematic cutting in slices as described in Section 7.4 Determination of water content part 4. Procedures point (i) to (ii).

If both the water content and the salt content are to be determined in the sample, two subsamples must be collected. The subsample for the water content determination is first collected as described in Section 7.4. The subsample for the salt content determination is collected by cutting 2 mm slices from each of the remaining 38 mm sections given uneven number III, V, VII, etc in the Figure of Section 7.4.
The whole collected subsample of 2 mm slices for the salt content determination should be thoroughly homogenised preferably by using an electric homogeniser.

Determination should be performed at least in duplicate.

DRAFT AMENDMENT TO THE STANDARD FOR QUICK FROZEN FISH STICKS (FISH FINGERS), FISH PORTIONS AND FISH FILLETS – BREADED OR IN BATTER

(At Step 7 of the Procedure)

6. LABELLING

6.1.3 The proportion of fish content should be declared on the label.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.4 Estimation of Fish Content

According to AOAC Method 966.15. In cases where there is some remaining doubts over the composition of the fish core then the method of analysis as outlined below could be used, i.e. as a reference method.

Determination of Fish Content

The fish content of a fish finger (fish stick) is calculated by using the following equation

$$\%\text{Fish Content} = \frac{\text{Weight of ingoing fish}}{\text{Weight of final product}} x100$$

For most products therefore, the fish ingredient weight is that of the raw ingredient. Any figure placed or declared on a product label would be a typical quantity reflecting the producer's normal manufacturing variations, in accordance with good manufacturing practice.

Checking of fish content by chemical analysis

The percentage fish content, corrected for the non-fish flesh nitrogen contributed by the carbohydrate coating, is calculated as follows.

$$\%\text{Fish} = \frac{(\%\text{ total nitrogen - }\%\text{ non - fish flesh nitrogen}}{\text{N factor *}} x100$$

* appropriate N (nitrogen) factor

The non-fish flesh nitrogen is calculated as follows:

% non-fish flesh nitrogen = % carbohydrate x 0.02

Where the carbohydrate is calculated by difference:

% carbohydrate = 100 – (% water + % fat + % protein + % ash)

References

Determination of nitrogen: ISO 937:1978

Determination of moisture: ISO 1442:1997

Determination of total fat: ISO 1443:1973

Determination of ash: ISO 936: 1978

Table 2: Interim Nitrogen factors to be used for white fish as an ingredient

(i.e. after GMP)

SPECIES	Nitrogen %
White fish:	
Cod	2.66
Minced Cod	2.61
Coley/Saithe	2.69
European Hake	2.64
Haddock	2.72
Ling	2.78
Plaice	2.46
Alaskan Pollack	2.59
Whiting	2.68
White fish mean	2.65

Additional species important for international trade proposed by Canada, South Africa and the USA but for which there are no nitrogen factors at present:

- Pacific Salmon, Atlantic Salmon, Halibut, Sole, Pacific Cod, Pacific Tomcod, Pacific Whiting, Yellowfin Sole and American Catfish
- South Africa Hake (Merluccins capensis and Merluccius paradoxus)

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

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2.3 LIVE AND [RAW] BIVALVE MOLLUSCS

Accepted / Acceptable / Approved	means accepted by the official agency having jurisdiction;
Conditioning	means placing live bivalve molluscs in tanks, floats or natural sites to remove sand, mud or slime and improve product acceptability;
Distribution Centre	means any approved on-shore or off-shore installation or establishment for the reception, conditioning, washing, cleaning, grading and packaging of live bivalve molluscs fit for human consumption;
Growing Areas	means all brackish and marine areas approved for the production or harvesting of bivalve mollusks either by natural growth or by aquaculture destined for human consumption. The growing areas may be approved as production or harvesting areas for bivalve molluscs for direct consumption, or they may be approved as production or harvesting areas for bivalve molluscs for either purification or relaying
Heat Shocking	means the process of subjecting bivalve molluscs in the shell to any form of heat treatment, such as steam, hot water, or dry heat for a short period of time, to facilitate rapid removal of meat from the shell for the purpose of shucking.
[Post Harvest Treated Bivalve Molluscs]	[are products prepared from live bivalve mollusc that have been treated after harvest to eliminate, reduce or limit specified target organisms within the product and to retain the sensory qualities of a live bivalve mollusc. As with all raw bivalve molluscs, post harvest treated bivalve molluscs must meet all microbiological criteria associated with traditional harvest water controls designed to prevent faecal contamination and resulting introduction of enteric pathogens. However, these traditional controls are not designed for control of such pathogens as Vibrios which are independent from faecal contamination.]
Purification	(depuration) means the reduction of microorganisms to a level acceptable for direct consumption by the process of holding live bivalve molluscs for a period of time under approved, controlled conditions in natural or artificial sea water suitable for the process, which may be treated or untreated.,
Relaying	means the removal of bivalve molluscs from microbiologically contaminated growing area to an acceptable growing or holding area under the supervision of the agency having jurisdiction and holding them there for the time necessary for the reduction of contamination to an acceptable level for human consumption.

2.7 SALTED FISH

Barrel	a cylindrical container made from wood or plastic with a lid for water-tight closure
Black membrane	parietal peritoneum, the pigmented lining of the abdominal cavity
Brine	solution of salt in water;
Brine Injection	is the process for injecting brine directly into the fish flesh;
Brining	means the process of placing fish in brine for a period of sufficient length for the fish tissue to absorb a specific quantity of salt;
Dry-Salting	is the process of mixing fish with suitable salt and stacking the fish in such a manner that the resulting brine drains away;
Dun	a discoloration and a development of the mould *Sporendonema epizoum* which affect the fish surface and make it look like peppered. The fish flesh is unaffected;

Fatty Fish	is fish in which the main reserves of fat are in the body tissue [and the fat content is more than 2% ??]
Gibbing	the process of removing the gills, long gut and stomach from fatty fish, such as herring, by inserting a knife or using hands at the gills; the milt or roe and some of the pyloric caeca are left in the fish;
Heavily Salted Fish	the salt content of the fish muscle is above 20 g/100 g water phase; **NOTE: NOT USED IN TEXT**
Medium Salted Fish	the salt content of the fish muscle is above 10 g/100 g water phase or is lower or equal to 20 g salt/100 g water phase; NOTE**: NOT USED IN TEXT**
Lean Fish (White Fish)	is fish in which the main reserves of fat are in the liver [and less than 2 % fat in the body tissue)]
Lightly Salted Fish	the salt content of the fish muscle is above 4 g/100 g water phase or is lower or equal to 10 g salt/100 g water phase; NOTE: **NOT USED IN TEXT?**
Maturing	the process from salting until the fish is salt-matured
Nobbing	removing the head and gut from fatty fish, such as herring, in one operation by partially severing the head and pulling the head away together with attached gut, the roe or milt is left in;
Pickle	brine which may contain vinegar and spices;
Pickling	is the process whereby primary fatty fish is mixed with suitable salt which may contain vinegar and spices and stored in watertight containers under the resultant pickle which forms by solution of salt in the water extracted from the fish tissue. Pickle may be added to the container. Pickled products will always remain in a brine solution.
Pink	a discoloration caused by red halophilic bacteria which damages the fish flesh
Salt	is a crystalline product consisting predominantly of sodium chloride. It is obtained from the sea, from underground rock salt deposits or from vacuum processed and refined brine;
Salt Cured Fish	means fish that is preserved with salt; NOTE **NOT USED IN TEXT**
Salt-Matured Fish	means salted fish that has an appearance, consistency and flavour characteristic of the final product;
Salted Fish /Salted Fillet	fish /fillets which have been treated by either brining, brine injection, dry-salting, pickling **or** wet-salting or a combination of these;
Saturated	the water phase of the fish muscle is saturated with salt (26,4 g salt/100g water phase);
Split Fish	fish that have been cut open from throat or nape to the tail, with gills, guts, roe or milt removed. Head and whole or part of backbone may be left in or removed;
Stacking (restacking)	laying fish in piles with salt spread evenly on the surface
Very Lightly Salted Fish	the salt content of the fish muscle is 4g/100g or less in the water phase Note**: NOT USED IN TEXT**

Wet-Salting is the process whereby primary lean fish is mixed with suitable salt and stored in watertight containers under the resultant brine which forms by solution of salt in the water extracted from the fish tissue. Brine may be added to the container. The fish can be removed from the container and stacked so that the brine drains away.

2.8 SMOKED FISH

Cold Smoking means smoking at a temperature of the smoked product lower than the temperature where the fish flesh shows sign of heat denaturation;

Hot Smoking means smoking at a temperature of the smoked product until the fish flesh is denatured throughout;

Mechanical Smoking means a smoking process where the smoke is generated outside the smoking chamber and by artificial ventilation forced to flow around the fish;

Smoke means the aerosol of particles and droplets in the combustion gases from the combustion of wood. The smoke might be submit to separation of tar before it enters the smoking chamber;

Traditional Smoking Kiln means an enclosed space such as a chamber or chimney where smoke is generated beneath the fish and allowed to flow around the fish by draught to a chimney;

Wood means wood including sawdust, shavings and chips, and woody plants in their natural or dried state. Painted, impregnated or otherwise treated wood or woody plants must not be used for the generation of smoke.

2.9 LOBSTERS AND CRABS

Autolysis is the breakdown or deterioration of crustacean meat or viscera by means of indigenous enzymes; NOTE**: NOT USED IN TEXT?**

Batch systems are those processing methods where crabs are processed as bulk units;

Black spot is the appearance of dark pigments at the joints and injured parts of lobster segments, caused by oxidative enzyme reaction;

Butchering is the process of removing crab back shell, viscera and gills. In some fisheries it may also include the removal of walking legs and claws. Butchering may take place either before or after cooking;

Butt end of the tail is that part of the tail muscle of lobsters which extends into the cephalothorax;

Carpus is the second leg segment from the shoulder of the crab; NOTE**: NOT USED IN TEXT**

Cephalothorax is the body region of lobsters which is formed anatomically by the fusion of head and thorax;

Claw means the pincer appendage at the end of the crab or lobster arm;

Cocktail claw is a crab claw product where the shell is partially removed to expose the meat portion of the claw; NOTE**: NOT USED IN TEXT**

Cooking means boiling of crustaceans in potable water, clean sea water or brine or heating in steam for a period of time sufficient for the thermal centre to reach a temperature adequate to coagulate the protein;

Crab means the commercially important species of the Decapoda order in the Brachyura and Anomura sections;

Dactyl tip Is the lowest segment on a crab leg. **NOTE: NOT USED IN TEXT**

Deterioration means those natural processes of quality reduction that occur after harvesting and that are quite independent of man's deliberate intervention;

De-vein Is to remove the intestine/vein from the lobster tail;

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

Enzymatic activity Is the catalytic action of enzymes on biochemical reactions;

Insensible Is the state of unresponsiveness as a result of thermal, electrical, or physical process imposed on lobsters and crabs prior to cooking;

Intestine/Vein is used in this code to mean the posterior portion of the lobster alimentary tract;

Leg tips are the third leg segments counting from the crab shell;

Lobster Means commercially important species in the order Decapoda, and families Nephropidae, Palinuridae or Scyllaridae or other important economic taxonomic families;

Loose neck has the same meaning in some areas as "Droptail"; **NOTE: NOT USED IN TEXT**

Merus is the first leg segment from the shoulder of the crab; **NOTE: NOT USED IN TEXT**

Pasteurisation Means subjecting crustacean meat to heat at times and temperatures, which destroy a high proportion of micro-organisms without noticeable changes in appearance, texture and flavour of the product;

Picking refers to the process of removing meat from the crabs shell by machine or by hand;

Pounding refers to the holding of live crabs or lobsters in water tanks or floating crates for extended periods of time;

Propodus is the third leg segment from the shoulder of the crab; **NOTE: NOT USED IN TEXT**

Sections are the cleaned, eviscerated and degilled crab parts usually consisting of one half of the crab body and the attached walking legs and claw;

Shaking refers to the industrial practice of manual meat extraction used for king, snow and Dungeness crabs. The cooked sections are processed by hitting or shaking the meat out of the shell;

Shell the hard outer covering of lobsters and crabs;

Shoulder is the section containing meat in the body of the crab;

Shucking is the process of removing the meat from the shell and appendages of the lobsters;

Tail in crustacean is the abdomen or posterior part of the body;

Tailing is the process of separating the tail from the cephalothorax;

Trimming is the process of removing any signs of blood, membrane or remnants of the gut which may be attached to the shell or meat of lobsters.

Viscera refers to the contents of the gut of crabs;

Waste means those crab or lobster parts which remain after the meat removal operation is completed.

2.10 SHRIMPS AND PRAWNS

Behead Means to remove the head from de entire shrimp or prawn;

De-veined shrimp Means all the shrimp which have been peeled, the back of the peeled segments of the

shrimp have been open out and the gut ("vein") removed;

Fresh shrimp are freshly caught shrimp which have received no preserving treatment or which have been preserved only by chilling. It does not include freshly cooked shrimp;

Peeled shrimp are shrimps with heads and all shell removed;

Raw headless shrimp are raw shrimps with heads removed and the shell on;

Shrimp in this code means any of the commercial species of crustacean commonly known as "shrimp", "shrimps" or "prawns" of the families *Penaeidae, Pandalidae, Palaemonidae* and *Crangonidae*;

2.11 CEPHALOPODS

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

2.13 TRANSPORT

2.14 RETAIL

Retail means an operation that stores, prepares, packages, serves, or otherwise provides fish, shellfish and their products directly to the consumer for preparation by the consumer for human consuption. This may be free standing seafood markets, seafood sections in grocery or department stores, packaged chilled or frozen and/ or full service.

Packaged means packaged in advance and displayed chilled or frozen for direct consumer pick up.

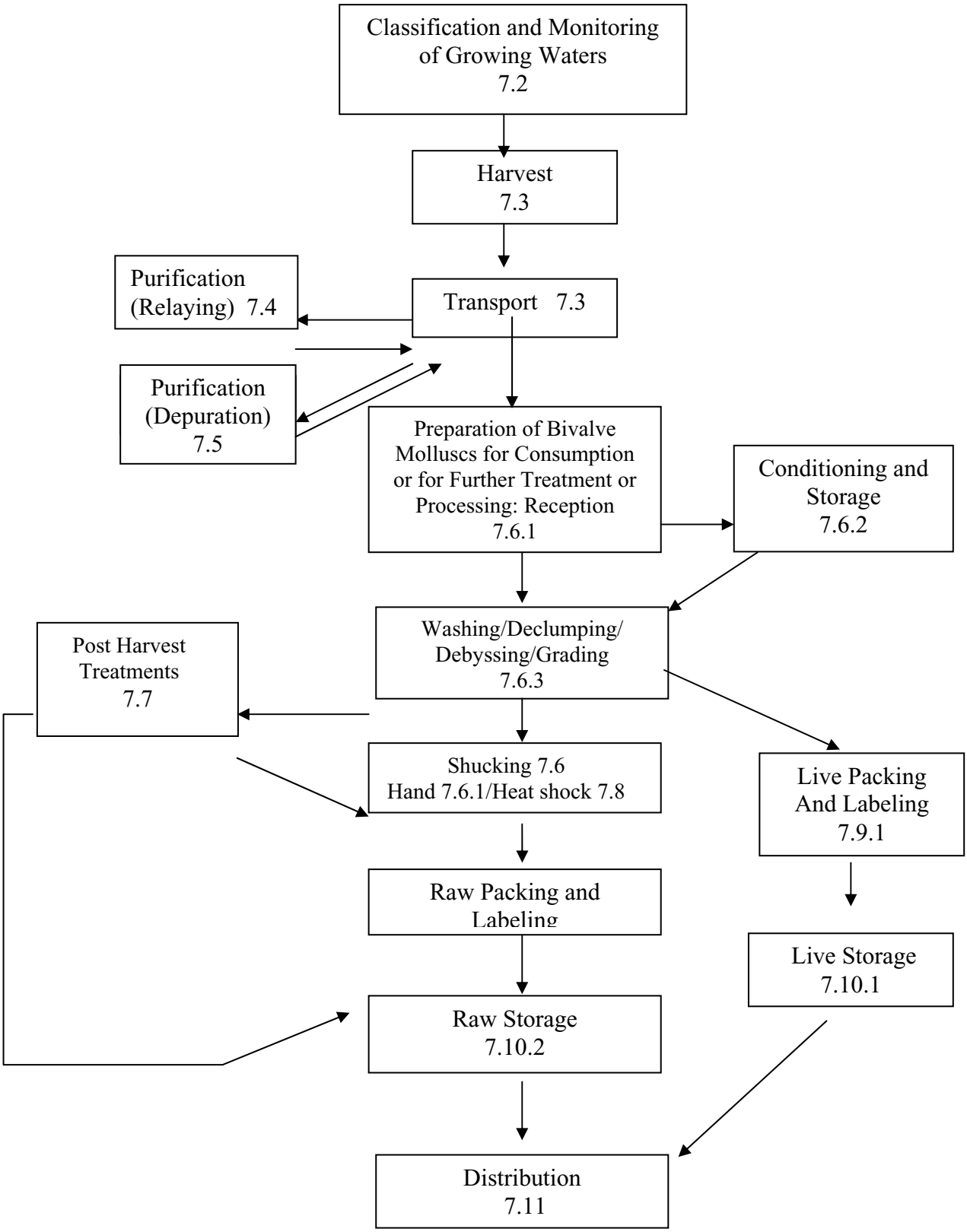
Full Service Display means a display of chilled fish, shellfish and their products to be weighed and wrapped by establishment personnel at the request of the consumer.

SECTION – 7 – LIVE AND [RAW] BIVALVE MOLLUSCS

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

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

References correspond to relevant Sections of the Code..



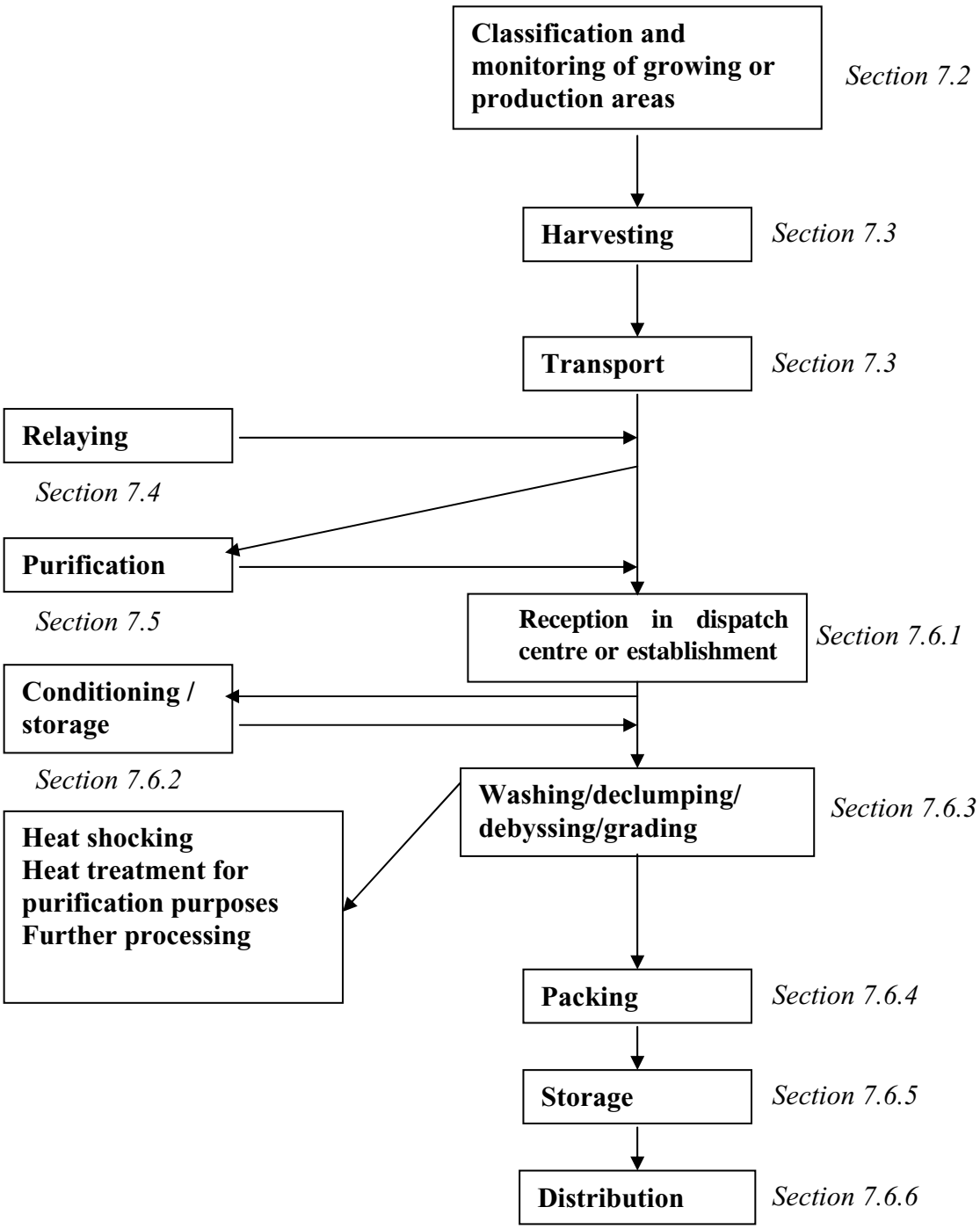


Figure 7.1 Example of a simplified flow diagram for the production of live [and raw] Bivalve Molluscs

7.1 GENERAL REMARKS, ADDITION TO THE PRE-REQUISITE PROGRAMME

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

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

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

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

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

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

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

7.2 CLASSIFICATION AND MONITORING OF GROWING AREAS

Potential Hazards: *Microbiological pathogens, Biotoxins, Chemical contamination.*

Potential Defects: *unlikely*

Technical Guidance:

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

- enteric bacterial pathogens;
- enteric viral pathogens (e.g. Norwalk like viruses, viruses causing hepatitis);
- naturally occurring bacterial pathogens (e.g. Vibrio spp.);
- biotoxins (e.g. DSP toxins, PSP toxins, NSP toxins, ASP toxins);
- chemical contaminants.

7.2.1 Classification of growing areas

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

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

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

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

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

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

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

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

7.2.2 Monitoring of growing areas

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

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

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

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

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

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

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

- the area is not subject to contamination that may present an actual or potential hazard to human health;
- The bivalve molluscs harvested meet the end product specification.

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

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

All growing areas should be frequently monitored on the presence of E. Coli/faecal coliforms or total coliforms

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

E. coli/faecal coliforms or total coliforms may be used as an indicator for the presence of enteric bacterial pathogens, enteric viral pathogens and some naturally occurring bacterial pathogens.

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

7.2.2.2 Pathogen Monitoring

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

7.2.2.3 Marine biotoxin control

All growing areas should be monitored for the presence of algae with potential for producing marine biotoxins/and marine biotoxins as appropriate. The risk of blooms of toxic algae may show seasonal variability and areas may also be affected by toxic algae previously unknown in the surrounding sea or coastal waters. These risks should be recognised when drawing up monitoring schedules.

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

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

7.2.2.4 Chemical contaminants

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

7.3 HARVESTING AND TRANSPORTATION OF LIVE BIVALVE MOLLUSCS

Refer also to Sections 3.1, 3.3, 3.4 and 3.5

This section applies to the transportation of bivalve molluscs for the purpose of direct human consumption, further processing, relaying or purification.

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

Potential Hazards: *Microbiological pathogens, Biotoxins, Chemical.contamination*

Potential Defects: *Physical damage*

Technical Guidance:

- Dredges and other harvesting equipment, decks, holds and containers, which are contaminated from use in a polluted area, should be cleaned and if applicable disinfected (sanitised) before being used for bivalve molluscs from an unpolluted area.
- Holds in which bivalve molluscs are held or containers should be so constructed that the bivalve molluscs are held above the floor level and drained so that the bivalve molluscs is not in contact with wash-down or bilge water, or shell fluid. Where necessary a bilge pumping system must be provided.
- Suitable precautions should be taken to protect bivalve molluscs from being contaminated by polluted water, droppings from sea birds, footwear which may have been in contact with faecal matter or by other polluted material.
- Wash-down pumps should draw water only from non-contaminated seawater.
- Bivalve molluscs should be harvested from and stored in an growing area or relaying area acceptable to the official agency having jurisdiction.
- On removal from water or during handling and transportation, bivalve molluscs should not be subjected to extremes of heat or cold or sudden variations in temperature. Temperature control is critical in handling live bivalve molluscs. Special equipment, such as insulated containers and refrigeration equipment should be used if prevailing temperatures and the time involved so require. Bivalve molluscs should not be exposed to full sun or surfaces heated by the sun or come into direct contact with ice and other freezing surfaces, nor should it be held in closed containers with solid carbon dioxide. In most cases storage above 10°C (50°F) or below 2°C (35°F) should be avoided.
- Bivalve molluscs should be freed from excessive mud and weed soon after being harvested by washing it with clean seawater or potable water under suitable pressure. Wash water should

not be allowed to flow over bivalve molluscs already cleaned. The water should not be re-circulated.

- The interval between harvesting and immersion in water for relaying, storage, conditioning or purification should be kept as short as possible. This also applies to the interval between final harvesting and handling in a distribution centre.
- If bivalve molluscs are to be re-immersed after harvest they should be re-immersed in clean seawater.
- Appropriate documentation should be maintained for harvesting and transportation activities.

7.4 RELAYING

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

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

Potential Hazards: *Microbiological pathogens, Biotoxins, Chemical contamination.*

Potential Defects: *unlikely.*

Technical Guidance:

- Relaying operations should be strictly supervised by the official agency having jurisdiction to prevent contaminated bivalve molluscs from being diverted directly to the consumer market or from cross contamination of other bivalve molluscs. Boundaries of relaying areas should be clearly identified by buoys, poles or other fixed means.
- Holding time and minimum temperature in the accepted area prior to harvest will be determined by the official agency having jurisdiction according to the degree of contamination before relaying, the temperature of the water, the bivalve molluscs species involved and local geographic or hydrographic conditions.
- Bivalve molluscs should be laid out at a density which will permit them to open and undergo natural purification.
- Appropriate documentation should be maintained for relaying operations.

7.5 PURIFICATION OF BIVALVE MOLLUSCS IN TANKS, FLOATS AND RAFTS

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

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

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

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

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

Potential Hazards: *Microbiological pathogens*

Potential Defects: *physical damage*

Technical Guidance:

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

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

- After purification the bivalve molluscs should meet the end product specification.
- Appropriate documentation should be maintained for purification.

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

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

7.6.1 Reception

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

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

Technical Guidance:

- Bivalve molluscs dispatched by a distribution centre must leave the distribution centre alive. Therefore stress and excessive shocks of the bivalve molluscs must be avoided.
- Distribution centres should only accept bivalve molluscs which meet the end product specification and which originate directly from approved growing areas or after relaying in an approved relaying area or after purification in an approved purification centre or tank .

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

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

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

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

Technical Guidance:

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

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

7.6.3 Washing, declumping, debyssing and grading

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Microbiological pathogens, Chemical and Physical contamination*

Potential Defects: *Mechanical damage*

Technical Guidance:

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

7.6.4 Packing

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

Potential Hazards: *Microbiological pathogens, physical contamination*

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

Technical Guidance:

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

7.6.5 Storage

Potential Hazards: *Microbiological pathogens*

Potential Defects: *physical damage*

Technical Guidance:

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

7.6.6 Distribution

Refer also to Section 3.6

Potential Hazards: *unlikely*

Potential Defects: *Physical damage*

Technical Guidance:

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

[7.7. POST HARVEST TREATMENT

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

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

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

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

Technical Guidance:

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

- The treatment parameters established to reduce or eliminate pathogens should be approved by the appropriate official having jurisdiction.]

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

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

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

7.7.1 Heat treatment for purification purposes

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Microbiological pathogens*

Potential Defects: *unlikely*

Technical Guidance:

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

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

- The bivalve molluscs must come from growing areas designated as acceptable by the official agency having jurisdiction.
- Bivalve molluscs designated for heat treatment should not accede the acceptable chemical or biotoxin levels.
- Each establishment which purifies bivalve molluscs with a heat treatment must develop a heat treatment process schedule, acceptable to the official agency having jurisdiction, which addresses such critical factors as the species and size of bivalve molluscs, time of exposure to heat, internal bivalve molluscs temperature, type of heat process used, water/steam to bivalve molluscs ratios, nature of heat equipment, measurement devices and their calibration, post heating chilling operations, cleaning and sanitising of heat process equipment.
- The heat treatment process must be approved by the official agency having jurisdiction.
- All bivalve molluscs should be washed with pressurised potable water or clean sea water and culled for damaged and dead bivalve molluscs prior to heat treatment.
- Polluted bivalve molluscs should not come in contact with bivalve molluscs which meet the end product specification.
- After the heat treatment the bivalve molluscs must meet the end product specification of the Codes Standard.

7.7.2 Heat shocking of bivalve molluscs followed by packing

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

Refer also to Sections 3.2, 3.3, 3.4 and 3.5

Potential Hazards: *Physical contamination*

Potential Defects: *unlikely*

Technical Guidance:

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

7.8 DOCUMENTATION

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

7.9 LOT IDENTIFICATION AND RECALL PROCEDURES

Refer also to Section 3.7

- Each product leaving the distribution centre or establishment should have an easy identifiable lot number. This lot number must include an identification code, the number of the distribution centre or establishment, the country of origin and day and month of packing, in order to facilitate the trace-back of the product. The distribution centres should establish a

record-keeping system based on these lot numbers so that individual lots of bivalve molluscs can be traced from the growing area to the end user.

- If a recall must be carried out its success depends on whether the management of the distribution centre has taken certain preparatory steps in advance.
- Some important aspects are:
  - The affected product must be easy identifiable by lot numbers;
  - Destination and customers of the affected product must be identifiable;
  - Competencies and responsibilities of management and personnel must be clear;
  - Names and telephone numbers of affected personnel, organisations and customers must be present.

SECTION 11 - PROCESSING OF SALTED FISH

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

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

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

11.1 GENERAL

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

- depending on the species for salting, fish should be completely bled as soon as practical;
- where appropriate, fresh fish intended for processing salted fish should be checked for visible parasites;
- frozen fish should not be salted before it is thoroughly thawed and inspected for suitability;
- freezing, heating or adequate combination of salt content and storage time can be used as treatment procedures for killing living parasites;
- the salt penetration will depend upon fat content, temperature, amount of salt, salt composition, brine concentration, etc.

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

References correspond to relevant Sections of the Code

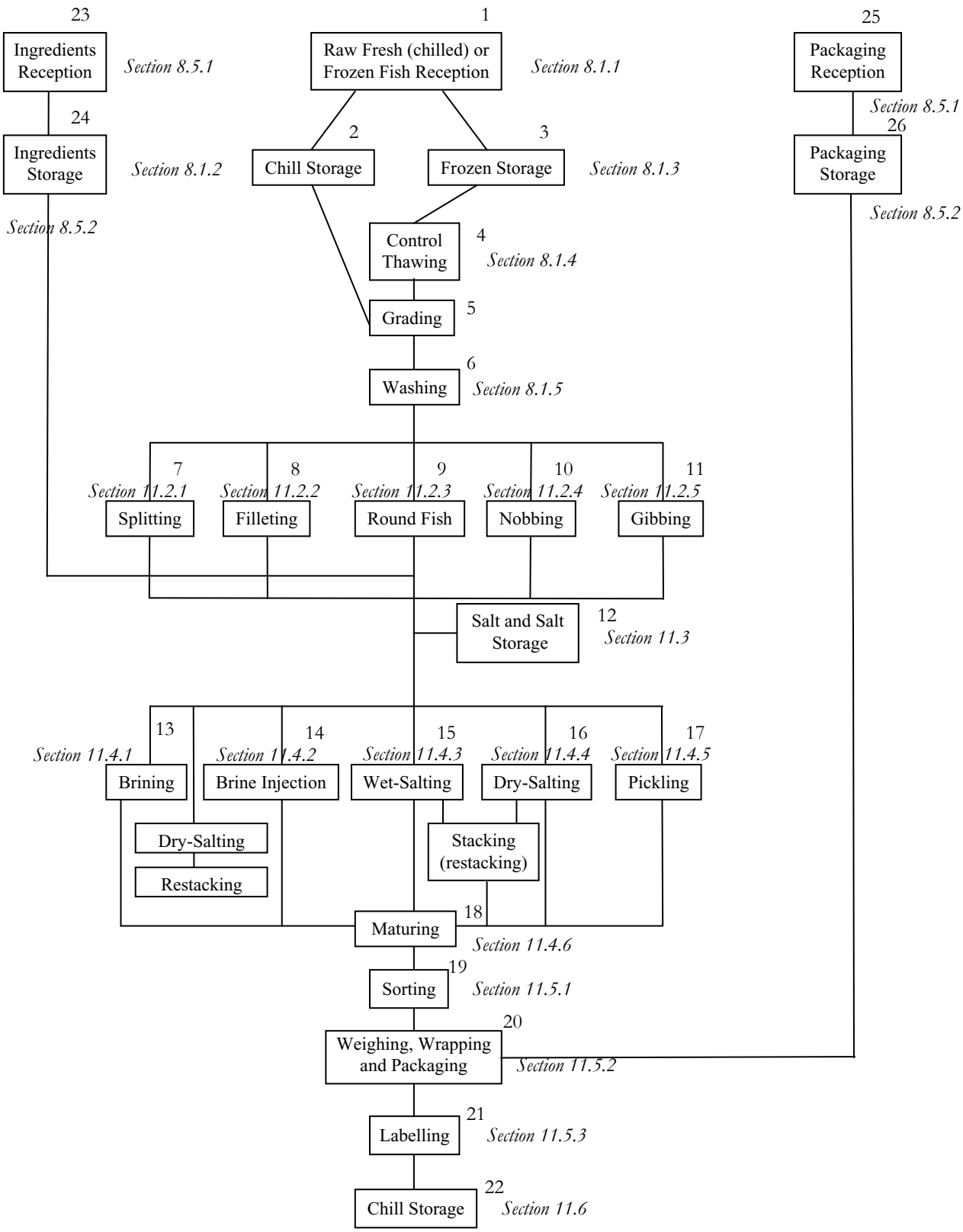


Figure 11.1 Example of flow chart of a salted fish processing line.

11.2 PREPARING FOR SALTING

11.2.1 Splitting, Washing and Rinsing (Processing Steps 7)

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

Potential Defects: *Parasites, decomposition*

Technical Guidance:

- the design of the splitting line should be continuous and sequential to permit the uniform flow without stops or slow-downs;
- fish should be split by a cut made parallel to the backbone straight down from the throat or nape to the tail and in such a way as to prevent uneven and ragged edges or a loss in recovery. If the backbone is to be removed, the fish should be split so deeply that the remains of the backbone (the tail-bone) lie free. It is important to cut the bone rather than to break it from the flesh;
- splitting of fish should be carried out expertly so that blood in nape and blood clots are removed;
- immediately after splitting, fish should be washed in plenty of running potable water or clean sea water, to remove all blood from the fish;
- all impurities, blood and livers should be removed;
- visible parasites should be removed;
- if the black membrane has to be removed than it should be done after the splitting step;

11.2.2 Filleting, Skinning and Trimming (Processing Steps 8)

Refer to Section 8.1.6.

11.2.3 Round Fish (Processing Steps 9)

Refer to Section 8.1.1 – 8.1.5.

11.2.4 Nobbing (Processing Steps 10)

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

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

Technical Guidance:

refer to section 11.2.1, 2nd bullet;

- after nobbing fish should be checked for remaining intestines;
- after nobbing fish should be thoroughly washed to remove blood, remaining intestines and scales if appropriate;
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of histamine or a defect, the nobbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

11.2.5 Gibbing (Processing Steps 11)

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

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

Technical Guidance:

refer to section 11.2.1, 2nd bullet;

- after gibbing fish should be checked for correct gibbing;

- fish with incorrect gibbing should be sorted out and used for other purposes;
- after gibbing fish should be thoroughly washed to remove blood, remaining undesirable intestines, heart, etc. and scales if appropriate;
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of histamine or a defect, the gibbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

11.3 SALT HANDLING AND SALT REQUIREMENTS (PROCESSING STEPS 12)

11.3.1 Handling

Potential Hazards: *Biological, chemical and physical contamination*

Potential Defects: *Biological, chemical and physical contamination*

Technical Guidance:

- salt for salting of fish should be transported and stored dry and hygienically covered in salt bins, storerooms, containers or in plastic sacks;
- in order to minimise infections of salted fish the re-use of salt should be avoided;

11.3.2 Salt Requirements

Potential Hazards: *Biological, chemical and physical contamination*

Potential Defects: *Biological, chemical and physical contamination, incorrect composition*

Technical Guidance:

- the quality of salt used in salting of fish should possess an appropriate composition for the product;
- the composition of salt differs according to the origin. Mine salt and solar salt of marine origin contain several other salts like calcium sulphate, magnesium sulphate and chloride as impurities. Vacuum processed and refined salt is almost pure sodium chloride;
- a relatively pure salt is needed for the dry-salting of fatty fish but for some products the presence of small quantities of calcium salts will give the product a somewhat superior appearance. Too much calcium may reduce the rate of salt penetration to an extent that spoilage may occur;
- magnesium salts if present at too high a concentration will give rise to unpleasant bitter flavours and may cause spoilage during the salting operation;
- salt produced from marine sources may contain halophilic bacteria and mould which continue to live in the salt and dry salted fish and could contribute to spoilage;
- salt used in salt fish should be inspected to ensure that it is clean, not used before, free from foreign matter and foreign crystals, show no visible sign of contamination with dirt, oil, bilge or other extraneous materials;
- the size of the salt granules used should be carefully considered. The use of very fine salt granules could result in the formation of clusters which is not favourable for ensuring the uniform distribution of salt on the fish. The use of very coarse salt granule could result in damage to the fish flesh during salting and may reduce the rate of maturation;
- small crystals of salt should be used for dry-salting of fatty fish and large crystals for lean fish;
- salt should meet the following requirements:
  - content of iron not more than 10 mg/kg;
  - content of copper not more than 0.1 mg/kg ;
  - free from micro-organisms, which adversely affect the quality of final products;

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

11.4 SALTING AND MATURING

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

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

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

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

11.4.1 Brining (Processing Steps 13)

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

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

Technical Guidance:

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

11.4.2 Brine Injection (Processing Steps 14)

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

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

Technical Guidance:

- apparatuses used for brine injection should be cleaned and disinfected at regular intervals;
- needles of apparatuses should be inspected daily for broken tips, for blocking and deflections of needles;
- brine injection devices should be operated by trained personnel only;

11.4.3 Wet-Salting (Processing Steps 15)

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

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

Technical Guidance:

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

11.4.4 Dry-Salting (Processing Steps 16)

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

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

Technical Guidance:

- fish for dry salting should be carefully arranged such that voids or channels between fish are minimised and that drainage is adequate;
- fish piles should never be placed directly on the floor or in direct contact with the wall;
- amount of salt, time and temperature should be carefully controlled to obtain the desired product. Sufficient amount of salt is important for the quality of the product;
- fish should be restacked periodically with the top of the pile going to the bottom of the new pile, and with the addition of fresh salt to ensure that sufficient salt will be present to complete the cure;
- if the fish is restacked on pallets, the pallet should be clean;
- fish should not be exposed to freezing temperatures during the salting process;
- salted fish of the Scombridae and Clupeidae families should be stored or maintained below 9° C to prevent possible scombrotoxin/histamine formation;

11.4.5 Pickling (Processing Steps 17)

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

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

Technical Guidance:

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

- pickling is primary used for fatty fish. Under certain conditions dry salting of small fatty fish, such as anchovy and small herring, may be used;

11.4.6 Maturing (Processing Steps 18)

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

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

Technical Guidance:

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

11.5 SORTING, WEIGHING, PACKAGING, WRAPPING AND LABELLING

Refer also to Sections 6.4.4 and 6.5.

11.5.1 Sorting (Processing Steps 19)

Potential Hazards: *Unlikely*

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

Technical Guidance:

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

11.5.2 Weighing, Wrapping and Packaging (Processing Steps 20)

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

Potential Defects: *Subsequent dehydration, decomposition*

Technical Guidance:

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

11.5.3 Labelling (Processing Steps 21)

Refer to Section 8.2.3 and 8.5.

11.6 CHILL STORAGE (PROCESSING STEPS 22)

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

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

Technical Guidance:

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

11.7 PACKAGING, LABELS & INGREDIENTS (PROCESSING STEPS 23, 24, 25 & 26)

Refer to Section 8.5.

SECTION 12 - PROCESSING OF SMOKED FISH

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

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

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

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

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

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

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

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

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Cold smoked fish should meet the requirements set out in the Codex Standard for Pre-Packed Cold Smoked Fish[1].

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

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

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

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

References correspond to relevant Sections of the Code.

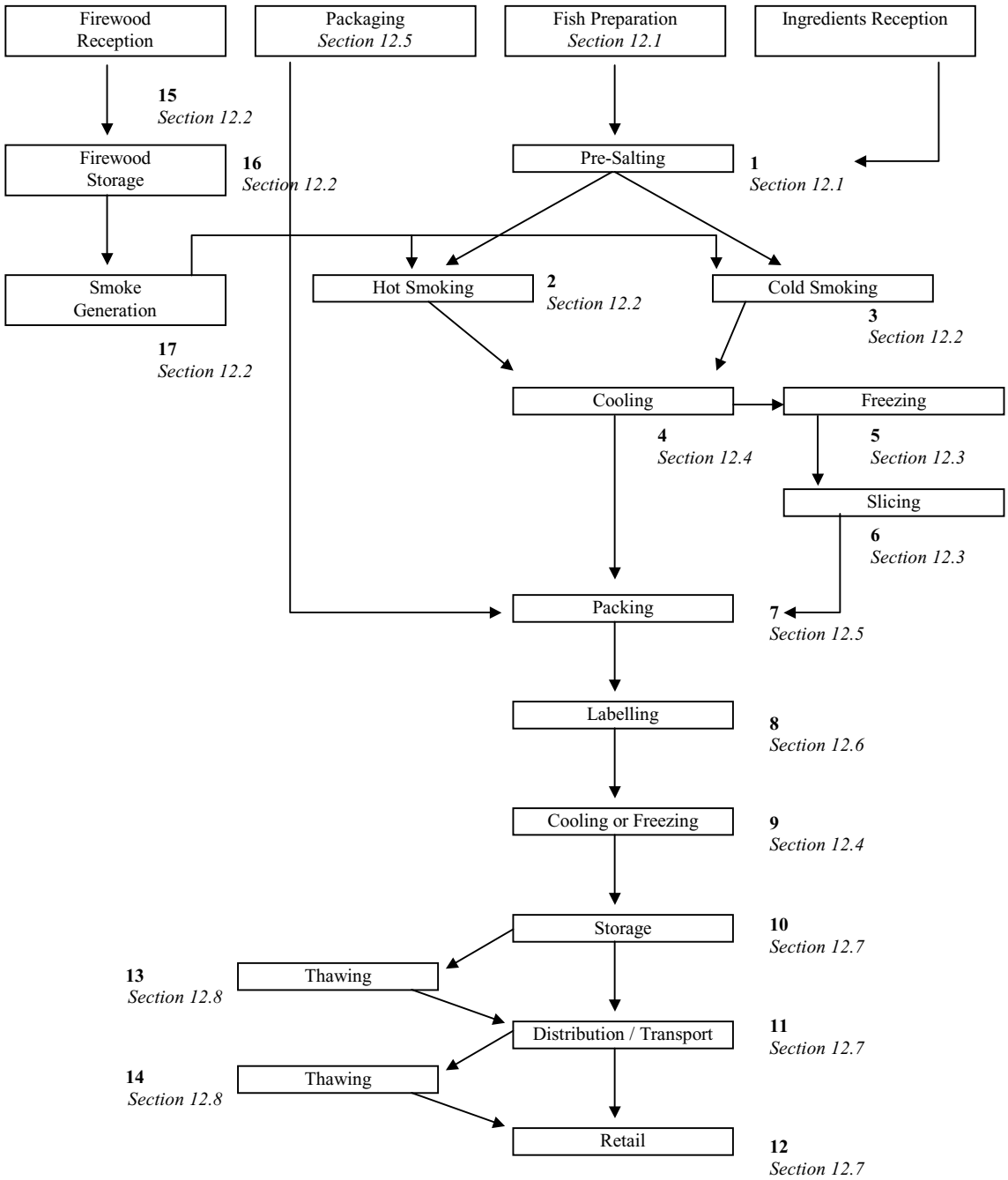

Figure 12.1 Example of a flow chart of a Hot Smoking and Cold Smoking preparation Line, including possible slicing operation at the Cold Smoking line.

12.1 PRE-SALTING (PROCESSING STEP 1)

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

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

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

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

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

12.2 THE SMOKING (PROCESSING STEPS 2 & 3)

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

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

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

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

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

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

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

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

Potential Hazards: Microbiological cross contamination, microbiological growth
Potential Defects: Unlikely
Technical Guidance:

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

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

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

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

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

Potential Hazards: Microbiological contamination, microbiological growth
Potential Defects: Decomposition, physical contamination
Technical Guidance:

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

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

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

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

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

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

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

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

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

12.6 LABELLING (PROCESSING STEP 8)

Refer to Section 8.2.3 "Labelling".
Potential Hazards: Unlikely
Potential Defects: Incorrect labelling
Technical Guidance:

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

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

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

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

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

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

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

12.8 THAWING (PROCESSING STEPS 13 & 14)

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

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

SECTION 13 - PROCESSING OF LOBSTERS AND CRABS

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

give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

This section applies to lobsters, rock lobsters, spiny lobsters, slipper lobsters from the genus *Homarus* of the family Nephropidae and from the families Palinuridae and Scyllaridae and other similar species but does not apply to *Nephrops*.

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

13.1 GENERAL – ADDITION TO PRE-REQUISITE PROGRAMME

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

13.1.1 Design and Construction of Equipment and Utensils

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

13.1.2 Hygiene Control Programme

- [When in-factory chlorination of water is used, the minimum residual content of free chlorine should be maintained at the effective level for the use intended.
- [Chlorinating system should not be relied upon to solve all hygiene problems].
- water, which has been in contact with crustaceans, should not be re-used to avoid taint problems;
- if it is unavoidable for the same workers to handle the raw as well as the cooked, stringent precautions should be taken to prevent contamination of the cooked product by micro-organisms from raw material;

13.2 General Considerations for the Handling of Lobsters and Crabs

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

13.2.1. Potential Hazards and Defects Associated with Lobsters and Crabs

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

13.2.1.1. Biological Hazards

Parasites

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

Bacteria

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

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

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

Chemical Hazards

Biotoxins

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

Defects

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

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

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

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

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

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

Histochemical enzymatic tests done with lobster specimens subjected to two different treatments showed negative test results for those which were anaesthetised in ice-cold water for 30 min, while those which were injured showed positive results. This suggests that the even distribution of enzymes and substrates is

changed in the integumentary tissues, and that the accumulation of fluids (haemolymph) in affected parts results in greater concentrations of these substances. Thus, the phenomenon which occurs is probably a host defense mechanism similar to that in insects, where humoral and/or cellular defense reactions help them recover from injuries.

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

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

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

Other defects

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

13.2.2 Minimise the Deterioration of Crustaceans - Handling

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

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

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

13.3 Processing Operations – Lobsters and Crabs

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

This section provides three examples of products derived from lobsters and crabs. Special consideration was given to elaborate on products which involve heat treatment because of their potential impact on food safety (such as post processing handling). The products and their respective flow diagrams are as follows: Frozen Raw Lobster Tails (Fig. 13.3.1), Chilled Cooked Whole Lobster/Chilled Cooked Lobster Meat (Fig. 13.3.2) and Chilled Pasteurized Crab Meat (Fig. 13.3.3). To provide an appreciation for other products of lobsters and crabs, a reference has been included in Appendix A and B.

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

References correspond to relevant Sections of the Code

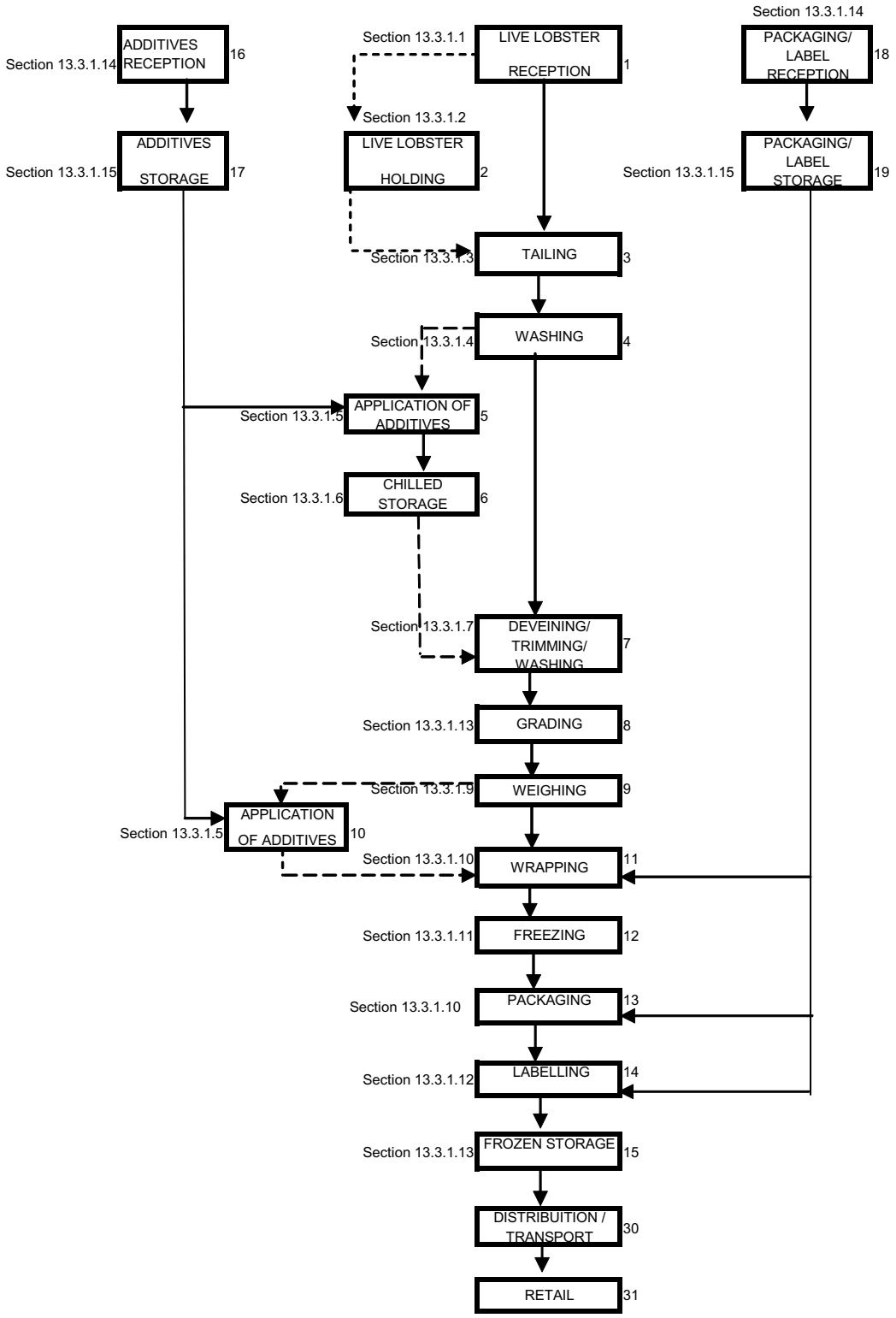

Figure 13.1 Example of a flow chart for a frozen raw lobster tail processing line.

13.3.1 Frozen Raw Lobster Tail

13.3.1.1 Live Lobster Reception (Processing Step 1)

Potential Hazards: *Phycotoxins (PSP).*

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

Technical Guidance:

- live lobsters should be inspected upon receipt to ensure that they are alive, which can be demonstrated by active leg movement and the tail of lobsters being curled light by underneath the body when the lobster is picked up;
- lobsters which are dead or may pose a hazard to human should not be processed, should be rejected and disposed of in a proper manner;
- weak lobsters should be processed immediately;
- since lobster legs and other appendages can be easily broken and the damage can cause to risk of infection and weakening of the lobsters, care in handling should be applied to live lobsters at all times. The necessary skills should be acquired by lobster handlers;
- training in species identification and communication in product specification should be provided to lobster handlers and appropriate personnel to ensure a safe source of incoming lobsters. Of special consideration are the reception and sorting of lobster species that poses a risk of PSP toxin;
- lobsters should be rejected if they are known to contain harmful or extraneous substances and/or defects which will not be eliminated or reduced to an acceptable level by normal procedures of sorting or preparation. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the HACCP or DAP plan should be modified where necessary.

13.3.1.2 Live Lobster Holding (Processing Step 2)

Refer also to Section 13.2.2 – Minimise the Deterioration of Crustaceans – Handling, of this document.. Refer also to "Section 6.1.2 – Growing Water Quality").

Potential Hazards: *Unlikely*

Potential Defects: *Lobster mortality*

Technical Guidance:

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

13.3.1.3 Tailing (Processing Step 3)

Potential Hazards: *Microbiological contamination*

Potential Defects *Unlikely*

Technical Guidance:

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

13.3.1.4 Washing (Processing Step 4)

Refer also to section 8.1.5 – Washing and Gutting

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

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

13.3.1.5 Application of Additives to Lobster Tails (Processing Steps 5 & 10)

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

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

Technical Guidance:

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

13.3.1.6 Chilled Storage (Processing Step 6)

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

Potential Hazards: *Unlikely.*

Potential Defects: *Unlikely*

Technical Guidance:

- for lobster tails, storage in refrigerated sea water is not recommended because excessive salt penetration into the muscle will take place rapidly. However, refrigerated clean water systems can be used for rapid pre-cooling before freezing or storage in ice;

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

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

Potential Hazards: *Microbiological contamination*

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

Technical Guidance:

- the intestine should be removed immediately and consideration should be given to use methods such as ejection by water pressure, vacuum, or physical removal by appropriate utensils (such as scissors, knives or extractors);
- skills should be acquired by lobster handlers with particular attention being given to the removal of membrane and blood from the butt end of the tail;
- an adequate supply of clean water, potable water [or chlorinated water] should be available for the washing of de-veined and trimmed lobster tails to ensure that no remnants of the gut or its contents remain;

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

- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of the development persistent and distinct objectionable odours or flavours indicative of decomposition, the de-veined or trimmed lobster tails should be washed and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;

13.3.1.8 Grading (Processing Step 8)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect grading*

Technical Guidance:

- lobster tails should be graded into species, sizes and weights for the relevant market, to assure the economic integrity of the final product;
- calibrated balances should be provided for accurate grading.

13.3.1.9 Weighing (Processing Step 9)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect net weight*

Technical Guidance:

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

13.3.1.10 Wrapping and Packaging (Processing Steps 11 & 13)

Potential Hazards: *Unlikely*

Potential Defects: *Subsequent dehydration*

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- care should be taken to ensure that the butt end of tail is completely wrapped to protect against dehydration.

13.3.1.11 Freezing (Processing Step 12)

Refer to section 8..3.1 – Freezing Process

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

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

13.3.1.12 Labelling (Processing Steps 14)

Refer to Section 8.2.3 “Labelling”.

Potential Hazards: *Absence of labelling of allergenic additives*

Potential Defects: *Incorrect labelling*

Technical Guidance:

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

13.3.1.13 Frozen Storage (Processing Step 15)

Refer to Section 8.1.3 – Frozen Storage

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

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

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

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

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

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

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

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

References correspond to relevant Sections of the Code

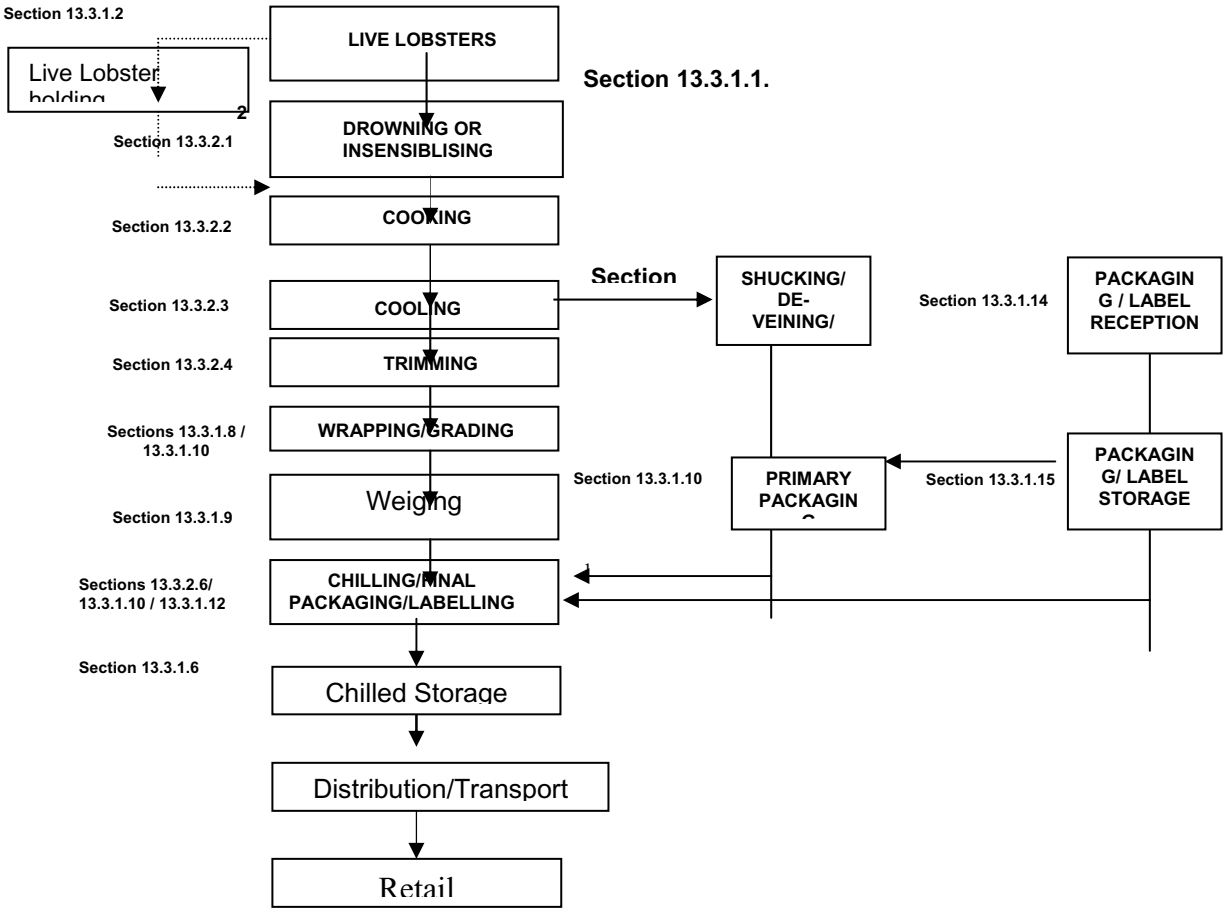


FIGURE 13.2 **Example of a flow chart for chilled cooked whole lobster and chilled cooked lobster meat processing lines.***

- The processing steps 9 and 10 are concerned with chilled cooked lobster meat product.

13.3.2 Chilled Cooked Whole Lobster and Chilled Cooked Lobster Meat

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

13.3.2.1 Drowning or Insensibilising (Processing Step 3)

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

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

13.3.2.2 Cooking (Processing Step 4)

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

Potential Defects: *Over / undercooking*

Technical Guidance:

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

13.3.2.3 Cooling (Processing Step 5)

Potential Hazards: *Unlikely*

Potential Defects: *Unlikely*

Technical Guidance:

- cooling times should be kept as short as possible and every effort should be made to avoid contamination of the product during this period;
- cooling should be done in a proper manner, immediately after cooking, to end it uniformly throughout the batch and to avoid holding at temperatures which would encourage the growth of bacteria;

13.3.2.4 Trimming (Processing Step 6)

Potential Hazards: *Microbiological contamination*

Potential Defects: *Unlikely*

Technical Guidance:

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

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

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

Potential Defects: *Presence of shell fragments*

Technical Guidance:

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

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

Refer to Section 8.2.3 "Labelling".

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect labelling*

Technical Guidance:

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

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

References correspond to relevant Sections of the Code

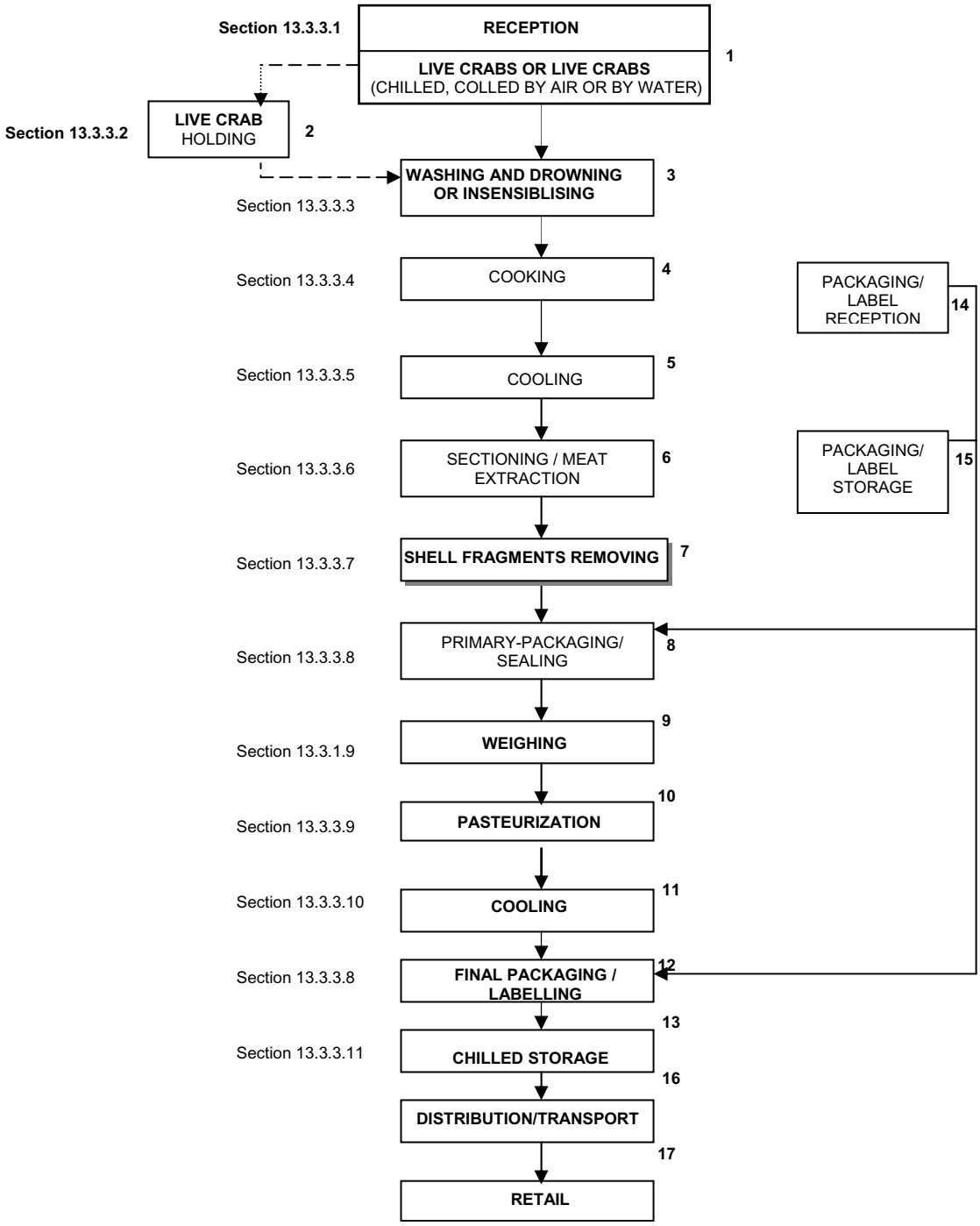


FIGURE 13.3 Example of a flow chart for a chilled pasteurised crab meat processing line[10].

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

13.3.3 Chilled Pasteurized Crab Meat

13.3.3.1 Live Crab Reception (Processing Step 1)

Refer also to section 13.3.1.1 of this document.

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

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

Technical Guidance:

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

13.3.3.2 – Live Crab Holding (Processing Step 2)

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

Potential Hazards: *Unlikely*

Potential Defects: *Crab Mortality*

Technical Guidance:

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

13.3.3.3 Washing and Drowning or Insensibilising (Processing Step 3)

Potential Hazards: *Unlikely*

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

Technical Guidance:

- crabs should be washed in plenty of running potable water, or clean sea water, [or chlorinated water], to remove all impurities. For some species, scrubbing by brush may be necessary. These methods can be combined;
- crabs which are to be processed whole for fresh and frozen products should be rendered insensible or killed just prior to cooking to prevent legs and claws loss. This may be accomplished by the following methods:
- cooling the crabs for [twenty minutes or until two hours] at 0°C or lower, depending of the specie;
- 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;

13.3.3.4 Cooking (Processing Step 4)

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

Potential Defects: *Over/undercooking.*

Technical Guidance:

- where the final product is to be marketed as cooked crabs in the shell or the shucked meat should be chilled to a temperature approaching that of melting ice and either passed into the distribution chain or processed within 18 hours;
- in most cases the cooking of crabs in boiling water is preferred to steaming. Steaming has a tendency to dry the meat, resulting in the flesh adhering to the shell. Continuous conveyorised cooking is recommended;
- Cooking should be carried out by appropriately trained personnel who has acquired the necessary skills to monitor and ensure that all crabs are given the same time/temperature exposure during the operation;
- adequate uniform cooking is essential because too much cooking causes excessive meat shrinkage, moisture loss and lower yields, and too little cooking makes it difficult to remove the meat from the shell;
- it is difficult to specify cooking times and temperatures generally due to differences in size, structure and physiology of the different species of crabs. Considering these reasons, time and temperature should be previously determined for cooking operation to assure the accomplishment of the microbiological levels of pathogenic bacteria. In general, a minimum meat temperature of 82 to 93°C (180 to 200°F) should be achieved.
- [The following represents some general practices presently used in the industry for various crab species:

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

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

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

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

13.3.3.5 Cooling (Processing Step 5)

Potential Hazards: *Microbiological contamination*

Potential Defects: *unlikely*

Technical Guidance:

- cooling should be done in cold circulated air, running potable water or clean sea water;
- where crabs are cooked on a continuous basis, cooling is also best done on a continuous basis;

- cooling should be completed as quickly as possible and every effort should be made to avoid contamination of the product during this period;
- the same water should not be used for cooling more than one batch;
- in some species, the body cavity contains a considerable amount of water, so that adequate drainage, in an area set aside for the purpose, is desirable;

13.3.3.6 Sectioning/Meat Extraction (Processing Step 6)

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

Potential Defects: *Unlikely*

Technical Guidance:

- after butchering, any remaining viscera and gills should be removed by brushing and washing. Proper cleaning at this stage is strongly recommended since it eliminates the risk of foreign material being included in the finished product;
- it is recommended that different staff be involved in operations with cooked and uncooked crabs, to avoid cross-contamination;
- picking or shaking operations should be carefully controlled to prevent contamination from bacteria and/or foreign materials;
- it is recommended that all types of meat are picked, packaged and either chilled [(internal temperature of 4.5°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;

13.3.3.7 Shell Fragments Removing (Processing Step 7)

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

Potential Defects: *Unlikely*

Technical Guidance:

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

13.3.3.8 Primary-Packaging/Sealing/Final Packaging/Labelling (Processing Steps 8 and 12)

Refer to Section 8.2.3 "Labelling" **(NOTE: check that this is standard wording)**

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

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

Potential Defects: *Incorrect labelling*

Technical Guidance:

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

13.3.3.9 Pasteurisation (Processing Step 10)

Potential Hazards: *Survival of pathogens*

Potential Defects: *Deterioration*

Technical Guidance:

- pasteurising of product should be carried out by appropriately trained personnel who has acquired the necessary skills to monitor and ensure that all packages are given the same time/temperature exposure during the operation;
- pasteurisation should be carried out in hermetically sealed containers;
- crab meat should be pasteurised immediately after picking and packaging;
- to prevent any possible deterioration of the product the crab meat should be pasteurised immediately. It is preferable that the meat be at a temperature of approximately 18°C (64.4°F) when the container are hermetically sealed to provide a slight vacuum after chilled storage temperatures;
- a time and temperature regime for the pasteurisation of different crab products should be established and should take into consideration the pasteurisation equipment and capacity, the physical properties of the crab and packaging container including their thermal conductivity, thickness, shape and temperature, to ensure that adequate heat penetration has been achieved for all containers in the lot;
- each container of crab meat should be exposed to a minimum processing temperature of 85°C (185°F) of at least 1 min at the geometric centre of the container;
- the water bath should be preheated to a temperature of 90°C (194°F) before the loaded basket is put into it. Special concern should be given to proper water circulation within the bath and around each individual container being pasteurised. Hot water bath temperature should remain constant until processing is completed;
- [Proper pasteurisation procedures for blue crab usually require a cooking time of 110 to 115 min when 401 flat cans are used.];
- once proper times and temperatures are established, they must be adhered to closely and pasteurisation processes should be standardized by accurate thermocouple measuring equipment. It is recommended that new equipment be standardized after installation and re-standardize on an annual basis or when difficulties are experienced;
- calibration and appropriate maintenance of temperature recording equipment should be performed on a regular basis to ensure accuracy;

13.3.3.10 Cooling (Processing Step 11)

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

Potential Defects: *Unlikely*

Technical Guidance:

- the pasteurized container of meat should be immediately cooled after processing.
- cooling is best accomplished in an ice water bath. The size of the cooling bath should exceed the size of the pasteurizing water bath to allow for an excess of ice, which is needed if the water is to be kept below 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.

13.3.3.11 Chilled Storage (Processing Step 13)

Potential Hazards: *Formation of Clostridium botulinum Toxin.*

Potential Defects: *Unlikely*

Technical Guidance:

- the pasteurized crab meat should be moved to the chilled storage facility without undue delay;
- the pasteurized product is perishable and unless it is kept chilled at a minimum temperature of below 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;

SECTION 14 – PROCESSING OF SHRIMPS AND PRAWNS

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

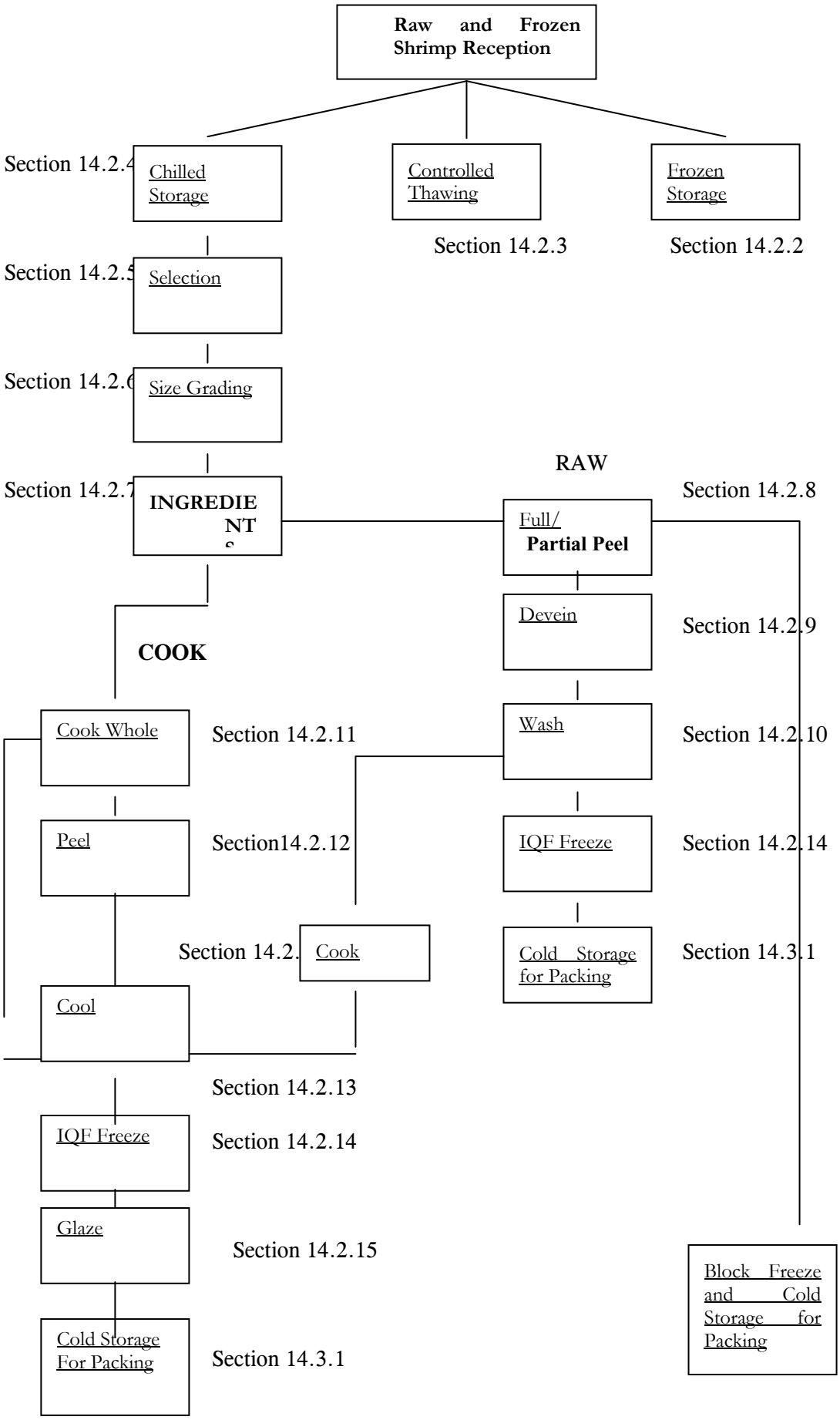
14.1 FROZEN SHRIMPS AND PRAWNS – GENERAL

- the term shrimp is the internationally recognised generic name for Paneus, Pandalus and Palamindae species.
- shrimps for frozen product originate from a wide variety of sources as varied as deep cold seas to shallow tropical inshore waters and rivers through to aquaculture in tropical and semi tropical regions.
- the methods of catching, or harvesting and processing are as equally varied. Species in northern regions may be caught by modern freezer vessels, cooked, individually quick frozen and packed on

board in their final marketing form. More often however, they will be raw IQF on board for further processing at on-shore plants, or even landed chilled on ice. Shrimps of these species are invariably pre-cooked at onshore plants through in-line integrated process lines, followed by mechanical peeling, cooking, freezing, glazing and packing. On the other hand, Paneus species, or warm water shrimps are usually hand peeled before cooking and freezing. More common marketing formats for these shrimps however, are in raw presentations such as head-off shell-on, or as butterfly shrimps, where the head and shell, except for the tail swimmers, are removed and the body is split ventrally and longitudinally to yield an attractive presentation.

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

Figure 14.2 Process flow diagram for preparation of frozen shrimps via typical routes for cooked, whole, cooked and peeled and raw prepared and semi prepared products.



SHRIMP PREPARATION [PROCESSING STEPS 14.2.1 TO 14.2.15]

14.2.1 Raw Fresh and Frozen Shrimp Reception (Process Steps)

Potential Hazards: *phyto toxins (e.g. PSP)*
pathogens/Microbiological contamination
antibiotics/Pesticides
Potential Defects: *variable batch quality*
mixed species
taints
Technical Guidance:

- inspection protocols should be devised to cover identified quality , HACCP and DAP plan parameters together with appropriate training for inspectors to undertake these tasks.
- shrimps should be inspected upon receipt to ensure traceability and that they are well iced or deep frozen.
- the origin and previous known history will dictate the level of checking that may be necessary for, for example, phyto toxins in sea caught shrimps for potential antibiotics presence in aquaculture shrimps, particularly if there is no supplier assurance certification. In addition, other chemical indicators for heavy metals, pesticides and indicators of decomposition such as TVBN's may be applied.
- Microbiological checks should be undertaken.
- shrimps should be stored in suitable facilities and allocated use-by times for processing to ensure quality parameters are met in end products.

14.2.2 Frozen Storage

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

- protective packaging should be undamaged, otherwise repacking to exclude possibilities of contamination and dehydration.
- cold storage temperatures to be suitable for storage with minimum fluctuation.
- product to be processed within the best before time on the packaging, or before as dictated at reception.

14.2.3 Controlled Thawing

Potential Hazards: - *microbiological deterioration/contamination*
- *contamination from wrapping*
Potential Defects: *quality deterioration*
Technical Guidance:

- thawing processes may be undertaken from block frozen or IQF shrimps depending on the raw material source. The outer and inner packaging should be removed prior to defrosting to prevent contamination and extra care should be taken on block frozen prawns where inner wax or polyethylene packaging may be entrapped with blocks.
- thawing tanks should be purpose designed and allow for 'counter current' water defrosting where necessary to maintain lowest temperatures possible. However water re-use is discouraged.
- thawing water and ice should either be fresh or sea water of potable quality with a water temperature no higher than 20°C (68°F) by use of additional ice.
- thawing should be achieved as quickly as possible to maintain quality.
- it is desirable for the exit conveyor, leading from the defrost tanks, to be equipped with a series of low velocity sprays to wash the shrimps with chilled clean water.
- immediately after thawing, the shrimps should be re-iced or held in chill to avoid temperature abuse before further processing.

14.2.4 Chilled Storage

Potential Hazards: *unlikely*
Potential Defects: *quality deterioration*

Technical Guidance:

- chilled storage, preferably under ice in chill rooms at less than 4°C after reception.

14.2.4 Selection

Potential Hazards: *unlikely*

Potential Defects: *quality deterioration*

Technical Guidance:

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

12.2.6 Size Grading

Potential Hazards: *microbiological*

Potential Defects: *quality deterioration*

Technical Guidance:

- size grading of shrimps is typically undertaken through mechanical graders of various degrees of sophistication. There is a possibility of shrimps becoming trapped in the bars of the graders so that regular inspection is required to prevent 'carry over' of old prawns and bacteriological contamination.
- Shrimp should be re-iced and stored in chill prior to further processing.

14.2.7 Addition of Ingredients and Use of Additives

Potential Hazards: *chemical and microbiological contamination*

Potential Defects: *quality deterioration*
ingredient quality
exceeding legislation standards

Technical Guidance:

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

14.2.8 Full and Partial Peeling

Potential Hazards: *microbiological cross contamination*
foreign bodies

Potential Defects: *quality deterioration*
shell fragments

Technical Guidance:

- this process applies mainly to warm water prawns and could be as simple as inspecting and preparing whole large prawns for freezing and down-grading blemished prawns for full peeling.
- other peeling stages could including full peeling or partial peeling leaving tail swimmers intact.

- whatever the process, it is necessary to ensure that the peeling tables are kept clear of contaminated shrimps and shell fragments with water jets and the shrimps are rinsed to ensure no carry over of shell fragments.

14.2.9 Deveining

Potential Hazards: *microbiological cross contamination*
metal contamination
foreign body contamination

Potential Defects: *objectionable matter*
quality deterioration

Technical Guidance:

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

14.2.10 Washing

Potential Hazards: *microbiological contamination*

Potential Defects: *quality deterioration*
contamination

Technical Guidance:

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

14.2.11 Cooking Processes

Potential Hazards: *undercooking, microbiological cross contamination*

Potential Quality Defects: *under/over cooking*

Technical Guidance:

- the cooking procedure, in particular time and temperature, should be fully defined according to the specification requirements of the final product, for example whether it is to be consumed without further processing and the nature and origin of the raw shrimp and uniformity of size grading.
- the cooking schedule should be reviewed before each batch and where continuous cookers are in use, constant logging of process parameters should be available.
- only potable water should be used for cooking, whether in water or via steam injection.
- cooking temperatures should be monitored by selecting samples and recording the process in shrimps of the largest size used.
- maintenance and cleaning schedules should be available for cookers and all operations should only be undertaken by fully trained staff.
- adequate separation of cooked shrimps exiting the cooking cycle utilising different equipment is essential to ensure no cross contamination.

14.2.12 Peeling Cooked Prawns

Potential Hazards: *cross contamination*

Potential Defects: *presence of shell*

Technical Guidance:

- this is essentially a process for Pandalus species of cold water prawns and is a highly mechanised process in-line with cooking, cooling and freezing processes.
- cleaning and maintenance schedules should be available, implemented by fully trained staff to ensure efficient and safe processing are essential.

14.2.13 Cooling

Potential Hazards: *microbiological contamination*

Potential Defects: *unlikely*

Technical Guidance:

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

14.2.14 Freezing Processes

Potential Hazards: *mcrobiological*

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

Technical Guidance:

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

14.2.15 Glazing

Potential Hazards: *microbiological cross-contamination*

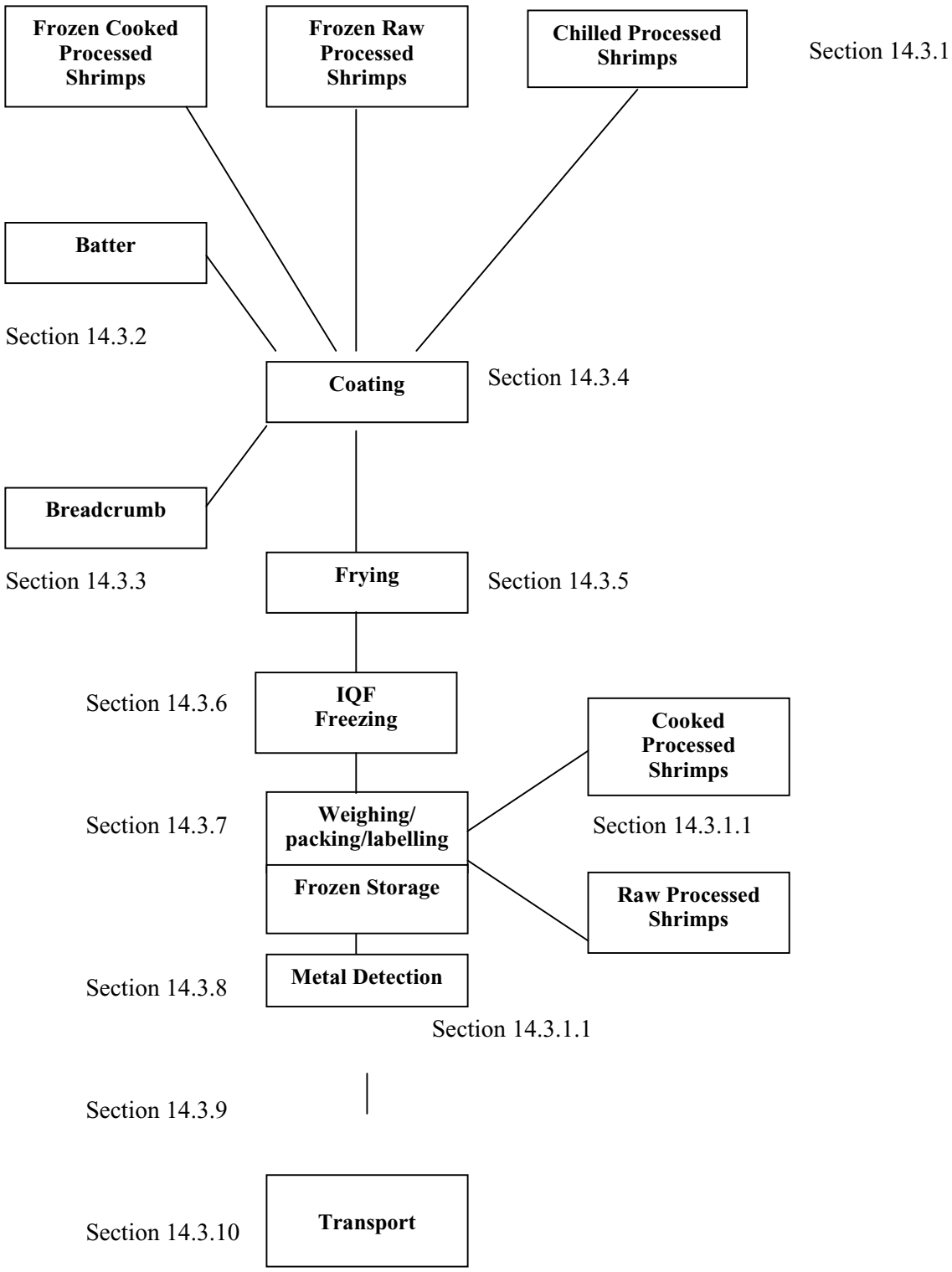
Potential Defects: *inadequate glaze, too much glaze, spot welding, incorrect labelling.*

Technical Guidance:

- glazing is applied to frozen shrimps to protect against dehydration and maintain quality during storage and distribution.

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

14.3 Process flow diagram for further added-value shrimp product preparation and for packing, weighing and labelling of all products.



14.3.1 Further Processing and Packing

Potential Hazards: *microbiological and toxin production*

Potential Defects: *contamination by extraneous material*
poor quality coatings

14.3.4 Coated Product Production

Potential Hazards: *oil fire risks*
microbiological toxins

Potential Defects: *Incorrect coating pick ups and labelling issues*
burnt crumb coating
poor texture

Technical Guidance:

- the essential process flow for further processed added value coated products involves the use of cooked frozen shrimps, raw frozen shrimps or either of these taken chilled immediately from the process lines.
- where chill shrimp materials are used, the issues of quality and continued protein deterioration need to be taken into account.
- where frozen shrimp materials are used, steps should be taken to keep them frozen to preserve quality and texture. Note also that frozen shrimp material should not be glazed otherwise coatings will 'blow-off' on frying or cooking.

14.3.2 Batter

- batter ingredients powders should be checked against buying specification and ideally sieved before use to remove any packaging and extraneous materials.
- water should be potable and chilled
- batter mixing should be to preset recipes and viscosity checked to ensure correct for batter pick up required on product.
- note that bacterial toxin formation is a possibility in batter mixes so that usage times and temperatures should be set and cleaning schedules of equipment defined and maintained.
- tempura style batters may be used, in which case additional crumb coatings will probably not be applied. However, frying temperatures and times will be critical to ensure correct texture.
- where batter is for adherence of a crumb coating, formulation and viscosity will be different to tempura styles.

14.3.3 Breadcrumb

- Breadcrumb formulation and grist, or particle size will need to be checked against buying specification and stored according to supplier instructions to avoid stailing.

14.3.5 Frying

- Whilst frying is necessary for tempura batter coatings, it may not always be used for crumb coating operations, although it does ensure adhesion.
- Fryers should be operated by trained staff. Oil changed on a regular basis to avoid oxidative rancidity.
    - Oil temperatures should be controlled to avoid burning crumb or fire risks.

14.3.6 IQF

- Freezing conditions are typical of those described in 14.2.14

14.3.7 Weighing, Packing and Labelling of Al l Products

Potential Hazards: *unlikely*

Potential Defects: *incorrect labelling*
quality deterioration

Technical Guidance:

- all wrappings for products and packaging including glues and inks should have been specified to be food grade, odourless with no risk of substances likely to be harmful to health being transferred to the packed food.
- all food products should be weighed in packaging with scales appropriately tared to ensure correct weight.
- where products are glazed, coated or otherwise prepared, checks should be carried out to ensure the correct compositional standards to comply with legislation and packaging declarations.
- ingredients lists on packaging should declare presence of ingredients in the food product in descending order by weight, including any additives used and still present in the food.
- all wrapping and packaging should be carried out in a manner to ensure that the frozen products remain frozen and that temperature rises are minimal before transfer back to cold storage.

14.3.8 Metal Detection

Potential Hazard: *residual metal contamination*

Potential Defect:

Technical Guidance:

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

14.3.9 Storage of End Product

Potential Hazard: *none likely*

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

***Technical* Guidance:**

- all end products should be stored at frozen temperature in a clean, sound and hygienic environment.
- severe fluctuations of storage temperature (greater than 3°C) has to be avoided.
- too long storage time (depending on fat content of species used and type of coating) should be avoided.
- the facility should be capable of maintaining the temperature of the fish at or colder than 18°C with minimal temperature fluctuations.
- the storage area should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended.
- a systematic stock rotation plan should be developed and maintained.
- products should be properly protected from dehydration, dirt and other forms of contamination.
- all end products should be stored in the freezer to allow proper air circulation.

14.3.11 Transport of End Product

Potential Hazard: *none likely*

Potential Defects: *quality deterioration*

Technical Guidance:

- during all transportation steps deep-frozen conditions should be maintained –18°C (maximum fluctuation +/-3°C) until final destination of product is reached.
- cleanliness and suitability of the transport vehicle to carry frozen food products should be examined.

  use of temperature recording devices with the shipment is recommended.

SECTION 15 - PROCESSING OF CEPHALOPODS

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

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

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

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

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

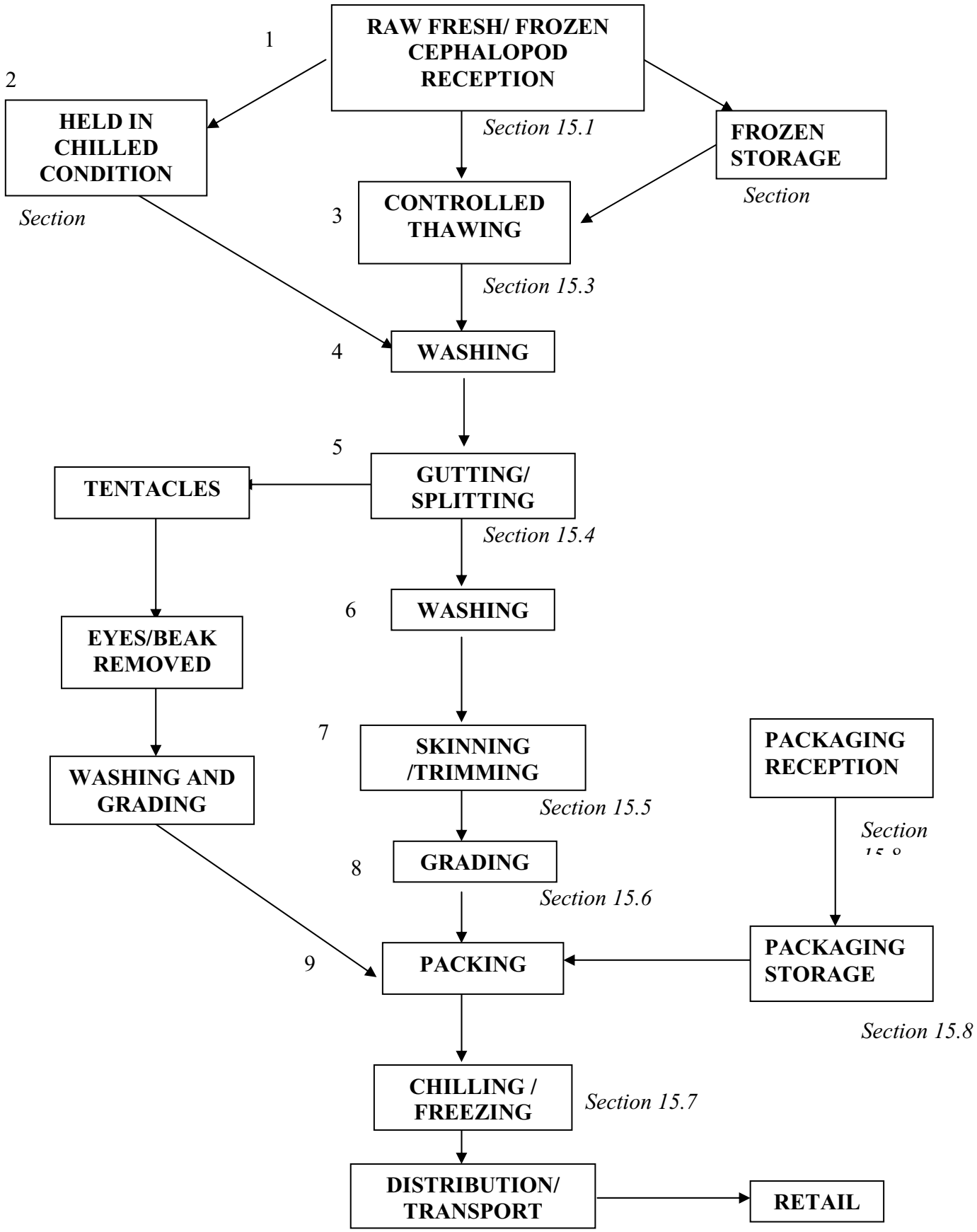


Figure 15.1 Example of a possible squid processing line

15.1 RECEPTION OF CEPHALOPODS (PROCESSING STEP 1)

Potential Hazards: *Pathogenic micro-organisms, chemical contamination, parasites*

Potential Defects: *Damaged products, extraneous matter*

Technical Guidance:

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

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

15.2 STORAGE OF CEPHALOPODS

15.2.1 Chilled storage (Processing steps 2 and 10)

Potential Hazards: *Microbiological pathogens*

Potential Defects: *Decomposition, physical damage*

Technical Guidance:

Refer to Section 8.1.2 "Chilled Storage"

15.2.2 Frozen Storage (Processing steps 2 & 10)

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

Potential Defects: *Freezer-burn*

Technical Guidance:

Refer to Section 8.1.3 "Frozen Storage".

- Consideration needs to be given to the fact that when there are high cadmium levels in the gut contents there may be migration of this heavy metal into the flesh.

15.3 CONTROLLED THAWING (PROCESSING STEP 3)

Potential Hazards: *Microbiological pathogens*

Potential Defects: *Decomposition, discoloration*

Technical Guidance:

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

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

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

Potential Hazards: *Unlikely*

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

Technical Guidance:

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

15.5 SKINNING, TRIMMING (PROCESSING STEP 7)

Potential Hazards: *Unlikely*

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

Technical Guidance:

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

15.6 GRADING/PACKING (PROCESSING STEPS 8 & 9)

Refer to Section 8.2.3 "Labelling".

Potential Hazards: *chemical or physical contamination from packaging*

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

Technical Guidance:

- Packaging material should be clean, be suitable for it's intended purpose and manufactured from food grade materials;
- Grading and packing operations should be carried out with minimal delay to prevent deterioration of the cephalopod;

15.7 FREEZING (PROCESSING STEP 10)

Potential Hazards: *parasites*

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

Technical Guidance:

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

- The time/temperature parameters developed should ensure rapid freezing of product and should take into consideration the type of freezing equipment, capacity, the size and shape of the product, and production volume. Production should be geared to the freezing capacity of the processing facility;

- If freezing is used as a control point for parasites, then the time/temperature parameters need to ensure that the parasites are no longer viable need to be established;
- The product temperature should be monitored regularly to ensure the completeness of the freezing operation as it relates to the core temperature;
- Adequate records should be kept for all freezing and frozen storage operations;

For further guidance refer to Section 8.3.1 "Freezing Process".

15.8 PACKAGING, LABELS AND INGREDIENTS – RECEPTION AND STORAGE

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

SECTION 17 - TRANSPORT

Transportation applies to all sections and is a step of the flow diagram which needs specific skills. It should be considered with the same care as the other processing steps. This section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

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

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

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

Technical Guidance:

17.1 FOR FRESH, REFRIGERATED AND FROZEN PRODUCTS

- pre-cool vehicles before loading;
- avoid unnecessary exposure to elevated temperatures during loading and unloading of fish, shellfish and their products;
- load in order to ensure a good air flow between product and wall, floor and roof panels ; load stabilizer devices are recommended
- monitor air temperatures inside the cargo hold during transportation; the use of a recording thermometer is recommended
- during transportation
  - frozen products should be maintained at –18°C or below (maximum fluctuation +3°C)
  - fresh fish, shellfish and their products should be kept at a temperature as close as possible to 0°C. Fresh whole fish should be kept in shallow layers and surrounded by finely divided melting ice; adequate drainage should be provided in order to ensure that water from melted ice does not stay in contact with the products or melted water from one container does not cross contaminate products in other containers.
  - [transportation of fresh fish in containers with dry freezer bags and not ice should be considered where appropriate;]
  - [transportation of fish in an ice slurry, chilled sea water or refrigerated sea water (e.g. pelagic fish) should be considered where appropriate;]
  - refrigerated processed products should be maintained at the temperature specified by the processor [but generally should not exceed 4° C].

– provide fish, shellfish and their products with adequate protection against contamination from dust, exposure to higher temperatures and the drying effects of the sun or wind.

17.2 FOR LIVE FISH AND SHELLFISH

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

17.3 FOR CANNED FISH AND SHELLFISH

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

17.4 FOR ALL PRODUCTS

- before loading, the cleanliness, suitability and sanitation of the cargo hold of the vehicles should be verified;
- loading and transportation should be made in order to avoid damage and contamination of the products and to ensure the packaging integrity.

SECTION 18 - RETAIL

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

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

Proper storage temperature after receipt is critical to maintain product safety and essential quality. Chilled products should be stored in a hygienic manner at temperatures less than or equal to 4°C (40°F), MAP products at 3°C (28°F) or lower, while frozen products should be stored at temperatures less than or equal to -18°C (0°F).

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

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

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

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

Potential Hazards: *see Reception 7.1, 8.1*

Potential Defects: *see Reception 7.1, 8.1*

Technical Guidance:

- The transport vehicle should be examined for overall hygienic condition. Products subject to filth, taint or contamination should be rejected.
- Product in the transport vehicle should be examined for possible cross contamination. Determine that cooked-ready-to-eat product has not been exposed to raw product or juices or live molluscan shellfish and that raw molluscan shellfish have not been exposed to other raw fish or shellfish.
- Seafood should be regularly examined for adherence to purchasing specifications.
- All products should be examined for decomposition and spoilage at receipt. Products exhibiting signs of decomposition should be refused.

18.1.1 Reception of Chilled Products at Retail

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

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

Technical Guidance:

- Product temperature should be taken from several locations in the shipment and recorded. Chilled fish, shellfish and their products should be maintained at or below 4°C (40°F). MAP product, if not frozen, should be maintained at or below 3°C (28°F).

18.1.2 Reception of Frozen Products at Retail

Potential Hazards: *None likely*

Potential Defects: *Thawing, Contaminants, Filth*

Technical Guidance:

- Incoming frozen seafood should be examined for signs of thawing and evidence of filth or contamination. Suspect shipments should be refused.
- Incoming frozen seafood should be checked for internal temperatures, taken and recorded from several locations in the shipment. Frozen fish, shellfish and their products should be maintained at or below -18°C (0°F) and should be rejected if the internal temperature exceeds 0°C (32°F).

18.1.3 Chilled Storage of Products at Retail

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

Potential Defects: *Decomposition, Contaminants, Filth*

Technical Guidance:

- Products in chilled storage should be held at 4°C (40°F). MAP product should be held at 3°C (28°F) or below.
- Seafood should be properly protected from filth and other contaminants through proper packaging and stored off the floor.
- A continuous temperature recording chart for seafood storage coolers is recommended.
- The cooler room should have proper drainage to prevent product contamination.

- Ready-to-eat items and molluscan shellfish should be kept separate from each other and other raw food products in chilled storage. Raw product should be stored on shelves below cooked product to avoid cross contamination from drip.
- A product rotation system to ensure first in, first out usage should be established.

18.1.4 Frozen Storage of Products at Retail

Potential Hazards: *None Likely*

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

Technical Guidance:

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

18.1.5 Preparation and Packaging Chilled Product at Retail

Refer to Section 8.2.3, "Labelling".

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

Potential Defects: *Decomposition, Incorrect Labelling*

Technical Guidance:

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

[NOTE: New section needed re: labelling of loose products sold from retail fish counters etc.]

18.1.6 Preparation and Packaging of Frozen Seafood at Retail

Refer to Section 8.2.3, "Labelling".

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

Potential Defects: *Thawing, Incorrect Labelling*

Technical Guidance:

- Care should be taken to ensure that allergens are identified, in accordance to Section 3, Pre-requisite Programmes and Codex Labelling Standards.
- Care should be taken to avoid cross contamination of ready-to-eat and raw product.
- Frozen seafood products should not be subjected to ambient room temperatures for a prolonged period of time.

18.1.7 Retail Display of Chilled Seafood

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

Potential Defects: *Decomposition, Dehydration*

Technical Guidance:

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

18.1.8 Retail Display of Frozen Seafood

Potential Hazards: *None Likely*

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

Technical Guidance:

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

APPENDIX I

MODIFIED ATMOSPHERE PACKING

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

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

For white fish gas mixtures containing 35-45% CO_2, 25-35% O_2 and 25-35% N_2 are recommended. Gas mixtures containing up to 60% CO_2 in combination solely with N_2 are recommended for oily fish. The inclusion of CO_2 is necessary for inhibiting common aerobic spoilage bacteria such as *Pseudomonas* species and *Acinetobacter/Moraxella* species. However, for retail packs of fillets or similar products, too high a proportion of CO_2 in the gas mixture can induce pack collapse, excessive drip and may cause bleaching. Other gases, N_2 and O_2, are included as diluents to prevent these effects. O_2 is preferentially excluded from oily fish in MA packs so as to inhibit oxidative rancidity. A gas/product ratio of 3:1 is commonly recommended. Any reductions in this ratio can result in an impaired shelf-life extension.

The extent to which the shelf-life of the product can be extended by MAP will depend on the species, fat content, initial bacterial load, gas mixture, type of packaging material and, especially important, the temperature of storage. Determination of the shelf life of a particular product should be by a suitably qualified person such as a food technologist or microbiologist. Since fish can be contaminated with *Clostridium botulinum* type E great care has to be exercised when determining the shelf life. Although it is generally accepted that *Clostridium botulinum* does not grow at temperatures below +3°C other factors, e.g. salt content or pH etc., can also have an inhibitory effect. Thus when determining the shelf life of MAP fresh fish it is advisable to do challenge tests on the product which accurately reflect the product conditions and storage and distribution environment. It is very important to note that the inclusion of O_2 does not preclude the growth of *Clostridium botulinum* type E and temperature control throughout the shelf-life of the product is very important. In many circumstances it is considered undesirable to use ice to cool these packs and therefore mechanical refrigeration methods are preferred.

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

Maintenance of the correct gas mixture injected into MA packs is essential to ensure product quality, appearance and shelf life extension. For these reasons routine gas analysis of MA packs should be included as part of the process control. Analysis of the gases within MA packs can indicate faults with seal integrity, MA materials, MAP machinery or gas mixing prior to flushing. The use of continuous gas analysers is recommended. Immediate gas analysis following packing is necessary as CO_2 absorption takes place rapidly.

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

APPENDIX III

OPTIONAL FINAL PRODUCT REQUIREMENTS[3] - FRESH, FROZEN AND MINCED FISH

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

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

1.1 Quick Frozen Finfish, Uneviscerated and Eviscerated

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

1.2 Quick Frozen Fish Fillets[4]

Defect	Recommended Defect Description
a) Moderate Dehydration	A loss of moisture from the surface of the sample unit, which is colour masking, but does not penetrate the surface and can be easily removed by scraping. Over 10% of the total surface area; or

Pack Size	Defect Area
a) <200 g units	>25cm^2
b) 201-500 g units	>50cm^2
c) 501- 5000 g units	>150cm^2

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

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

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

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

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

Pack Size	Defect Area
a) $<200g$ units	$>25cm^2$

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

APPENDIX IV

OPTIONAL FINAL PRODUCT REQUIREMENTS - FROZEN SURIMI

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

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

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

1. Primary Quality Attribute

1.1 Raw Surimi Tests

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

1.1.1 Moisture

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

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

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

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

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

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

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

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

1.1.2 pH

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

1.1.3 Objectionable Matter

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

Spread 10 g of the test sample to the thickness of 1 mm or less, and count the number of visible objectionable matter in it. Indicate the value obtained thereby, provided an objectionable matter of 2 mm or larger shall be counted as one and an objectionable matter smaller than 2 mm shall be counted as one half, respectively, and any unnoticeable matter smaller than 1 mm shall be disregarded.

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

1.2 Cooked Surimi Gel Tests

1.2.1 Gel Strength and Deformability

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

1.2.1.1 Puncture Test

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

A. Comminution

Sample volume necessary for surimi paste preparation depends on the capacity of mixing instrument used. Use of 1.5 kg or more is necessary to represent the property of 10 kg of block. Regarding that enough amount of surimi is necessary for consistency of testing, equipment of large capacity which can mix surimi of 1.5 kg or more must be installed in laboratory. When you use larger size of the equipment, you also need to put in adequate amount of surimi in accordance with equipment to secure enough texture of surimi paste. Crush 1.5 kg or more of the test sample with a silent cutter, then add 3% of salt to it, and further grind and mash it for 10 minutes or more into homogenized meat paste. Remember to keep the temperature of the material to be tested, at 10°C or less.
Desirable timing for adding salt is at -1.5°C.
Desirable temperature of the test material is 5-8°C.

B. Stuffing

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

C. Heating

Heat the test material in hot water of 84-90°C for 30 minutes.
At the time the test material is being put in, the temperature drop should not exceed 3°C.

D. Cooling

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

Test Method

Perform between 24 and 48 hours after cooking the following measurements of the prepared inspection sample of surimi gel of which temperature should equilibrate to the room temperature and record the temperature of the sample at the time of measurement.
Measure the gel strength and deformability of the inspection sample of surimi gel with a squeeze stress tester (rheometer). Use a spherical (plunger), of which diameter shall be 5 mm and speed shall be 60 mm/minute.
Remove film off the inspection sample of surimi gel, cut it into 25 mm long test specimen, and place test specimen on the sample deck of the tester so that the centre of the test specimen will come just under the plunger. Apply load to the plunger, and measure the penetration force in g and the deformation in mm at breakage.
Record the obtained value of the penetration and deformation in g by integral number. Record the obtained value of the deformation in mm to the first decimal place.
Prepare six or more test specimens from the same inspection sample of Surimi gel, and test each of them. Record the average values obtained thereby.

1.2.1.2 Torsion Test

Preparation of the surimi gel test specimen

A. Comminution

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

B. Stuffing

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

C. Heating

Heat process by immersing filled tubes in a water bath previously equilibrated to the proper temperature. Time-temperature relationships for thermal processing are: low temperature setting ability: 0-4°C for 12-18 hours, followed by 90°C for 15 min; median temperature setting ability: 25°C for 3 hours, followed immediately by 90°C for 15 min; high temperature setting ability: 40°C for 30 minutes, followed immediately by 90°C for 15 min; evaluation of protease activity: 60°C for 30 minutes, followed immediately by 90°C for 15 min; rapid cooking effect: 90°C for 15 minutes. It is recommended that water baths be heated to about 5°C higher than the intended treatment temperature, to account for the heat loss experienced upon loading, and the temperature be adjusted approximately within 2 minutes, possibly requiring ice addition.
Only cold water species will demonstrate good setting ability at lower temperatures. The heat process used to prepare the sample should be specified; if not, it is assumed that only the rapid cooking effect is being assessed. Relative proteolytic activity is assessed by comparing tests conducted on gels prepared at 60/90°C with those processed only at 90°C.

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

D. Cooling

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

Test Method

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

Measurement of Stress and Strain:

The gel-forming ability of surimi is evidenced by the fundamental rheological properties of the test product when strained to failure (breakage). Allow refrigerated samples to reach room temperature (near 25°C) before testing. Cut test specimens to length of about 30 mm. Attach specimens to mounting discs at each flat end with cyanoacrylate glue, being careful to place samples in centre of mounting discs. Mill centre of test specimens to a capstan shape, the milled portion being 1 cm. in diameter. Mount the milled test specimen in the torsion rheometer. Rotate top of sample to the point of sample failure (breakage) and record torque and rotational distance at this point. Calculate and report stress and strain at sample failure as: Stress = t = 1581 x (torque units); Strain = ln $[1+(g^2/2) + g(1+g^2/4)^{0.5}]$, where g = 0.150 x (rotational distance, mm) - 0.00847 x (torque units). In practice these equations are normally programmed onto a computer linked to the torsion rheometer for data acquisition and analysis, thus yielding directly the stress and strain measurements.

1.2.2 Colour

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

2. Secondary Quality Attributes

2.1 Raw Surimi Tests

Preparation of test sample:

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

2.1.1 Objectionable Matter(Scales)

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

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

2.1.2 Crude Protein Content

AOAC Kjeldahl Method

2.1.3 Sugar Content

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

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

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

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_0 : Weight of receptacle(g)
W_1 : Weight of receptacle after fat has been extracted(g)

2.1.5 Colour and Whiteness

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

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

2.1.6 Pressure Induced Drip

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

measure the weight of the dripped liquid. Calculate its percentage to the weight of the test sample to the first decimal place. Indicate the value obtained thereby.

2.2 Cooked Surimi Tests

2.2.1 Preparation of test sample

2.2.1.1 Water-added Surimi gel:

A. ***Comminution***

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

B. Casing

Same as Section1 2.1.1.B of this Appendix

C. Heating

Same as Section 1.2.1.1.C of this Appendix

D. Cooling

Same as Section 1.2.1.1.D of this Appendix

2.2.1.2 Starch-added Surimi gel

A. Comminution

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

B. Stuffing

Same as Section 1.2.1.1.B of this Appendix

C. Heating

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

D. Cooling

Same as Section 1.2.1.1.D of this Appendix.

2.2.1.3 Suwari (setting)-treated Surimi gel

A. Comminution

Same as Section 1.2.1.1.A of this Appendix.

B. Casing

Same as Section 1.2.1.1.B of this Appendix.

C. Heating

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

D. Cooling

Same as Section 1.2.1.1.D of this Appendix.

2.2.2 Test method

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

2.2.2.1 Whiteness

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

2.2.2.2 Expressible Moisture

Place a slice of surimi gel (2 cm diameter X 0.3 cm thick and about 1 g in weight) between two filter papers and press them by an oil pressure equipment under a fixed pressure (10 kg/cm^2) for 20 sec.
Calculate the expressible water according to the following formula to the first decimal place.
Test three or more pieces of the test sample, and indicate the average value obtained thereby.

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

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

Water holding capacity (%) is calculated as follows.

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

2.2.2.3 Folding test:

The folding test is conducted by folding a 5-millimeter thick slice of gel slowly in half and in half again while examining it for signs of structural failure (cracks). Make sure the sample is folded completely in half. Keep the folded state for five seconds, and then evaluate the change in the shape by 5 - stage merit marks. The minimum amount of folding required to produce a crack in the gel determines the score for this test. Test three or more slice pieces of the same inspection sample, and indicate the average mark obtained. In case of folding by hand, apply constant power throughout the folding surface.

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

2.2.2.4 Sensory (Biting) Test

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

Merit Mark	"Ashi (footing) Strength"
10	Extremely strong
9	Very strong
8	Strong
7	Slightly strong
6	Fair
5	Slightly weak
4	Weak
3	Very weak
2	Extremely weak
1	Incapable to form gel

APPENDIX V:
OPTIONAL FINAL PRODUCT REQUIREMENTS:- COATED QF FISHERY PRODUCTS

Type of product	Defect	Recommended Description
Frozen state	Presence of Surplus Loose Coating	Any excessive amount of loose material in the package as percentage of declared net weight.
	Excessive Fat (Oil)	Each instance of perceptible amounts of oil which have stained the inside of and soaked through the packaging.
	Ease of separation	Upon removal from the pack units do not separate easily by slight force exerted by hand without damage and without packaging material sticking to the surface, percentage of stick (fingers) or portions (fillets) affected.
	Broken Products	Broken products, which have been separated into pieces. Each instance.
	Damaged Products	Damaged products, which have been squashed, mashed or otherwise mutilated to an extent that appearance is materially affected. Each instance
	Discoloration of Coating	Colour of individual units which are black or very dark brown. Each instance. Colour significantly different from other units in the sample. Each instance. Widespread black spots derived from burnt breadcrumbs.
	Size uniformity (if declared)	Deviation of the individual size of stick or portion expressed as percentage of weight.
	Coating	Fish sticks (fingers), portions or fillets where the surface is not completely covered by breading and/or batter.
	Ice Pockets (which may result in coating damage during cooking)	Ice pockets with a surface area greater than1cm^2 (each instance). Air pockets with a surface area of greater than1cm^2 and with a depth of greater than 3 mm, each instance.

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

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

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

1. PRODUCT DESIGNATION OF SALTED FISH OF FAMILY GADIDAE

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

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

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

Quality classification

Imperial/superior

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

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

This category may include fish with the following characteristics:

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

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

Universal

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

This trade category may include fish with the following characteristics:

1. inadequately split
2. round tail
3. inadequately washed or rinsed
4. insufficient removal of backbone
5. moderate blood clot
6. major tears or longitudinal cracks
7. moderate cracking
8. minor blood, liver and/or bile stains

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

Popular

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

2. Product designation of ....

APPENDIX VII OPTIONAL PRODUCT REQUIREMENTS – SMOKED FISH

[TO BE COMPLETED]

APPENDIX VIII - OPTIONAL FINAL PRODUCT REQUIREMENTS – LOBSTERS AND CRABS

(HAS TO BE COMPLETED)

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

1. Quick Frozen Lobsters

Defect	Recommended Defect Description
a) Appearance	(i) Not easily separated without thawing when labelled as individually quick frozen.
	(ii) Colour not generally uniform and non characteristic of the product, species and habitat or areas from which harvested.
	(iii) In the case of products in the shell, the shell is not firm and is broken.
b) Damaged	Broken telson, cuts or scars penetrating the shell, crushed or cracked shell.
c) Soft Shell	The shell is easily flexed by hand.
	The raw meat is not characteristically translucent.
	(% affected by weight)
d) Opacity	The meat of lobster, rock lobsters, spiny
e) Texture	lobsters and slipper lobsters is tough, fibrous, mushy or
	gelatinous. (% affected by weight).

APPENDIX IX :
OPTIONAL FINAL PRODUCT REQUIREMENTS:- SHRIMPS & PRAWNS

A. FROZEN AND IQF PEEL AND DE-VEIN SHRIMPS OR PRAWN

QUALITY FACTOR
Determination of Grade

The grade should be determined by examining the product in the frozen, thawed and cooked states, using the table of deduction:

100 to 90	**First quality**
89 to 80	**Second quality**

Flavour:	Characteristic, without unpleasant flavours.
Frozen:	Means the product with a thermal centre of maximum temperature of -18° C (0° F)
Odour:	Characteristic. Yodoform odour isn't considered a defect.
Dehydration:	The shell and/or meat of the shrimps or prawns have parts that affect appearance, texture and flavour.
Texture:	Texture should be firm, but tender and moist. Slight: fairly firm, only slightly tough or rubbery, does not form a fibrous mass in the mouth, moist but not mushy. Moderate: moderately tough or rubbery, has noticeable tendency to form a fibrous mass in the mouth, moist but not mushy. Excessive: excessively tough or rubbery, has marked tendency to form a fibrous mass in the mouth, or is very dry or very mushy.
Black spots:	The shell and/or meat of the shrimps or prawns should be absent of black spots that affect the appearance.
Broken:	Shrimps with a broken part bigger than ¾ of the size.
Piece:	Part of shrimps or prawns, minimal ¼ of the size.
Extraneous material:	All the material present in the pack that isn't part of shrimps or prawn and is not dangerous.
Uniformity of size:	Select by count 10 of the largest shrimps or prawns, and 10 of the smallest shrimps or prawns and divide the largest weight by the smallest weight to get a weight ratio.

Evaluation of flavour and odour:

For the evaluation of odour hold the shrimps or prawns close to the nose for evaluation. If the results of the raw odour evaluation indicate the existence of any off-odours, the sample shall be cooked to verify the flavour and odour.

Steam method:

Put the sample in a plastic bag, and place on a wire rack suspended over boiling water in a covered container. Steam the packaged product for 5 to 10 minutes.

Examination for physical defects:

Each of the shrimps or prawns in the sample should be examined for defects using the list of defect definitions.

Schedule of Point Deductions per Sample

Type of Product	Factor scored	Method of determining score	Deduct
Frozen State	Dehydration	Up to 5% From 5.1% to 10% More than 10% More than 15%	0 3 6 11
Thaw State	Black spot only in shell	Absence Up to 5% Each 4% additional or less	0 1.5 2
	Black spot in meat	Absence Up to 3% From 3.1% to 5% Each 5% additional or less	0 1 2 2
	Broken, damaged and pieces	Up to 1% From 1.1% to 3% Each 3% additional or less	1 2.5 2.5
	Dehydration	Absence Up to 2% From 2.1 to 5% More than 5%	0 3 6 11
	Dehydration in meat	Absence Slight Moderate Excessive	0 3 6 11
	Heads and unacceptable shrimps or prawns	Up to 1% Each 1% additional or less	2 3
	Extraneous material, not dangerous	1 piece 2 pieces More than 2 pieces Sand	1 2 4 21
	Uniformity of size	Slightly larger or smaller. Each 3% or fraction. Larger or smaller. Each 3% or fraction.	1 2
	Odour	Characteristic. Slightly different to characteristic. Moderately different to characteristic. Excessively different to characteristic.	0 6 12 21
	Inappropriate peel and de-vein	Absence Over 1%; not over 6% Over 6.1%; not over 10% More than 10%	0 1 2 4
	Shells	Up to 3% Each 1% additional or less	0 2
Cooked State	Texture	Firm, but tender and moist Slight Moderate Excessive	0 2 4 21
	Odour	Characteristic Slight Unpleasant	 0 21

B. BREADED SHRIMPS OR PRAWNS

QUALITY FACTOR

Determination of Grade

The grade should be determined by examining the product in the frozen and cooked states, using the table of deduction:

100 to 85 **First quality**
84 to 75 **Second quality**

Schedule of Point Deductions per Sample:

Type of Product	Factor scored		Method of determining score	Deduct
Frozen State	Broken		Break or cut greater than ¾ of the size	15
	Uniformity of size		Over 1.0; not over 1.35 Over 1.36; not over 1.40 Over 1.41; not over 1.45 Over 1.46; not over 1.50 Over 1.51; not over 1.55 Over 1.56; not over 1.60 Over 1.61; not over 1.65 Over 1.65	0 1 1.5 2 2.5 3.0 3.5 4
	Easy of separation		Slight: Hand separation difficult. Each affected. Moderate: Separated with knife. Each affected.	1 2
Cook State	Black spot in meat		Absence Up to 5% Each 4% additional or less	0 1.5 2
	Coating defects		Absence Up to 3% From 3.1% to 5% Each 5% additional or less	0 1 2 2
	Texture	Shrimp flesh	Firm, but tender and moist Slight Moderate Excessive	0 2 4 15
		Coating	Moderately dry, soggy or tough Mealy, pasty, very tough	5 15

APPENDIX X - OPTIONAL FINAL PRODUCT REQUIREMENTS -CEPHALOPODS [TO BE COMPLETED]

APPENDIX XI

OPTIONAL FINAL PRODUCT REQUIREMENTS - CANNED FISH

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

1. Canned finfish

Defects	Recommended Defect Description
a) Drained or Washed Drained Weight	The drained weight of fish (liquid pack), or the washed drained weight of fish (sauce packs) shall be not less than the following % (m/m) of water capacity of the can when packed in : (i) edible oil 70% (ii) own juice ; brine or water ; marinade ; aspic 60% (iii) sauces, also with other packing media added 50%
Exuded water (oil packs only)	Water content (expressed as % of declared net contents of can). (i) fish packed in oil > 8% (ii) fish packed in oil with own juice > 12%
Separation of sauces	Sauce separated into solid and liquid (except oil)
b) Appearance	The product in a can shall comprise fish of an appearance and colour characteristic of the genus processed and packed in the manner indicated.
Dressed Fish and Cutlets in Various Packing Media	Cutting, Trimming and Evisceration (i) Parts of tail (except for small fish) and/or head (ii) Hard scutes (jack mackerel) (iii) More than one fish with feed except for small fish and cutlets in the belly uncut. Excessive amount of viscera (one or more fish not eviscerated). Non characteristic pieces (i) Each additional small piece (ii) Over 10% of flake or further disintegrated fish flesh, skin, bone or fin fragments.
Fillets, Bits, and Flakes in Various Packing Media	Cutting and Trimming Parts of head, tail, viscera or scutes each instance. Skin (fillets labelled skinless) - Each instance greater than 3 cm^2 Black Membrane - Each instance greater than 5 cm^2 Non characteristic pieces (fillets and pieces only) Flake or further disintegrated fish flesh clearly separated from fillets or pieces of fillets (expressed as % of drained fish solids material)
Discoloration, packing media	The packing medium not of normal colour and consistency for the type of pack.
Fill of Container	A can not well filled with fish and packing media not in accordance with the type of pack.

2. Canned sardines and sardine-type products

Defects	Recommended Defect Description
a) Appearance	The fish in the container : (i) are not reasonably uniform in size ; (ii) are not of an appearance or colour characteristic of the species processed or packed in the manner indicated ; (iii) are not neatly cut to remove the head ; (iv) have excessive ventral breaks (unsightly rupture of the ventral area), or breaks and cracks in the flesh. (v) More than 40% of fish in a can having ventral breaks of half the length or more of the abdominal cavity (vi) The packing medium is not of normal colour and consistency for the type. (vii) The can is not well filled with fish.
b) Exuded water (oil packs only)	Water content expressed as % of net contents of can

3. Canned tuna and bonito

No optional defects have been developed for this product.

4. Canned salmon

Defect	**Recommended Defect Description**
a) Appearance (i) Cross fill (ii) Ragged appearance	(i) The can is not well filled with fish. (ii) In the case of regular packs, the sections of fish are not arranged so that the cut surfaces are approximately parallel to the opened end and the skin side is not parallel to the walls of the can. Regular packs are not reasonably free from cross packs and pieces or sections of vertebrae across the top of the can. (iii) The oil and liquid released during processing are not normal and characteristic of the species packed.
b) Bones	Hard bone
c) Colour of Flesh	Fish having the appearance and colour of the following : (i) Mixed colours in a single can (ii) Abnormal pale colour for the species (iii) Belly burn
d) Bruising and Blood Spots	Presence of bruising or blood spots expressed as a % of the net content of the can.

5. Canned crab meat

Defect	**Recommended Defect Description**
Appearance	On opening the cans are not well filled and are not well arranged where appropriate for the style of presentation.

6. Canned shrimps or prawns

No optional defects have been developed for this product..

APPENDIX XII

CODEX CODES AND STANDARDS CONCERNING FISH AND FISHERY PRODUCTS AND RELATED DOCUMENTS

Recommended International Code of Practice for the Processing and Handling of Quick-Frozen Foods	CAC/RCP 8-1976
Method of Checking Product Temperature of Quick-Frozen Foods	Addendum 1, 1978 to CAC/RCP 8-1976
Recommended International Code of Practice for Fresh Fish	CAC/RCP 9-1976
Recommended International Code of Practice for Canned Fish	CAC/RCP 10-1976
Recommended International Code of Practice for Frozen Fish	CAC/RCP 16-1978
Recommended International Code of Hygienic Practice for Shrimp or Prawns	CAC/RCP 17-1978
Recommended International Code of Hygienic Practice for Molluscan Shellfish	CAC/RCP 18-1978
Recommended International Code of Practice for Lobsters	CAC/RCP 24-1979
Recommended International Code of Practice for Smoked Fish	CAC/RCP 25-1979
Recommended International Code of Practice for Salted Fish	CAC/RCP 26-1979
Recommended International Code of Practice for Minced Fish Prepared by Mechanical Separation	CAC/RCP 27-1983
Recommended International Code of Practice for Crabs	CAC/RCP 28-1983
Standard for Quick Frozen Raw Squid	CODEX STAN 191-1995
Standard for Salted Fish and Dried Salted Fish of the Gadidae Family	CODEX STAN 167-1989, Rev. 1-1995
Standard for Canned Salmon	CODEX STAN 3-1981, Rev. 1-1995
Standard for Quick Frozen Finfish	CODEX STAN 36-1981, Rev. 1-1995
Standard for Canned Shrimp or Prawns	CODEX STAN 37-1981, Rev. 1-1995
Standard for Quick Frozen Fish Fillets	CODEX STAN 190-1995
Standard for Canned Tuna and Bonito	CODEX STAN 70-1981, Rev. 1-1995
Standard for Canned Crab Meat	CODEX STAN 90-1981, Rev. 1-1995
Standard for Quick Frozen Shrimp or Prawns	CODEX STAN 92-1981, Rev. 1-1995
Standard for Canned Sardines and Sardine-type Products	CODEX STAN 94-1981, Rev. 1-1995
Standard for Quick Frozen Lobster	CODEX STAN 95-1981, Rev. 1-1995
Standard for Canned Finfish	CODEX STAN 119-1981, Rev. 1-1995
Standard for Quick Frozen Blocks of Fish Fillets, Minced Fish Flesh and Mixtures of Fish Fillets and Minced Fish Flesh	CODEX STAN 165-1989, Rev. 1-1995
Standard for Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets-Breaded or in Batter	CODEX STAN 166-1989, Rev. 1-1995
Guide to Shellfish Hygiene by P.C. Wood	WHO Offset Publication No. 31 (1976)
Recommended International Code of Practice - General Principles of Food Hygiene (including an Annex on the HACCP System and Guidelines for its Application:	CAC/VOL. A - Ed. 1
Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories	CAC - GL 31 - 1999

PROPOSED DRAFT STANDARD FOR LIVE AND [RAW] BIVALVE MOLLUSCS

(At Step 3 of the Procedure)

1. SCOPE

This standard applies to live and [raw] bivalve molluscs excluding scallop adductal muscle only, intended for direct human consumption or further processing.

2. DESCRIPTION

2.1 Product Definition

Live bivalve molluscs are products that are alive immediately prior to consumption. Presentation includes the shell. [Rawbivalve molluscs are products that are no longer alive immediately prior to consumption but were alive immediately prior to the commencement of processing or to shucking, freezing or other treatment that did not eliminate the sensory characteristics of live products.]

2.2 Process Definition

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

Frozen bivalve molluscs shall after suitable preparation be derived from organisms which meet the requirements for live bivalve molluscs and the product shall, after any suitable preparation [deshelling], 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 freezing process shall not be regarded as complete unless and until the product temperature has reached -18ºC or colder at the thermal centre after thermal stabilization. The product shall be kept deep frozen so as to maintain the quality during transportation, storage and distribution. Frozen bivalve molluscs shall be processed and packaged so as to minimize dehydration and oxidation.

Processed bivalve molluscs shall be derived from organisms which meet the requirements for live bivalve molluscs.

Canned bivalve molluscs are packed in hermetically sealed containers and shall have received a processing treatment sufficient to ensure commercial sterility.

Other approved processes including heat processing (other than canning) may be applied to provide sterilisation.

Covered in Code of Practice.

[Post-harvest treated bivalve molluscs shall be organisms that meet the requirements for live bivalve molluscs, either because they are derived from organisms that meet these requirements or because they have received post-harvest treatment, or because of a combination of the two. The post-harvest treatment shall assure the elimination, reduction, or limitation of the target organisms to the satisfaction of the official agency having jurisdiction.]

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 in count per unit of weight or per package.

In the case of live bivalve molluscs, they may be packed by weight, count, count per unit of weight, volume or per package.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Live Bivalve Molluscs

Bivalve molluscs intended for direct consumption or intended to be processed shall be alive immediately prior to consumption or prior to the commencement of processing and of a quality fit for human consumption.

Bivalve molluscs must respond adequately to percussion and must contain a normal quantity of intravalvular liquid as determined by product specialists familiar with the species.

3.2 Glazing (for frozen bivalve molluscs)

If glazed, the water used for glazing or preparing glazing solutions shall be clean water. (Clean water defined in the Code.)

3.3 Other Ingredients

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

3.4 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

Only the use of the following additives is permitted in processed bivalve molluscs

Antioxidants

For fresh shucked molluscs any antioxidant listed in food category 09.1.2 (Fresh Mollusks, crustaceans and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995) at levels not to exceed good manufacturing practices (GMP).

For fresh raw frozen molluscs any antioxidant listed in food category 09.2.1 (Frozen fish, fish fillets, and fish products, including mollusks, crustaceans, and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995) at levels not to exceed good manufacturing practices (GMP).

For fresh raw frozen molluscs any antioxidant listed in food category 09.2.2 (Frozen battered fish, fish fillets and fish products, including mollusks, crustaceans, and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995) at levels not to exceed good manufacturing practices (GMP).

For fresh raw frozen molluscs any antioxidant listed in food category 09.2.5 (Smoked, dried, fermented, and/or salted fish and fish products, including mollusks, crustaceans, and echinoderms) of the General Standard for Food Additives (CODEX STAN 192-1995) at levels not to exceed good manufacturing practices (GMP).

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

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

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

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

AND/OR – for discussion

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

(iii) [Live bivalve molluscs and products thereof must not contain Salmonella in 25 g flesh.]

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

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

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

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

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

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

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

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

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

5.4 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the following Codes: the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3 (1997));

- the Code of Practice for Fish and Fishery Products[1];

6. LABELLING

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

6.1 The Name of the Food

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

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

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

6.2 Content Declaration

[1] Reference to be inserted

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

Processed bivalve molluscs shall have a net weight declaration in accordance with:- *Refer to other codex standards*.

6.3 Storage Instructions

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

6.4 Labelling of Non-Retail Containers (for bulk transport of live and raw shucked bivalve molluscs)

Information shall specify on the container and in accompanying documents,

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

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

6.5 Other Labelling Requirements

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

6.5.2 [For live and raw shucked bivalve molluscs] OR [For live and processed bivalve molluscs], identification of the establishment approved by the official agency with the jurisdiction, for the production of the product.

6.5.3 [Safety claims made for post-harvest treated bivalve molluscs should be specific to the target organisms that have been eliminated, reduced, or limited by the post-harvest treatment.]

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

7. SAMPLING, EXAMINATION AND ANALYSES

7.1 Sampling

(i) Sampling of lots for examination of the product shall be in accordance with the Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CODEX STAN 233-1969).

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

7.2 Sensory and Physical Examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Sections 7.3 through 7.6, and Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories" (CAC/GL 31-1999).

7.3 Determination of Net Weight and Drained Weight

The net weight and drained weight of all sample units shall be determined by the procedures described or mentioned in sections 7.3.1, 7.3.2, 7.3.3 and 7.3.4..

7.3.1 Determination of Net Weight

(i) Weigh the unopened container;

(ii) Open the container and remove the contents;

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

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

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

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

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

7.3.3 Determination of Net Weight of Products Covered by Glaze

AOAC official method 963.18, Net Contents of Frozen Seafoods

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

7.3.5 Determination of Drained Weight

7.4 Determination of Count per Unit Weight or Volume

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

7.5 Sample Preparation

7.5.1 Procedures for Thawing

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

7.5.2 Cooking Methods

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

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

> **Baking Procedure**: Wrap the product in aluminium foil and place it evenly on a shallow flat pan.
>
> **Steaming Procedure**: Wrap the product in aluminium foil and place it on a wire rack suspended over boiling water in a covered container.
>
> **Boil-in-Bag Procedure**: Place the product into a boilable film-type pouch and seal. Immerse the pouch into boiling water and cook.
>
> **Microwave Procedure**: Enclose the product in a container suitable for microwave cooking. If plastic bags are used, check to ensure that no odour is imparted from the plastic bags. Cook according to equipment instructions.

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

(to be elaborated)

Method for E. coli proposed by Germany:

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

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

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

7.7 Determination of Biotoxins

(to be elaborated)

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

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

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

ASP - HPLC testing method.

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

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

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

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

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 (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.

8.2 Foreign Matter

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

8.3 Odour/Flavour

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

8.4 Texture

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

8.6 Dead or Damaged Product

For bivalve molluscs sold live, the presence of dead or damaged product. Dead product is characterised by no response to percussion. Damaged product includes product that is damaged to the extent that they can no longer function biologically. Sample shall be rejected if dead or damaged product exceed 5% by count.

9. LOT ACCEPTANCE

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

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

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

(iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;

(iv) the Food Additives, Hygiene and Labelling requirements of Sections 4, 5.1, 5.2, 5.3 and 6 are met.

PROPOSED DRAFT STANDARD FOR GRANULAR [STURGEON] CAVIAR

(At Step 3 of the Procedure)

1. SCOPE

This standard shall apply to granular sturgeon caviar.

2. DESCRIPTION

2.1. DEFINITIONS

The following definitions are used in this standard:

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

2.1.2 Granular caviar: The product made from fish egg of the sturgeon family by treating with salt or mixture of salt with a food additive.

2.1.5 Caviar lot: An amount of caviar taken from one biological fish species, treated in the same manner and packed in similar containers by the same producer for delivery to the same customer.

2.1.10 Primary package: (primary container). Metal cans or glass jars or other suitable containers in which caviar is packed directly.

2.1.11 Secondary package: (secondary container). Package containing one or several primary containers.

2.2 Product Definition

The product is prepared from fish eggs of sturgeon fishes belonging to the Acipenseridae family (four genus Acipenser, Huso, Pseudoscaphirhynchus and Scaphirhynchus and hybrids of these species)

The product is made with, or without food additives, and is intended for direct human consumption.

2.3 Process Definition

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

The product shall be packed in:

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

2.3.2 Industrial re-packaging of the product from larger to smaller containers under controlled conditions shall be permitted without mixing caviar from different [lots] species and quality (including from the same species but different in colour). The product shall be packaged so as to minimize the time that the caviar remains unpacked in order to prevent its warming and microbial contamination, as well as physical contamination.

2.4 HANDLING PRACTICE

- Granular caviar is produced from fish ovary reached maturation stage IV and extracted from sturgeon fishes without impairing their integrity, and under stringent sanitary conditions without disturbing the entirety of fish ovary. The roe is separated from the connective tissue of ovary. When the roe is delivered in large quantities it is kept until processing in closed containers in a refrigerating chamber at a temperature from minus 1°C to plus 2° C for no more than 8 h.

- Caviar-grain is sorted by quality, colour and size. Before salting it is washed out in clean cooled water to remove clots of blood, squashed eggs and film pieces. Washed roe is immediately directed to the drained.
- Then it is treated with food grade salt with/without preservatives. All the above mentioned technological operations shall be performed without delay to avoid microbial spoiling.
- Preparation of granular caviar shall comply with the International Code of Practice for Sturgeon Caviar (to be elaborated).

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Raw Material

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

3.2 Other Ingredients

Potable water and salt shall be of food grade quality and conform to all applicable Codex Standards.

3.3 Final Product

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

- **Table 1**

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

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

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

4. FOOD ADDITIVES

4.1 (to be additionally developed)

4.2 A complete list of permitted food additives shall be approved by the Codex Committee for Food Additives and Contaminants.

5. CONTAMINANTS

5.1 Pesticide residues

The product covered by this standard should comply with those maximum residue limits established by the Codex Alimentarius Commission for these products.

5.2 Other contaminants

The product shall comply with the provisions of the Codex General Standard for Contaminants and Toxins in Food (Codex Stan 193-1995).

6. HYGIENE

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

6.2. When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission, the product shall be free from microorganism or substances originating from microorganism in amount which may present a hazard to health in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

6.3. It is recommended that the product covered by the provision of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969,Rev.3-1997).]

7. LABELLING

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

The name of the product shown on the label shall be "Granular caviar" or "Caviar", and may precede or follow the common or established name of the biological species of sturgeon in compliance with the laws and traditions of the country where the product is distributed to avoid misleading of the customer. The information on the salient feature (characteristic) of caviar (granular) may be placed in the immediate vicinity of the product name.

7.2 The following provisions in respect of the labelling of this product are subject to endorsement by the Codex Committee on Food Labelling:

The package shall bear clear directions for the regime and time of keeping the product, including the following information:

- the name of the biological species of fish in English; e.g. beluga, kaluga, sturgeon, sevruga and sterlet;
- the storage time should be calculated as from the date of making, and the marking should include the "storage time", and a reference to the place of the label where the date of making is shown.

The information on the salt share index, e.g. malossol, should be shown in the label when the weight share of salt in the product shown is less than 3.5%.

It is allowed to show the information on the container of granular caviar at one or several places, suitably legibly, as well as to use the background on the labels, or on lithographed containers, according to the species of raw material, as follows: blue for beluga and kaluga, yellow for sturgeon, red for sevruga, green for starlet in accordance with the information in Annex C.

7.3. The granular caviar of sturgeons should be labelled for identification with disposable sticker labels according to the CITES guidelines for a uniform system of labelling caviar for trade or identification:

- information on the source of caviar: not to be given for "wild" sturgeons; for aquaculture – grown fish the label should read "Aquaculture product" (to be marked near the biological name of the species);
- the three-letter code for the biological species according to Annex B should be given as a sign over the line on the level of the upper edge of script, with the name of the fish in English, e.g. beluga^{hus}, sturgeon^{per}, sturgeon^{gue};
- the two-letter Alpha – 2 code of the country of origin in Latin according to ISO 3166-97;
- international standard code;
- data on the food value of product in accordance with the guidelines for marking of food products CAC/GL 2-1985 (Rev. 1-1993);
- the official registration code (up to four symbols – xxxx) of the producing plant, or code of the caviar repackaging plant; when caviar is repackaged in the importing country the code should include the two-letter ISO code, and the official registration code of the plant, e.g. when the granular caviar is repackaged in France: FR – xxxx;
- the date of making the product should be marked as a sequence of digits; one digit for the ten day period, two digits for the month, the last digit of the year for the year.

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

A lot of granular caviar shall mean a volume of product prepared in accordance with Section 2.1.5.

8.2 The methods of analysis and sampling described hereunder are to be endorsed by the Codex Committee on Methods of Analysis and Sampling.

8.2.1.Sensory and Physical/Chemical Examination

Samples taken for sensory and physical/chemical examination shall be assessed by experts trained in such examination and in accordance with methods elaborated in Sections 8.2.1- 8.2.2 and the Codes of Practice for the Sensory Evaluation of Caviar and Caviar Products (to be developed).

8.2.2.Determination of Net Weight

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

- container filled with the product shall be swept dry and weighed;
- container shall be opened, and freed from caviar;
- empty container with a lid, (and packing material, if available), cleaned of the product, washed and dried, shall be weighed;
- subtract the weight of the empty container with a lid (and packing material, if available) from the weight of the container with the product, and determine the net weight of product.

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

9. DEFINITION OF DEFECTS

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

9.1 Foreign admixtures

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

9.2 Odour and Flavour

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

9.3 Consistency and Condition

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

[9.4. Extraneous material

Membranes and fats clusters shall be absent from finished granular caviar]

10. LOT ACCEPTANCE

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

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

8 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.

9 3. The Food Additives, Hygiene, Packing and Labelling requirements of Sections 4, 2.3, 5, 6, 7 and 8 are met.

ANNEX A

SENSORY AND PHYSICAL EXAMINATION

The samples used for sensory evaluation should not be same as that used for other examination.
1.Examine the sample unit for foreign matter, bones and discolouration.

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

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

ANNEX B

IDENTIFICATION CODES OF STURGEON SPECIES

- **Table B.1**

Denomination of sturgeon fishes Scientific names	Code
Huso huso	HUS
Huso dauricus	DAU
Acipenser naccari	NAC
Acipenser transmontanus	TRA
Acipenser schrenkii	SCH
Acipenser sturio	STU
Acipenser baerii baikalensis	BAI
Acipenser sinensis	SIN
Acipenser dabryanus	DAB
Acipenser persicus	PER
Acipenser brevirostrum	BVI
Acipenser fulvescens	FUL
Acipenser oxyrhynchus	OXY
Acipenser oxyrhynchus desotoi	DES
Acipenser gueldenstaedtii	GUE
Acipenser medirostris	MED
Acipenser baerii	BAE
Acipenser micadoi	MIK
Acipenser stellatus	STE
Acipenser ruthenus	RUT
Acipenser nudiventris	NUD

ANNEX C

INFORMATION ANNEX

Figure 1

Figure 2

Continuation of **INFORMATION ANNEX**

Figure 3

Figure 4

PROPOSED DRAFT STANDARD FOR HOT SMOKED AND PRE-PACKED COLD SMOKED FISH

(At Step 3 of the Procedure)

1. SCOPE

This standard applies to chilled or frozen, ready-to-eat hot and cold smoked fish and to sliced and similar transformed products thereof. It does not apply to speciality products where hot or cold smoked fish constitutes only a part of the edible contents, nor to mince products based on hot or cold smoked fish. It does not apply to speciality products where hot or cold smoked fish has been marinated or covered with herbs or spices prior to smoking.

2. DESCRIPTION

2.1 PRODUCT DEFINITION

Cold smoked fish is prepared from fresh or frozen fish of any suitable species and treated with smoke generated from smouldering wood at a temperature which will not cause visible coagulation of the flesh. The fish can either be salted or be non-salted before smoking.

Hot smoked fish is prepared from fresh or frozen fish of any suitable species and treated with smoke generated from burning and or smouldering wood at a temperature which will cause visible coagulation of the flesh. The fish can either be salted or be non-salted before smoking.

2.2 PROCESS DEFINITION

The fish after any suitable preparation destined for hot smoking may be subjected to a salting process and shall comply with the conditions laid down hereafter.

The fish after any suitable preparation destined for cold smoking may be subjected to a salting process and shall comply with the conditions laid down hereafter.

2.2.1 Salting of smoked fish

2.2.1.1 Salting of cold smoked fish

Salting according to custom and usually to a content of between 3% and 6% NaCl in the water phase (w/w) and possibly drying. Smoked to taste with cold/cooled smoke at a lower temperature than to cause visible coagulation.

The product is either refrigerated [to below 4.4º C (40º F)] or [quick] frozen. The product is packaged in materials that will not transmit harmful substances to the product. If the salt content of the product is less than 3% in the water phase and the product is packaged to the exclusion of oxygen (e.g. vacuum packed) the product shall be presented [deep] frozen.

2.2.1.2 Salting of hot smoked fish

Salting according to custom and usually to a content of between 0% and 6% NaCl in the water phase (w/w) and drying.

The product is either refrigerated [to below 5º C] or [quick] frozen. The product is either packed in paper in boxes, air packed or vacuum packaged in materials that will not transmit harmful substances to the product. If the salt content of the product is less than 3% in the water phase and the product is packaged to the exclusion of oxygen (e.g. vacuum packed) the product shall be presented [deep] frozen.

2.2.1 Procedure for killing off parasites in cold smoked fish

Any species of fresh fish originating from waters infested with human pathogenic parasites must be frozen either before or after the cold smoking to sufficiently kill the living parasites. This process must be performed at -20º c for 24 hours or -35º C for 15 hours.

2.3 PRESENTATION

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

2.3.1 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.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 THE RAW MATERIAL

Smoked fish shall be prepared from sound and wholesome fresh or frozen fish of any suitable species, which are of a quality to be sold fresh for human consumption after appropriate preparation. If salted fish is used for smoking purposes it shall comply with the standard for salted fish.

3.2 SALT AND OTHER INGREDIENTS

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

3.3 WOOD FOR GENERATION OF SMOKE

Wood for generation of smoke must not have been treated with any chemicals such as paint or impregnating materials.

Liquid smoke or other preparations are not permitted.

3.4 FINAL PRODUCT

Products shall meet the requirements of this standard and any other relevant standards.

4. FOOD ADDITIVES

No food additive is permitted in these products.

5. HYGIENE AND HANDLING

5.1 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the recommended international code of practice – general principles of food hygiene (CAC/RCP 1-1985, rev. 3, 1997) and other relevant codex texts such as codes of practice and codes of hygienic practice, as follows;

(i) the recommended international code of practice for fresh fish (CAC/RCP 9-1976)

(ii) the Recommended International Code of Practice for Frozen Fish (CAC/RCP 16-1978)

(iii) the Recommended International Code of Practice for Salted Fish (CAC/RCP 26-1979)

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

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

5.4 Parasites

Fish flesh from cold smoked products shall not contain living larvae of parasites (nematodes).

5.5 *Listeria monocytogenes*

Cold smoked fish products consistently free from *Listeria monocytogenes* cannot be produced; however, by adhering to GMPs (including training staff), it is possible to reduce prevalence. Smoke houses with strict adherence to GMPs are capable of producing cold smoked products with very low levels of *Listeria monocytogenes* often less than 1 cell per gram. Although not eliminated, such low levels would ensure that the number of *Listeria monocytogenes* does not increase to above 100 cfu / g at time of consumption given that appropriate temperature (5º C) and time (3-4 weeks) limits are met.

5.6 *Clostridium botulinum*

This section is to be elaborated further

Based on a rage of model studies in broth and in inoculation studies with hot or cold smoked fish, it can be concluded that a combination of 3,5% NaCl (WPS) and chill storage (4.4º C, 40º F), allowing for short periods of elevated temperatures up to 10º c (50º F), will prevent toxin formation in reduced oxygen packaging cold smoked fish for several weeks beyond its sensory shelf life.

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. Countries where the products are to be consumed can be expected to make their science-based risk management choices within this framework, i.e., select some options and exclude others, based on conditions within the country (e.g., nature and enforcement of refrigeration and shelf life controls; transportation times and conditions; variability in amount of salt in the water phase that could occur despite best efforts to achieve a required percentage, etc.), and the level of protection that the country chooses for itself for this particular risk. The table shown in Annex 1 addresses these control options.

5.6 Histamine

The products shall not contain histamine that exceeds 200 mg/kg in any sample unit and the average of a sampling set shall not exceed the average of 100 mg/kg.

6. LABELLING

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

6.1 NAME OF THE FOOD

6.1.1 The name of the product as declared on the label shall contain the words "Smoked" in combination with the name of the fish appropriate to the species of the fish in accordance with the law, custom or practice in use in the country of distribution.

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

6.3 STORAGE INSTRUCTIONS

The label shall contain storage conditions for the product.

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

6.4 LABELLING OF NON-RETAIL CONTAINERS

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

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 SAMPLING

(i) Sampling of lots for examination of the product for quality shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepacked Foods (AQL-6.5) CODEX STAN 233-1969).
A sample unit is the primary container or for individually packed products at least a 1 kg portion of the sample unit.

(ii) The average net weight of all sample units is not less than the declared weight, provided that there is no unreasonable shortage in any container;

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

7.2 SENSORY AND PHYSICAL EXAMINATION

- Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Sections 6.3 through 6.5 and the "Code of Practice for the Sensory Evaluation of Fish and Shellfish" (under elaboration)

- "Histamine gives a very characteristic sensation on the tongue and in the mouth. Therefore a special training of people (a panel) should be set up, so that they, by tasting the fish and fishery products, are able to determine the possible presence of histamine below the limits. Whenever a sensory evaluation gives a suspicious result chemical analysis shall be carried out."

7.3 DETERMINATION OF HISTAMINE

AOAC 977.13 (15th Edition, 1990).

7.4 DETERMINATION OF PARASITES

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

7.5 DETERMINATION OF NET WEIGHT

7.5.1 The net weight is determined as the weight of the product as presented to the consumer exclusive packaging material, interleaving material, glaze etc.

7.5.2 NET CONTENTS

Where sliced products are interleaved with sheets of paper/other material the net weight is determined by subtracting from the gross weight of the package the weight of the packaging material including the interleaving sheets.

7.5.2 If glazed the net weight is the weight without glaze.

9.6 Procedure for thawing

To be elaborated on:
Frozen raw fish ….
Frozen smoked fish....

8. DEFINITION OF DEFECTIVES

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

8.1 FOREIGN MATTER

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

8.2 PARASITES

(THE PRESENCE OF ANY VISIBLE LIVE PARASITES IN A SAMPLE OF THE EDIBLE PORTION OF THE SAMPLE UNIT DETECTED BY NORMAL VISUAL INSPECTION OF THE FISH FLESH)

8.3 ODOUR AND FLAVOUR

Smoked product affected by persistent and distinct objectionable odours or flavours characteristic for decomposition, rancidity, burning sensation or other sensorial impressions not characteristic for the product.

9. LOT ACCEPTANCE

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

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

(ii) The average net contents of all packages examined are not less than the declared weight, provided there is no unreasonable shortage in any package, and

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

ANNEX 1

To be elaborated on:

Packaging	Storage Temp	Water Phase Salt	Comments
Air Packaged To be defined	4ºC (40ºF)	No minimum water phase salt is needed for safety. Nonetheless, where there is a reasonable possibility of severe time/temperature abuse, the country where the product is being consumed might choose a water phase salt barrier of at least 3 -3.5% as a precautionary measure.	Storage temp is for the control of pathogens generally and for quality. In air-packaged products, aerobic spoilage organisms provide sensory signs of spoilage before the formation of toxin by *C. botulinum.* However, even in air packaging it is possible for anaerobic micro-environments to exist and toxin may form if the product is subject to severe time/temperature abuse. For that reason, the country where the product is consumed may still require water phase salt as a barrier to growth of non-proteolytic strains of *C. botulinum* if there are concerns about the ability of transporters, retailers or consumers to maintain time/temperature control.
Reduced Oxygen	Frozen	No minimum water phase salt is needed for safety.	*C. botulinum* toxin cannot form when product is frozen. Because toxin production can occur after thawing, labelling information about the need to keep frozen, to thaw under refrigeration, and to use the product immediately after thawing is important.
Reduced Oxygen	4ºC (40ºF)	Water phase salt at minimum level of between 3 -3.5% may be selected by the country where the product is to be consumed.	**Water phase salt at a minimum level of between 3 and 3,5% (water phase salt) in combination with chilling will significantly delay (or prevent) toxin formation.** As an alternative to water phase salt, time/temperature controls may be used. *C botulinum* cannot grow and produce toxin at or below 3ºC (38ºF). Other time/temperature combinations exist that similarly control the formation of toxin (Skinner and Larkin, 1998). 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.

ANNEX 2

END PRODUCT SPECIFICATIONS

Contaminants

?

Microorganisms

?