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Agenda Item 6

CX/FH 09/41/6

November 2009

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD HYGIENE

Forty first-session

The Loews Coronado Bay Hotel, San Diego, United States of America

PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR *VIBRIO SPP.* IN SEAFOOD AT STEP 4

COMMENTS AT STEP 3 SUBMITTED BY:

**AUSTRALIA, COSTA RICA, EUROPEAN COMMUNITY, EGYPT, INDIA, JAPAN, KENYA,
NEW ZEALAND, NICARAGUA, NORWAY, THAILAND & THE UNITED STATES OF AMERICA**

AUSTRALIA

General comments¹

Australia acknowledges the work of the physical working group on the development of the proposed annex to the guideline document. The physical working group has identified a number of key points and recommendations, including a change to the title of the draft annexes to specifically name 'bivalve molluscs' rather than the generic 'molluscan shellfish'. The working group did note in their meeting summary that the groups' terms of reference did not include changes to the guideline document. In the current version, the guideline document only refers to the annex as a footnote at paragraph. 65. The physical working group suggested moving paragraphs 29 -31 to the annex. Other paragraphs may also be better placed in the annex. It is strongly suggested that the content of both the guideline document and the annex are considered together to ensure that both documents are consistent and appropriately referenced.

The annex contains many references to monitoring, modelling and risk. There is a need to have standard microbiological methods e.g. ISO methods for *Vibrio* spp. in order begin to establish the levels of *Vibrio* spp. in seafood. However, in relation to monitoring, standard microbiological methods are not adequate to assess risk to consumers. Molecular techniques are required to identify specific virulence factors and genes. The predictive tool being developed by the United States to assess the risk posed by *V. parahaemolyticus* and *V. vulnificus* in seafood is welcomed.

Specific comments for Appendix IV of ALINORM 09/32/13

	Suggested text
Paragraph 11. A definition of 'partially treated' should also be included in the footnote (or a cross reference to Section 2.3 'Definitions' included.	

¹ In the general comments physical working group refers to the physical working group the Proposed Draft Annexon Control Measures for *Vibrio parahaemolyticus* and *Vibrio vulnificus* in Molluscan Shellfish.

<p>Paragraph 28. Prior to temperature and salinity being considered as criteria for controlling <i>Vibrio</i> spp. in seafood a robust association between these parameters and <i>Vibrio</i> spp. levels in seafood should be established. While the paragraph alludes to undertaking studies to demonstrate the criteria it should be expanded to include that a statistical association should be shown. Suggest amending the wording as follows:</p>	<p><i>“Temperature and salinity should be considered for controlling pathogenic <i>Vibrio</i> spp. in seafood. Where applicable, specific temperature or salinity levels that can be used as control measures should be identified based on epidemiological and exposure studies as well as monitoring of preharvest pathogenic <i>Vibrio</i> levels. Prior to utilising temperature and salinity as control criteria a robust association between levels of pathogenic <i>Vibrio</i> spp. and temperature and salinity should be demonstrated.”</i></p>
<p>Paragraph 29. The paragraph is a bit vague with respect to specifically undertaking ‘Risk Assessment’ to determine high risk production areas and seasons. Suggest amending the text as follows:</p>	<p><i>“A risk assessment, including monitoring of molluscan shellfish at harvest for the levels of pathogenic <i>Vibrio</i> spp., should be conducted to determine the regional and seasonal risk of these microorganisms. for the application of Appropriate controls should be applied during times of significant human health risk.”</i></p>
<p>Paragraph 30. As acknowledged in the introduction section it is unclear as to how many <i>Vibrio</i> spp. cells will cause infection in humans. It is therefore difficult to set acceptable levels/criteria for <i>Vibrio</i> spp. in seafood. A confounding factor is that many methods that are used do not distinguish between pathogenic and non pathogenic strains of <i>Vibrio</i> spp. therefore it may be overly conservative/punitive to set a ‘nil tolerance’ level. Therefore suggest altering this paragraph to remove the reliance on testing/monitoring criteria as follows:</p>	<p><i>“When testing/monitoring criteria, If high risk times are able to be defined established by a via risk assessment the following control measures could be employed to manage and mitigate the risk: are exceeded, closing the harvesting area or issuing a public warning, restricting the time to refrigeration, diverting product into cooking or post-harvest processing (vibriocidal treatment). should be considered”</i></p>
<p>Paragraph 32. In areas in which molluscan shellfish are grown sanitary surveys should be undertaken. A sanitary survey identifies all potential sources of faecal pollution and establishes harvesting criteria to ensure that shellfish are harvested at times when the area is not impacted. Suggest amending the text as follows:</p>	<p><i>“For seafood grown in coastal locales, especially in cholera-endemic areas, care should be taken to avoid contamination of seafood with faecal cholerae V. cholerae. For molluscan shellfish a sanitary survey of the production area should be undertaken and harvesting criteria established to ensure that shellfish are not contaminated with faeces when harvested.”</i></p>
<p>Paragraph 34. Suggest that the CCFFP definition of ‘clean water’ be included in the list of definitions in this guideline. Suggest amending the text as follows:</p>	<p><i>“For the storage and handling of seafood aboard fishing vessels, the use of seawater taken near the seashore or from the region near the mouth of drain or river contaminated with sewage should not be undertaken be avoided.”</i></p> <p><i>[taken and not undertaken ?]</i></p>
<p>Paragraph 58. <i>Vibrio</i> spp. that has been internalised in seafood via digestive or filtration processes is unlikely to be easily washed out using clean water. Washing with clean water could play a role in limiting surface contamination of animals and fomites. Suggest amending the paragraph as follows:</p>	<p><i>“An adequate supply of clean water should be available for handling and washing of seafood and fomites to limit the load of pathogenic <i>Vibrio</i> spp..”</i></p>
<p>Paragraph 65. In section 65 and 81 three scenarios are raised: (a) maintenance of raw product during processing as close as possible to 0oC (if other</p>	<p><i>The Code of Practice for Fish and Fishery Products indicates maintaining the product at temperature as close as possible to 0°C. For pathogenic <i>Vibrio</i> spp.,</i></p>

<p>pathogenic bacteria species may also be hazards) (b) maintenance of raw product during processing at 10 °C or lower (for <i>Vibrio</i> control) and (c) storage of live product at the lowest temperature tolerable for the species. Other pathogenic bacterial species such as <i>Listeria</i> are always potential hazards in seafood. While this guideline is specifically about <i>Vibrio</i> it needs to reflect best practise for seafood processors therefore the criteria of 10 °C or lower should be discluded from the guideline and the recommendation of processing being undertaken at temperatures as close as possible to 0 °C should be included. A sentence should be added to paragraph 65 to note that storage of live product should be undertaken at the lowest temperature tolerable for the species. Suggest amending the paragraph as follows:</p>	<p><i>a temperature of 10°C or lower is adequate to prevent growth. However other potential bacterial pathogens may be present and therefore the facilities should be capable of controlling ambient temperature to ensure that product temperature of raw seafood during processing is as close as possible to 0°C. during processing of raw is maintained at a temperature of 10°C or lower. Processing and storage of live seafood should be undertaken at the lowest temperature tolerable for the species.”</i></p>
<p>Paragraph 78. Critical parameters should be given to ensure that the inactivation technologies that may be used are vibriocidal. For example if heating is used as a vibriocidal step what time/temperature parameters are feasible.</p>	
<p>Paragraph 99. Consideration should be given to including a recommendation that data loggers could be included in initial shipments to fully define and understand the ‘cool chain’ especially during transportation.</p>	
<p>Paragraph 103. Some seafood is produced in areas which have been demonstrated through testing and epidemiology to be of low risk with respect to <i>Vibrio</i> spp.. When seafood is produced in areas such as these the risk of consumers becoming infected and ill from <i>Vibrio</i> spp. after consumption is significantly reduced/negligible (as evidenced through epidemiological case studies). Seafood is an extremely important/essential source of protein and nutrients for ~ 1 billion people globally and to label all seafood as ‘high risk’ may jeopardise the health of these consumers. Therefore the recommendation of labelling all unpackaged live and raw seafood to alert consumers to the risk is not warranted. It has been demonstrated previously through food borne illness that consumers do not consistently read or follow labelling instructions on products, additionally consumers often do not cook seafood thoroughly enough to inactivate pathogenic bacteria. High risk consumers may receive better advice as to potential hazards in seafood through targeted education given by medical practitioners. Suggest the amending this section as follows:</p>	<p><i>In addition, countries should give consideration to labelling of unpackaged live or raw seafood that is at high risk of being contaminated with <i>Vibrio</i> spp., so that consumers are adequately informed with respect to the safety and true nature (alive or not alive) of these products. In particular, labelling should alert at-risk consumers to avoid or cook those products. Any treatment (e.g. heat treatment), that is applied to the product should be mentioned on the label (if present) if consumers would be misled by its omission.</i></p>
<p>Paragraph 106. High risk consumers may receive better advice as to potential hazards in seafood</p>	<p><i>“Liver disease is a prominent risk factor for human infection with pathogenic <i>Vibrio</i> spp., especially <i>V.</i></i></p>

through targeted education given by medical practitioners. Suggest amending this section as follows:	<i>vulnificus</i> . Additional risk factors include diabetes, haemochromatosis and HIV/AIDS ⁹ . Subpopulations with increased susceptibility should follow the advice below: avoid the consumption of raw or partially treated seafood; and heat seafood thoroughly before consumption. <i>Consideration should be given to providing medical practitioners with concise information on the risks associated with consuming raw or partially treated seafood for dissemination to high risk consumers.</i>
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COSTA RICA

Costa Rica is grateful for the opportunity to comment on this document. Costa Rica's comments are listed below:

Regarding paragraph 4, Costa Rica proposes the following phrasing:

It is now possible to differentiate between toxic and non-toxic or pathogenic and non-pathogenic strains of *V. cholerae* and *V. parahaemolyticus*, based on their ability or inability to produce the most important virulence factors. The pathogenic mechanisms of *V. vulnificus* have not been clearly explained, and its virulence appears to be multi-faceted and not well understood. Therefore, all strains are considered virulent.

In line number 6, paragraph 5, replace the phrase “*el cocción*” with “*la cocción*.”

In paragraph 7, replace the term “se considere” with the term “se considera.”

In paragraph 8, Costa Rica proposes changing the term “*self-contained*” to “*self-limiting*.”

Regarding paragraph 24, Costa Rica proposes the following phrasing:

This Code is *complementary to* and should be used *in conjunction* with the *Recommended International Code of Practices: General Principles on Food Hygiene* (CAC/RCP 1-1969) and the *Code of Practices for Fish and Fishery Products* (CAC/RCP 52-2003). It is possible that application of this Code by different countries may require certain modifications and amendments, taking into consideration regional differences such as: the prevalence of pathogenic *Vibrio spp.* and water temperature and salinity.

2- Costa Rica proposes defining *clean water*, which is included in paragraphs 35, 35 [sic], 36, 37, 58, 72.

3- Regarding the Microbiological and other aspects, Costa Rica proposes developing the standard to establish microbiological criteria in seafood that include *Vibrio* pathogens (*V. parahaemolyticus* and *V. vulnificus*).

4-Regarding paragraph 78 and 79, Costa Rica thinks that what constitutes validation of pressurization and moderate heating treatments should be clarified.

5- Regarding paragraph 90, Costa Rica thinks that the type of water that should be used should be clarified; we think that the term potable water should be included.

6- Regarding point 9.4.1, Costa Rica proposes replacing the term “subpopulations” with “populations.”

EUROPEAN COMMUNITY

As regard the development of microbiological criteria for *Vibrio*, the European Community and its Member States (ECMS) fully support the decision of the Committee to abstain going in that direction, as it clearly appears that the risk reduction derived from a certain microbiological criterion is very diverse among different parts of the world and that it is therefore very difficult to set microbiological criteria which would be applicable worldwide.

The ECMS would support the final adoption of this document at step 5/8 subject to some amendments as described below.

Specific comments

Title	<p>PROPOSED DRAFT GUIDELINES ON THE APPLICATION OF GENERAL PRINCIPLES OF FOOD HYGIENE TO THE CONTROL OF PATHOGENIC <i>VIBRIO</i> SPP. IN SEAFOOD</p> <p><u>Rationale:</u> The ECMS are of the opinion that the second version of the title better reflects the content of the document and is consistent with titles used in other recent CCFH documents (e.g. Listeria in ready-to-eat foods)</p>
Section 2.3 Definitions	<p>The ECMS note that the 30th session of CCFFP agreed to amend the definition of clean water (proposal from Japan) in the Code of Practice for Fish and Fishery Products(CAC/RCP 52-2003) as follows:</p> <p>Clean Water: means water from any source where harmful microbiological contamination, substances and/or toxic plankton are not present in such quantities <u>that</u> as may affect the <u>food safety</u> health-quality of fish, shellfish and their products <u>intended for human consumption</u>.</p> <p>This definition was sent to the Codex Alimentarius Commission for final adoption. The ECMS fully support the clarification of the definition.</p>
Section 5.2.2.3, para. 78	The ECMS support the deletion of the square brackets around the sentence "The use of these technologies should be done in accordance with the legislation of the country of retail sale".
Section 9.3, para. 103	<p>"In addition, countries should give consideration to labelling of unpackaged live and raw seafood, so that consumers are adequately informed with respect to the safety and true nature (alive or not alive) of these products. In particular, labelling should alert at-risk consumers to avoid or cook those products <u>in line with the legislation of the country of retail sale</u>. Any <u>significant and optional</u> treatment (e.g. heat treatment), that is applied to the product, should be mentioned on the label (if present) if consumers w<u>c</u>ould be misled by its omission."</p>
Section 9.3, para 108	<p>IIndustry (fishermen, primary producers, manufacturers, distributors, retailers and food service/institutional establishments) and trade associations play an important role in providing specific instructions and/or training to employees and consumers ete. for the control of pathogenic <i>Vibrio</i> spp. Special consideration shall be given to <u>imported products</u> developing countries, to take into account possible difference of prevalence of pathogenic <i>Vibrio</i> spp. in the exporting country taking into consideration their <u>and various</u> fishing techniques, including small fisherfolks.</p>

EGYPT

- It is more appropriate to use similar title as used in other recent CCFH document ((Proposed Draft Guidelines On The Application Of General Principles Of Food Hygiene To The Control Of Pathogenic *Vibrio* SPP. In Seafood) .
- EOS agrees on the other points mentioned in the proposed draft.

INDIA**Section 3.2 : HYGIENIC PRODUCTION OF SEAFOOD SOURCES**

It is proposed to include the following bullet points:

- Purification of Bivalve molluscs in a controlled environment;
- Survey the harvest centers periodically for *V.parahemolyticus* and *V. vulnificus*.

JAPAN

Document title

Japan supports the second option.

2.3 DEFINITIONS

The term “clean water” should be defined as follows:

***Clean water:** Water from any source where harmful microbiological contamination, substances and/or toxic plankton are not present in such quantities that may affect safety of fish, shellfish and their products intended to human consumption.*

3.1 ENVIRONMENTAL HYGIENE

Paragraphs 29-31 should be deleted as they are covered in the draft proposed Annex. Consequently a short text should be inserted to refer to the Annex, as follows:

For monitoring of molluscan shellfish at harvest, refer to Annex.

4.4.1 Water supply

Paragraph 58

For clarity:

58. An adequate supply of clean water and/or potable water should be available

5.2.2 Specific process steps

Paragraphs 73 and 75

The term “clean” should be deleted as it is unnecessary.

9.4.1 Special Attention to Susceptible Subpopulations

In paragraph 106, second bullet point, the term “heat” should be replaced with “treat”, for accuracy.

10.1 AWARENESS AND RESPONSIBILITIES

In paragraph 108, “consumer, etc.” should be deleted as consumer training has been addressed in Section 9.4 (Consumer education).

KENYA

Comment on the title

We would like to propose that the first title is preferable to us; when the content of the standard is read it relates with the title and it is more direct and gives detail on how to control the pathogenic *Vibrio* species in sea foods .We therefore recommend to remove both the opening and closing square brackets so the title can read **“PROPOSED DRAFT GUIDELINES ON THE CONTROL OF PATHOGENIC VIBRIO SPP. IN SEAFOOD”**

Comment on clause 10.1

Kenya would like to propose the comment as stated below:

10.1 AWARENESS AND RESPONSIBILITIES

All personnel involved in sea food operations should receive training appropriate to their tasks and should be assessed while performing their duties to ensure tasks are being completed correctly. Training should be delivered in a language and manner to facilitate understanding of the information and expectations. Training programs should be designed to help personnel understand what is expected of them and why and it should emphasize the importance of using hygienic practices. A well-designed training programme considers the barriers to learning of the trainees and develops training methods and materials to overcome those barriers.

NEW ZEALAND

General Comments

New Zealand notes that the FAO/WHO risk assessment for *Vibrio parahaemolyticus* in oysters has not been published and may provide useful information in the development of this annex.

New Zealand notes that whilst there are standard international methods to detect *V. vulnificus* and *V. parahaemolyticus* that there is no current internationally accredited method, e.g. ISO accreditation, to facilitate the enumeration of the total number or the proportion of pathogenic *V. parahaemolyticus* present. The accreditation of validated methods that are robust and easy to use will be important for determining the risk management options and also assessing the risk to consumers from the consumption of seafood.

New Zealand believes that the draft Code of Hygienic Practice for *Vibrio spp.* will be a useful risk management tool and guide for risk managers and national governments. The development of a specific Annex on Control Measures for *Vibrio parahaemolyticus* and *Vibrio vulnificus* in bivalve molluscs will facilitate the identification of specific control measures related to each organism's biology, habitat preferences, hosts, etc.

2.3 Definitions

Paragraph 25 – New Zealand suggests that the definition for “post-harvest processing” currently provided in the Proposed draft annex on the control measures for *Vibrio parahaemolyticus* and *Vibrio vulnificus* in molluscan shellfish should be included in the overarching code of hygienic practice instead to aid clarity. The definition reads: “Post-harvest processing: processes (e.g. freezing, high pressure and mild heating) intended to significantly reduce or limit but not completely eliminate *V. parahaemolyticus* and *V. vulnificus* while essentially retaining the sensory characteristics of live bivalve molluscs (Section 7.7 of the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003)).”

3.1 Environmental hygiene

Paragraph 30 – For the sentence that states “When testing/monitoring criteria, established by a risk assessment, are exceeded, closing the harvesting area or issuing a public warning, restricting the time to refrigeration, diverting product into [cooking](#) or post-harvest processing should be considered.” New Zealand suggests that due to the lack of clarity surrounding an agreed definition for cooking that this sentence should be amended. Cooking is a heat treatment that is applied to make a food palatable or change the sensory characteristics and does not necessarily result in the elimination or inactivation of the target micro-organisms of concern. Therefore where cooking, as a heat treatment, is intended to eliminate or inactivate the target pathogenic micro-organism then this must be stated or defined within the text. For the purposes of this code of hygienic practice New Zealand suggests:

1. Amend the sentence to read: “When testing/monitoring criteria, established by a risk assessment, are exceeded, closing the harvesting area or issuing a public warning, restricting the time to refrigeration, diverting product into cooking [that inactivates or eliminates pathogenic *Vibrio spp.*](#) or post-harvest processing should be considered.” or
2. “When testing/monitoring criteria, established by a risk assessment, are exceeded, closing the harvesting area or issuing a public warning, restricting the time to refrigeration, diverting product into a [thorough treatment](#) or post-harvest processing should be considered.” Where a “[‘thorough treatment’ is a treatment that completely eliminates or inactivates all micro-organisms of concern](#)”, or
3. Provide a definition for cooking. “[Cooking means a heating process that eliminates or inactivates pathogenic *Vibrio spp.* whilst not retaining the sensory characteristics of raw seafood](#)”, or

To support this approach data should be developed to provide different time and temperatures combinations required to inactivate or eliminate pathogenic *Vibrio spp.* in seafood.

Section 5.2.2.2 Cooking

Paragraph 74 – New Zealand suggests amending the sentence to ensure consistency within the document where references to cooking are equivalent to a thorough treatment. The sentence thus reads “Time and temperature should be determined for each cooking operation to ensure the inactivation [and elimination of the pathogenic *Vibrio spp.* of concern](#).”

Paragraph 75 - New Zealand asks whether the requirement for ‘clean’ potable water is superfluous and if so the sentence should read: ”[after cooking and blanching, potable water should be used for cooling.](#)”

NICARAGUA

Nicaragua thanks the presidency for the opportunity to present our comments on this document Annex IV to the Report of the 40th MEETING OF THE CODEX COMMITTEE ON FOOD HYGIENE held in Guatemala City, Guatemala, December 1-5, 2008

NIC SUGGESTS ADOPTING THE FOLLOWING AS THE TITLE:

[PROPOSED DRAFT GUIDELINES ON THE CONTROL OF PATHOGENIC *VIBRIO* SPP. IN SEAFOOD]

~~**[PROPOSED DRAFT GUIDELINES ON THE APPLICATION OF GENERAL PRINCIPLES OF FOOD HYGIENE TO THE CONTROL OF PATHOGENIC *VIBRIO* SPP. IN SEAFOOD]**~~

(At Step 3 of the Procedure)

INTRODUCTION

1. During the last several years, there has been an increase in reported outbreaks and cases of food-borne disease attributed to pathogenic *Vibrio* species. As a result, there have been several instances where the presence of pathogenic *Vibrio* spp. in seafood has led to a disruption in international trade. This has been particularly evident with *Vibrio parahaemolyticus* where there has been a series of pandemic outbreaks due to the consumption of seafood, and its emergence has been observed in regions of the world where it was previously unreported. A number of *Vibrio* species are increasingly being recognized as potential human pathogens. The food safety concerns associated with these microorganisms have led to the need for specific guidance on potential risk management strategies for their control.

General Characteristics of Pathogenic Vibrio spp.

Nicaragua proposes different phrasing

2. ~~The genus *Vibrio* contains at least twelve species pathogenic to humans, ten of which can cause food-borne illness. The majority of food-borne illness is caused by *V. parahaemolyticus*, choleraogenic *Vibrio cholerae*, or *Vibrio vulnificus*. *V. parahaemolyticus* and *V. cholerae* are solely or mainly isolated from gastroenteritis cases that are attributable to consumption of contaminated food (both species) or intake of contaminated water (*V. cholerae*). In contrast, *V. vulnificus* is primarily reported from extraintestinal infections (septicaemia, wounds, etc.) and primary septicaemia due to *V. vulnificus* infection is often associated with consumption of seafood.~~ Nicaragua proposes: The genus *Vibrio* contains at least twelve species pathogenic to humans, ten of which can cause food-borne illness. The majority of food-borne illness is caused by *V. parahaemolyticus*, choleraogenic *Vibrio cholerae*, or *Vibrio vulnificus*.

V. parahaemolyticus and *V. cholerae* are solely or mainly isolated from gastroenteritis cases that are attributable to consumption of contaminated food or intake of contaminated water. In contrast, *V. vulnificus* is primarily reported from extraintestinal infections (septicaemia, wounds, etc.), however it is also a primary cause of septicaemia associated with the consumption of seafood.

Nicaragua proposes the following inclusions and deletions:

3. In tropical and temperate regions, these species of *Vibrio* occur naturally in marine, coastal and estuarine (brackish) environments and are most abundant in estuaries. Pathogenic *Vibrio* spp., in particular *V. cholerae*, can also be detected in freshwater reaches of estuaries, where it can also be introduced by faecal contamination. *V. cholerae*, unlike most other *Vibrio* species, can survive in freshwater environments.

Nicaragua proposes the following inclusions and deletions:

4. It is now possible to differentiate environmental strains of *V. cholerae* and *V. parahaemolyticus* between pathogenic and non-pathogenic strains based on their ability or inability to produce their major virulence factors. The pathogenic mechanisms of *V. vulnificus* have not been clearly elucidated, and its virulence appears to be multifaceted and is not well understood, and therefore all strains are considered virulent.

Nicaragua proposes the following inclusions and deletions: Nicaragua recommends grammatical changes to the Spanish translation: first line "...especies de *Vibrio*..."; 4th line "...una especie de *Vibrio*..."; 5th line change from "El cocción" to "La cocción..."

5. The following are important characteristics common to all *Vibrio* spp. *Vibrio* spp. are sensitive to low pH but grow well at high pH, and thus infections caused by *Vibrio* spp. are frequently associated with low-acid foods. In addition, the ingestion of a large number of viable cells is needed for pathogenic *Vibrio* spp. to survive the acidic environment of the stomach and establish an infection. Proper cooking of food products readily inactivates *Vibrio* spp. even in highly contaminated products. Hygienic approaches used with all food-borne pathogens will in general control the growth of pathogenic *Vibrio* spp.

6. There are, however, characteristics specific to each of the three major pathogenic species of *Vibrio* that require attention as described below.

***Vibrio parahaemolyticus* Nicaragua proposes a grammatical change for the Spanish translation: first line, from "se considere" to "se considera".**

7. *V. parahaemolyticus* is considered to be part of the autochthonous microflora in the estuarine and coastal environments in the tropical to temperate zones. While *V. parahaemolyticus* typically is undetectable in seawater at 10°C or lower, it can be cultured from sediments throughout the year at temperatures as low as 1°C. In temperate zones, the life cycle consists of a phase of survival in winter in sediments and a phase of release with the zooplankton when the temperature of the water increases up to 14 - 19 °C. *V. parahaemolyticus* is characterized by its rapid growth at favourable conditions.

8. The vast majority of strains isolated from patients with diarrhea produce a thermostable direct hemolysin (TDH). It has therefore been considered that pathogenic strains possess a *tdh* gene and produce TDH, and non-pathogenic strains lack the gene and the trait. Additionally, strains that produce a TDH-related hemolysin (TRH) encoded by the *trh* gene should also be regarded as pathogenic. Symptoms of *V. parahaemolyticus* infections include explosive watery diarrhea, nausea, vomiting, abdominal cramps and, less frequently, headache, fever and chills. Most cases are self-limiting, however, severe cases of gastroenteritis requiring hospitalization have been reported. Virulent strains are seldom detected in the environment or in foods, including seafoods, while they are detected as major strains from feces of patients.

Nicaragua proposes a correction to the Spanish translation: from "clon serotipo O3:K6" to "clon serotipo O3:K6"

9. *V. parahaemolyticus* was first identified as a foodborne pathogen in Japan in the 1950s. By the late 1960s and early 1970s *V. parahaemolyticus* was recognized as a cause of diarrhoeal disease worldwide. A new *V. parahaemolyticus* clone of O3:K6 serotype emerged in Calcutta in 1996. This clone, including its serovariants, has spread throughout Asia and to the USA, elevating the status of the spread of *V. parahaemolyticus* infection to pandemic. In Asia, *V. parahaemolyticus* is a common cause of foodborne disease. In general, the outbreaks are small in scale, involving fewer than 10 cases, but occur frequently. This pandemic *V. parahaemolyticus* has now spread to at least 5 continents. There is a suggestion that ballast discharge may be a major mechanism for global spread of pandemic *V. parahaemolyticus*, but a possibility of export/import seafood-mediated international spread cannot be ruled out.

10. From the point of controlling seafood-borne *V. parahaemolyticus* illnesses, harvest is probably the most critical stage, since it is from this point onwards that individuals can actually implement measures to control *V. parahaemolyticus*.

11. Foods associated with illnesses due to consumption of *V. parahaemolyticus* include for example crayfish, lobster, shrimp, fish-balls, boiled surf clams, jack-knife clams, fried mackerel, mussel, tuna, seafood salad, raw oysters, clams, steamed/boiled crabmeat, scallops, squid, sea urchin, mysids, and other species of sardines. These products include both raw and partially treated² and thoroughly treated seafood products that have been substantially recontaminated through contaminated utensils, hands, etc.

Vibrio cholerae

² "treated" means any vibriocidal treatment (e.g. heat treatment, high pressure.)

Nicaragua proposes the following inclusions and deletions:

12. *V. cholerae* is native to fresh and brackish water environments in tropical, subtropical and temperate areas worldwide. Over 200 O serogroups have been established for *V. cholerae*. Strains belonging to O1 and O139 serotypes generally possess the *ctx* gene and produce cholera toxin (CT) and are responsible for epidemic cholera. Epidemic cholera is confined mainly to developing countries with warm climates. Cholera is exclusively a human disease and human feces from infected individuals are the primary source of infection in cholera epidemics. Contamination of food production environments (including aquaculture ponds) by faeces can indirectly introduce cholerae *V. cholerae* into foods. The concentration of free-living cholerae *V. cholerae* in the natural aquatic environment is low, but *V. cholerae* is known to attach and multiply on zooplankton such as copepods.

13. Seven pandemics of cholera have been recorded since 1823. The first six pandemics were caused by the classical biotype strains, whereas the seventh pandemic that started in 1961 and has lasted until now, is due to *V. cholerae* O1 biotype El Tor strains. Epidemic cholera can be introduced from abroad by infected travellers, imported foods and through the ballast water of cargo ships. Detection frequencies of cholerae strains of *V. cholerae* from legally imported foods were very low and they have seldom been implicated in cholera outbreaks. *V. cholerae* O139 has been responsible for the outbreaks of cholera in the Bengal area since 1992, and this bacterium has spread to other parts of the world through travellers. The cholerae strains of *V. cholerae* that spread to different parts of the world may persist, and some factors may trigger an epidemic in the newly established environment.

14. Some strains belonging to the O serogroups other than O1 and O139 (referred as non-O1/non-O139) can cause food-borne diarrhea that is milder than cholera.

15. Outbreaks of food-borne cholera have been noted quite often in the past 30 years; seafood, including molluscan shellfish, crustaceans, and finfish, are most often incriminated in food-borne cholera cases in many countries. While shrimp has historically been a concern for transmission of cholerae *V. cholerae* in international trade, it has not been linked to outbreaks and it is rarely found in shrimp in international trade.

Vibrio vulnificus

Nicaragua proposes the following inclusions and deletions: In the Spanish translation Nicaragua proposes removal of the “individuos ~~de otra manera~~ sanos, ~~mas~~ sin embargo...”

16. *V. vulnificus* can occasionally cause mild gastroenteritis in healthy individuals, but it can cause primary septicaemia in individuals with chronic pre-existing conditions, especially liver disease or alcoholism, diabetes, haemochromatosis and HIV/AIDS, following consumption of raw molluscan shellfish. This is a serious, often fatal, disease with the highest fatality rate of any known foodborne bacterial pathogen. The ability to acquire iron is considered essential for virulence expression of *V. vulnificus*, but a virulence determinant has not been established and, therefore, it is not clear whether only a particular group of the strains are virulent. The host factor (underlying chronic diseases) appears to be the primary determinant for *V. vulnificus* infection. Incubation period ranges from 7 hours to several days, with the average being 26 hours. The dose response for humans is not known.

Nicaragua proposes the following inclusions:

17. Of the three biotypes of *V. vulnificus*, biotype O1 is generally considered to be responsible for most seafood-associated human infection and thus the term *V. vulnificus* refers to biotype 1 in this Code.

18. Foodborne illness from *V. vulnificus* is characterized by sporadic cases and an outbreak has never been reported. *V. vulnificus* was isolated from oysters, other molluscan shellfish, and other seafood worldwide.

Nicaragua proposes the following inclusions and deletions:

19. The densities of *V. vulnificus* are high in oysters at harvest when water temperatures exceed 20°C in areas where *V. vulnificus* is endemic; *V. vulnificus* multiplies in oysters at a temperature higher than 13°C. The salinity optimum for *V. vulnificus* appears to vary considerably from area to area, but highest numbers are usually found at intermediate salinities of 5 to 25 g/l (ppt: parts per thousand). Introducing oysters to high salinity waters (>32 g/l (ppt: parts per thousand) was shown to reduce *V. vulnificus* numbers by 3–4 logs (<10 per g) within 2 weeks. Units should be revised to ppm.

FAO/WHO Risk Assessments

Nicaragua proposes the following inclusions and deletions: Nicaragua suggested a change to the Spanish translation from “poco hechos” to “semi-crudos” for undercooked.

20. FAO/WHO risk assessments on *Vibrio vulnificus* in raw oysters and choleraogenic *Vibrio cholerae* O1 and O139 in warm water shrimp in international trade have been published (2005)^{3,4}. Additional risk assessments on *Vibrio parahaemolyticus* in raw oysters, in raw and undercooked finfish and in *Anadara granosa* (bloody clams) have been completed and are in press^{5,6,7}. These risk assessments constitute the basis of this Code.

SECTION I – OBJECTIVES

21. This Code provides guidance on control of pathogenic *Vibrio* spp. in seafood, with a view towards protecting the health of consumers and ensuring fair practices in food trade. The primary purpose of this Code is to highlight the key control measures that can be used to minimise the likelihood of illness arising from the presence of pathogenic *Vibrio* spp. in seafood. This Code also provides information that will be of interest to the food industry, consumers, and other interested parties.

SECTION II – SCOPE, USE AND DEFINITION

2.1 SCOPE

22. This Code covers seafood that is marketed in a live, raw, chilled/frozen, partially treated, or thoroughly treated state, which could include ready-to-eat seafood. It is applicable to the whole food chain from primary production to final consumption.

23. As major causative agents of foodborne bacterial illnesses associated with seafood, the target microbiological hazards of this Code are pathogenic *V. parahaemolyticus*, *V. vulnificus* and choleraogenic *V. cholerae*. The control measures described in this Code may be applicable to other pathogenic *Vibrio* spp.

2.2 USE OF THE DOCUMENT

24. This Code is supplemental to and should be used in conjunction with the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003). The application of this Code by countries may require modifications and amendments, taking into account regional differences such as the prevalence of pathogenic *Vibrio* spp., water temperatures and salinity.

2.3 DEFINITIONS

25. For the purpose of this Code, the following definitions apply:

Definitions of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

Refrigeration: The lowering of product temperature to limit microbial activity.

Seafood: Fish, shellfish and other aquatic invertebrates from marine and fresh water sources and their products which are intended for human consumption.

Partially treated: Any treatment intended to reduce but not eliminate *Vibrio* spp. in seafood.

SECTION III - PRIMARY PRODUCTION

³ FAO and WHO, 2005. Risk assessment of *Vibrio Vulnificus* in raw oysters. Microbiological Risk Assessment Series, No.8.

⁴ FAO and WHO, 2005. Risk assessment of choleraogenic *Vibrio cholerae* O1 and O139 in warm-water shrimp in international trade. Microbiological Risk Assessment Series, No.9.

⁵ FAO and WHO, 20XX. Risk assessment of *Vibrio parahaemolyticus* in raw oysters. Microbiological Risk Assessment Series, No.XX (In press).

⁶ FAO and WHO, 20XX. Risk assessment of *Vibrio parahaemolyticus* in raw and undercooked finfish. Microbiological Risk Assessment Series, No.XX (In press).

⁷ FAO and WHO, 20XX. Risk assessment of *Vibrio parahaemolyticus* in *Anadara granosa* (bloody clams). Microbiological Risk Assessment Series, No.XX (In press).

3.1 ENVIRONMENTAL HYGIENE

26. Refer to Section 3.1 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969). In addition:

27. Generally, pre-harvest controls are more applicable to molluscan shellfish than to other seafood (e.g. open-sea harvested fish). Where relevant to other seafood, pre-harvest controls should be considered for areas where the likelihood of introduction of pathogenic *Vibrio* spp. is significant and can be controlled.

28. Temperature and salinity should be considered for controlling pathogenic *Vibrio* spp. in seafood. Where applicable, specific temperature or salinity levels that can be used as control measures should be identified based on epidemiological and exposure studies as well as monitoring of pre-harvest pathogenic *Vibrio* levels.

29. Monitoring of molluscan shellfish at harvest for the levels of pathogenic *Vibrio* spp. should be conducted to determine the regional and seasonal risk of these microorganisms for the application of appropriate controls.

30. When testing/monitoring criteria, established by a risk assessment, are exceeded, closing the harvesting area or issuing a public warning, restricting the time to refrigeration, diverting product into cooking or post-harvest processing should be considered.

31. Where predictive models are used to indicate the concentration of pathogenic *Vibrio* spp. in seawater and/or molluscan shellfish based on water temperatures and/or salinity, the predictive ability can be improved by incorporating local data and considering additional factors such as hydrodynamic effects (occurrence of tidal waves, rainfall) and sunlight.

32. For seafood grown in coastal locales, especially in cholera-endemic areas, care should be taken to avoid contamination of seafood with faecal cholerae *V. cholerae*.

3.2 HYGIENIC PRODUCTION OF SEAFOOD SOURCES

33. Refer to Section 3.2 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

3.3 HANDLING, STORAGE AND TRANSPORT

Nicaragua proposes the following inclusions and deletions: Nicaragua proposes changing “debe” to “debería” in the Spanish translation.

34. For the storage and handling of seafood aboard fishing vessels, the use of seawater taken near the seashore or from the region near the mouth of drain or river contaminated with sewage should be avoided. In particular, clean seawater or potable water should be used for seafood intended to be eaten raw, and for preparing ice for such use. Seafood should be held at temperatures between 0° and 4° Celsius to minimise and/or prevent the growth of pathogenic *Vibrio* spp. after harvest, for example, in an ice-water slurry, ice or refrigeration on vessels and at harvest sites. The delay between harvest and refrigeration should be as short as possible.

NICARAGUA PROPOSES THE FOLLOWING COMMENTS:

First, the concept of clean water should be expanded to clean seawater or potable water. Review the definitions in the code for fishery products.

Second, the temperature range for refrigeration between 0° and 4° Celsius should be included. Generalities tend to be misinterpreted.

35. For on-boat cooked (boiled, blanched) seafood products, ice and/or refrigeration should be used to facilitate the rapid cooling. Ice made from potable water should be used to minimize cross-contamination.

The water should be treated with a degree of chlorine that will ensure potability.

Paragraphs 36, 37 and 38 are already included in the Code of Practice for Fish. Make a reference to the same.

3.4 CLEANING, MAINTENANCE AND PERSONNEL HYGIENE AT PRIMARY PRODUCTION

36. Refer to Section 3.4 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

37. Refer to Section 7.1 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969). A carrier of choleraogenic *V. cholerae* should not handle seafood or ice for the storage of seafood, which may result in the contamination of the seafood with choleraogenic *V. cholerae*.

SECTION IV - ESTABLISHMENT: DESIGN AND FACILITIES

Objectives

38. Equipment and facilities should be designed, constructed and laid out to minimise cross-contamination and recontamination with pathogenic *Vibrio* spp.

4.1 LOCATION

39. Refer to Section 4.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.1.1 Establishments

40. Refer to Section 4.1.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.1.2 Equipment

41. Refer to Section 4.1.2 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.2 PREMISES AND ROOMS

4.2.1 Design and layout

42. Refer to Section 4.2.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

43. The following practices should be followed, if possible, for live or raw ready-to-eat and cooked ready-to-eat seafood.

44. Whenever feasible, premises and rooms should be designed to separate processing and finished seafood_product areas. This can be accomplished in a number of ways, including linear product flow (raw materials to finished products) or physical partitions.

45. Where feasible, the washing room for food equipment used in the finished product manufacturing should be physically segregated from the finished product processing area.

4.2.2 Internal structures and fittings

46. Refer to Section 4.2.2 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.2.3 Temporary/mobile premises and vending machines

47. Refer to Section 4.2.3 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.3 EQUIPMENT

4.3.1 General

48. Refer to Section 4.3.1 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.3.2 Food control and monitoring equipment

49. Refer to Section 4.3.2 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

50. The chill room should be equipped with a calibrated thermometer.

4.3.3 Containers for waste and inedible substances

51. Refer to Section 4.3.3 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

4.4 FACILITIES

52. Refer to Section 4.4 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

53. Adequate facilities should be provided for the handling and washing of products.

54. Suitable and adequate facilities should be provided for storage and/or production of ice.

4.4.1 Water supply Nicaragua adds the word “suficiente” to the Spanish translation for “adequate supply.”

55. An adequate supply of clean water from a reliable source (artesian well) should be available for handling and washing of seafood to limit the load of pathogenic *Vibrio* spp..

Review the concepts of clean water. If these include clean seawater and potable water there would be no reason to make the change, but this one yes.

4.4.2 Drainage and waste disposal

56. All drainage and waste lines should be capable of coping with peak demands.

57. Accumulation of solid, semi-solid or liquid wastes should be minimised to prevent contamination, because pathogenic *Vibrio* spp. may grow rapidly in these wastes under certain circumstances.

58. Separate and adequate facilities should be provided to prevent contamination by offal and waste material.

4.4.3 Cleaning

59. Refer to Section 4.4.3 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.2.1 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

4.4.4 Personnel hygiene facilities and toilets

60. Refer to Section 4.4.4 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.5.1 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

4.4.5 Temperature control

61. Refer to Section 4.4.5 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 4.1 of *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

62. The *Code of Practice for Fish and Fishery Products* indicates maintaining the product at temperature as close as possible to 0°C. For pathogenic *Vibrio* spp., a temperature of 10°C or lower is adequate. The facility should be capable of controlling ambient temperature to ensure that product temperature during processing of raw seafood is maintained at a temperature of 10°C or lower⁸.

4.4.6 Air quality and ventilation

63. Refer to Section 4.4.6 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.2.2 of *Code of Practice for Fish and Fishery Products*

⁸ In this Code, 10°C is used as the target temperature to prevent/minimize growth of *Vibrio* spp. However, pathogenic bacteria species such as *Listeria monocytogenes*, *Clostridium botulinum* and histamine formers may also be hazards in addition to *Vibrio* spp. If this is the case, more strict temperature control, as close as possible 0°C, should be implemented. In the case of molluscan shellfish, a different temperature control specified in the Annex would be required.

(CAC/RCP 52-2003).

4.4.7 Lighting

64. Refer to Section 4.4.7 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.2.3 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

4.4.8 Storage

65. Refer to Section 4.4.8 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.2.2 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

SECTION V - CONTROL OF OPERATION

5.1 CONTROL OF FOOD HAZARDS

66. This section should be applicable from harvest through to retails/food service/catering businesses. Control of pathogenic *Vibrio* spp. will typically require the stringent application of Good Hygienic Practices and other supportive programs. These prerequisite programs, together with HACCP, can provide a sound framework for the control of pathogenic *Vibrio* spp. in seafood.

67. The factors and attributes described below are components of Good Hygienic Practice programs that will typically require increased attention to control pathogenic *Vibrio* spp. and may be used as critical control points in HACCP programs where pathogenic *Vibrio* spp. are identified as a hazard of concern.

5.2 KEY ASPECTS OF HYGIENE CONTROL SYSTEMS

5.2.1 Time and temperature control

68. Refer to Section 4.1 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003). Time and temperature are the most important factors affecting the rate of growth of pathogenic *Vibrio* spp. in seafood. At each step the temperature should be controlled and monitored.

5.2.2 Specific process steps

5.2.2.1 Washing and processing

69. Clean water at low temperature should be used for washing and processing seafood at processing establishments.

70. The eviscerated cavity of fish intended for raw consumption (e.g. preparation of *sashimi*) should be thoroughly washed with clean, potable running water.

5.2.2.2 Cooking

71. Time and temperature should be determined for each cooking operation to ensure the inactivation of pathogenic *Vibrio* spp.

72. After cooking and blanching, clean potable water should be used for cooling.

Nicaragua uses potable water throughout the process. 0.5 and 1.5 ppm.

5.2.2.3 Food processing practices

73. Food processing practices (e.g. acidification to pH below 4.8, salting to a sodium chloride concentration of more than 8-10% for *V. parahaemolyticus*, food preservatives (as established by the CCFA), water activity less than 0.94) can be used to minimise the growth and possibly reduce the levels of pathogenic *Vibrio* spp. in seafood.

74. Freezing could be used to reduce the level or prevent the growth of pathogenic *Vibrio* spp. in seafood.

75. For pathogenic *V. parahaemolyticus*, several possible inactivation technologies have been reported such as high pressure and mild heating. [The use of these technologies should be done in accordance with the legislation of the country of retail sale.]

76. Any practice selected to reduce/inactivate pathogenic *Vibrio* spp. in seafood or control/minimize their growth of pathogenic *Vibrio* spp. should be adequately validated to ensure that the process is effective.

77. The food processing practices should be closely monitored and verified to ensure that pathogenic *Vibrio* spp. are controlled as intended.

Nicaragua proposes the following inclusions and deletions:

These practices are necessary given that there is an elevated presence of these *Vibrio* spp. in fish and fishery products that are caught very near the shore.

5.2.2.4 Storage

78. Seafood intended for raw consumption, as well as other ready-to-eat seafood, should be stored in shallow layers and surrounded by sufficient finely crushed ice or with a mixture of ice and clean water before preparation. Live fish and shellfish should be stored at the lowest temperature tolerable for species (Refer to Section 9 of the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003)).

79. Seafood should be stored so as to avoid over-stacking or over-filling of containers so that cold air can adequately circulate.

5.2.3 Microbiological and other specifications

80. Refer to Section 5.2.3 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and the *Principles for the Establishment and Application of Microbiological Criteria for Foods* (CAC/GL 21-1997).

5.2.4 Microbiological cross-contamination

81. Refer to Section 5.2.4 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969) and Sections 3.2.2 and 3.3.2 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

82. For all seafood, particularly those that are ready-to-eat, microbiological cross-contamination should be avoided in all foods with respect to pathogenic *Vibrio* spp., especially *V. parahaemolyticus*.

5.2.5 Physical and chemical contamination

83. Refer to Section 5.2.5 the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.2.2 and 3.3.2 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

5.3 INCOMING MATERIAL REQUIREMENTS

84. Refer to Section 5.3 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 8.5.1 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

5.4 PACKAGING

85. Refer to Section 5.4 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 8.5.2 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

5.5 Water

5.5.1 In contact with food

86. Refer to Section 5.5.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) except cases specified within this Code where clean water could be used.

87. Coastal seawaters used at landing docks and at markets have been shown to be occasionally contaminated with high level of pathogenic *V. parahaemolyticus*. Therefore, the use of these waters should be avoided in the post-harvest stage.

5.5.2 As an ingredient

88. Refer to Section 5.5.2 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

5.5.3 Ice and steam

89. Refer to Section 5.5.3 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

5.6 MANAGEMENT AND SUPERVISION

90. Refer to Section 5.6 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

5.7 DOCUMENTATION AND RECORDS

91. Refer to Section 5.7 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

5.8 RECALL PROCEDURES

92. Refer to Section 5.8 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

SECTION VI - ESTABLISHMENT: MAINTENANCE AND SANITATION

93. Refer to Section 6 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.4 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

SECTION VII - ESTABLISHMENT: PERSONAL HYGIENE

94. Refer to Section 7 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.5 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

SECTION VIII – TRANSPORTATION

95. Refer to Section 8 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Sections 3.6 and 17 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

96. Transportation is an integral step in the food chain and temperature during this period should be controlled, monitored and recorded where appropriate.

SECTION IX - PRODUCT INFORMATION AND CONSUMER AWARENESS

9.1 LOT IDENTIFICATION

97. Refer to Section 9.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

9.2 PRODUCT INFORMATION

98. Refer to Section 9.2 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

9.3 LABELLING

99. Refer to the General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985). Where appropriate, product labels should include information on safe handling practices and storage recommendations.

100. In addition, countries should give consideration to labelling of unpackaged live or raw seafood, so that consumers are adequately informed with respect to the safety and true nature (alive or not alive) of these products. In particular, labelling should alert at-risk consumers to avoid or cook those products. Any

treatment (*e.g.* heat treatment), that is applied to the product should be mentioned on the label (if present) if consumers would be misled by its omission.

9.4 CONSUMER EDUCATION

101. Since each country has specific food habits, communication and education programs pertaining to pathogenic *Vibrio* spp. are most effective when established by individual governments.

102. Programs should be directed at consumers:

- to educate them on household practices and behaviours as indicated in Five Keys to Safer Food (WHO) “ that would specifically keep the numbers of pathogenic *Vibrio* spp. that may be present in foods, to as low a level as possible and minimise the potential of cross-contamination from seafood to hands of food handlers, and then from hands to other foods, or from seafood to utensils (*e.g.*, cutting board), and then from utensils to other foods by:
 - keeping seafood cold to minimise and/or prevent the growth of pathogenic *Vibrio* spp.;
 - keeping refrigerator temperatures as low as practical;
 - using thermometers inside home refrigerators, ice chests or other storage containers;
 - preparing, cooking and/or consuming seafood immediately after removing them from the refrigerator;
 - promptly refrigerating leftover seafood;
 - washing and disinfecting hands, utensils and equipments whenever raw seafood is handled; and
 - separating utensils and equipment used for raw seafood, from other ready-to-eat foods, where appropriate.
- to help them make informed choices about the purchase, storage, shelf-life labelling and appropriate consumption of certain raw seafoods that have been identified in relevant risk assessment and other studies, taking into consideration the specific regional conditions and consumption habits.

9.4.1 Special Attention to Susceptible Subpopulations

103. Liver disease is a prominent risk factor for human infection with pathogenic *Vibrio* spp., especially *V. vulnificus*. Additional risk factors include diabetes, haemochromatosis and HIV/AIDS⁹. Subpopulations with increased susceptibility should follow the advice below:

- avoid the consumption of raw or partially treated seafood; and
- heat seafood thoroughly before consumption.

SECTION X – TRAINING

10.1 AWARENESS AND RESPONSIBILITIES

104. Refer to Section 10.1 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.8 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

105. [Industry (fishermen, primary producers, manufacturers, distributors, retailers and food service/institutional establishments) and trade associations play an important role in providing specific instructions and/or training to employees and consumers etc. for the control of pathogenic *Vibrio* spp. Special consideration shall be given to developing countries, taking into consideration their fishing techniques, including small fisherfolks.]

10.2 TRAINING PROGRAMMES

106. Personnel involved in the primary production, harvesting, processing and handling of seafood should have appropriate training for the tasks they are performing. This may include:

⁹ FAO and WHO, 2005. Risk assessment of *Vibrio Vulnificus* in raw oysters. Microbiological Risk Assessment Series, No.8.

- the nature of pathogenic *Vibrio* spp., namely *V. parahaemolyticus*, choleraogenic *V. cholerae* and *V. vulnificus*, their harbourage sites, and their resistance to various environmental conditions to be able to conduct a suitable hazard analysis for their products;
- control measures for reducing the risk of pathogenic *Vibrio* spp. associated with seafood during harvesting, processing, distribution, marketing, use and storage, for preventing cross-contamination and minimizing the growth of pathogenic *Vibrio* spp.; and
- the means for verifying effectiveness of control programs, including sampling and analytical techniques.

10.3 INSTRUCTION AND SUPERVISION

107. Refer to Section 10.3 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

10.4 REFRESHER TRAINING

108. Refer to Section 10.4 of the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1-1969) and Section 3.8 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

NORWAY

Background

The Committee on Food Hygiene, at its last 40th Session, had considered the Proposed Draft Code of Hygienic Practice for Pathogenic *Vibrio* spp. in Seafood in detail. For details of the considerations see ALINORM 09/32/13, paras 104-136.

The Committee considered amending the title of the code, in order to better reflect the contents of the document and to use a similar title as used in other recent CCFH documents, e.g. Guidelines on the Application of General Principles of Food Hygiene to the Control of *Listeria Monocytogenes* in Ready-to-eat Foods (CAC/GL 61-2007), for consistency. However no agreement was reached, therefore the two different titles were placed in square brackets for further consideration.

Recognizing that substantial progress had been made to the text, it was noted that some important issues would need further consideration. Therefore the Committee agreed to return the proposed draft Code of Hygienic Practice for pathogenic *Vibrio* species in seafood to Step 3, for comments and further consideration at the next session of the Committee (see Appendix IV of the above ALINORM).

Comments

To ensure consistency with the adopted guideline on: *Listeria monocytogenes*, Norway would prefer the title of the code to be: Guidelines on the Application of General Principles of Food Hygiene to the Control of... There have been discussions at earlier sessions in the CCFH, particularly during the development of the code on *Listeria*. Several delegations, including Norway, expressed the need for consistency in developing future codes. Where a risk- assessment exists, the *Listeria*-code should be a template, when it comes to both the title and structure. In this code for *Vibrio* spp., a risk-assessment is available from JEMRA and has been presented to the CCFH.

THAILAND

Thailand would like to thank Japan as a working group chair for the work done. We would like to provide to the Committee a few specific comments as follows;

Section 3.1 Environmental hygiene (pre-harvest control)

Paragraph 31

We are of the view that monitoring of molluscan shellfish at harvest for the level of pathogenic *Vibrio* spp. is a resource-consuming activity and should be prioritized for a high risk products eg. for the products intended to be confirmed raw. We would like to amend paragraph 31, to read

“Monitoring of molluscan shellfish intended to be consumed raw at harvest for the levels of pathogenic *Vibrio* spp. should be conducted to determine the regional and seasonal risk of these microorganisms for the application of appropriate controls.”

Section 3.4 Cleaning, maintenance and personnel hygiene at primary production

Paragraph 42

We suggest that the second sentence should be amended to be more practical and to facilitate understanding of food business operators and food handlers as follows:

“A person known to be carrier of choleraenic *V. cholerae* should not handle seafood or ice for the storage of seafood, which may result in the contamination of the seafood with choleraenic *V.cholerae*.”

Section 9.3 Labelling

Paragraph 105

It should be clarified what is a certain seafood that need specific labeling. We would like to recommend inserting a phrase to the first sentence, to read

”Countries should give consideration to labelling of certain live and raw seafood intended to be consumed raw, so that consumers can make informed choices with respect to the safety and true nature of these products”.

UNITED STATES OF AMERICA

The United States supports the document as attached to the report of the 40th Session of CCFH. This guide provides a strong framework for governments and industry to use in the control of all *Vibrio* spp. in the many seafood products where these microorganisms are likely to occur and present a risk for human illness.

The United States does note that there are some provisions related to bivalve molluscs that are contained in the base document and that these may be more appropriately located in the Annex.