

# **Elaboration of Codex Guidelines on the Application of General Principles of Food Hygiene to the Control of Pathogenic *Vibrio* Species in Seafood**

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## **Introduction**

Codex Alimentarius Commission is the inter-governmental food safety risk management body, which elaborates international standard and guidelines. The 32nd session of the Codex Committee on Food Hygiene (CCFH), which is a horizontal committee for controlling microbiological hazards in food, identified *Vibrio parahaemolyticus* in shellfish as one of the priority issues for consideration by the joint FAO/WHO Expert Consultation on microbiological risk assessment (JEMRA). Afterward, CCFH agreed to develop a Discussion Paper on Risk Management Strategies for *Vibrio* spp. in seafood. At the 39th session of the CCFH, the Committee agreed to take up a new work on a Code of Hygienic Practice for *Vibrio* spp. in Seafood since food safety concerns associated with these pathogens made CCFH recognize the need for specific guidance on potential risk management strategies for their control based on the results of JEMRA and other relevant scientific information.

## **Materials and Methods**

Relevant Codex documents and reports of the CCFH meetings were reviewed.

## **Results and Discussion**

### *Objective*

These Guidelines provides guidance on control of pathogenic *Vibrio* spp. in seafood (Fish, shellfish and other aquatic invertebrates from marine and fresh water sources and their products which are intended for human consumption), with a view towards protecting the health of consumers and ensuring fair practices in food trade. The primary purpose of these Guidelines 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.

### *Scope*

These Guidelines covers seafood that is marketed and may be consumed in a live, raw, chilled/frozen, partially treated, or thoroughly treated state. It is applicable to the whole food chain from primary production o final consumption. The target microbiological hazards of these Guidelines are pathogenic *V. parahaemolyticus*, *V. vulnificus* and choleraogenic *V. cholerae*. These Guidelines uses the same structure of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969), and are supplement to

the General Principles of Food Hygiene.

### *Primary Production*

Pre-harvest controls are more applicable to bivalve molluscs 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.

To prevent contamination, for the storage and handling of seafood aboard fish vessels, clean water should be used for seafood intended to be eaten raw, and for preparing ice for such use. The use of sea water taken from near the seashore or from a drainage outlet or river contaminated with sewage should be avoided. When the product is required to be washed, whether onboard the boat or at port, clean water should be used. Seafood should be held at temperatures that minimise and/or prevent the growth of pathogenic *Vibrio* spp. after harvest. The delay between harvest and refrigeration should be as short as possible.

### *Control of the hazards during operation*

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. For pathogenic *Vibrio* spp., a temperature of 10°C or lower is considered as adequate.

Clean water at low temperature should be used for washing and processing seafood at processing establishments. However, the eviscerated cavity of fish intended for raw consumption (*e.g.* preparation of *sashimi*) should be thoroughly washed with potable running water. Time and temperature should be determined for each cooking operation to ensure the inactivation and elimination of pathogenic *Vibrio* spp.. After cooking and blanching, potable water should be used for cooling.

Food processing practices (*e.g.* acidification to pH below 4.8, salting to a sodium chloride concentration of more than 10% for *V. parahaemolyticus*, food preservatives and/or water activity less than 0.94) can be used to minimize the growth and possibly reduce the levels of pathogenic *Vibrio* spp. in seafood. Freezing could be used to reduce the level or prevent the growth of pathogenic *Vibrio* spp. in seafood.

Several possible technologies such as high pressure, mild heating, freezing and extended storage, have been reported to inactivate *Vibrio* spp.. The use of these technologies should be done in accordance with the legislation of the country of retail sale.

Any practice selected to reduce/inactivate pathogenic *Vibrio* spp. in seafood or control/minimize the growth of pathogenic *Vibrio* spp. should be adequately validated to ensure that the process is effective. The food processing practices should be closely monitored and verified to ensure that pathogenic *Vibrio* spp. are controlled and/or reduced as intended.

Coastal seawaters used at landing docks and at markets have been shown to be occasionally

contaminated with high level of pathogenic *V. parahaemolyticus*. Therefore, only clean/potable waters should be used in the post-harvest stage. CCFH did not develop microbiological criteria for *Vibrio* spp.. This was due to the fact that the risk reduction derived from a certain microbiological criteria was diverse among different parts of the world and that it was difficult to set microbiological criteria, which were applicable worldwide based on the risk assessment.

#### *Annex on the control measures for Vp and Vv in Bivalve Molluscs*

This Annex covers bivalve molluscs that are intended for consumption in a live, raw, or partially treated state, and highlights the key control measures that influence the introduction/contamination of and minimize levels of *V. parahaemolyticus* and *V. vulnificus* in bivalve molluscs and thus the risk of foodborne diseases caused by these pathogens. Effective control measures for these pathogens in bivalve molluscs will typically require an evaluation in terms of the risk associated with environmental factors in the harvesting area and harvesting practices based on epidemiology and environmental conditions (i.e. air and water temperature and salinity), and may need to restrict harvest or otherwise prevent use of product for raw consumption, or restrict the time to refrigeration. Control measures such as limit time from harvest or first exposure to ambient air temperature, or minimize time and temperature conditions that would allow the growth of the pathogens, during handling, storage and transport of harvested bivalve molluscs should be applied as necessary. It may be useful to survey levels periodically of *V. parahaemolyticus* and *V. vulnificus* in bivalve molluscs at various points in the distribution chain to verify effectiveness of recommended controls.

“Post-harvest processing”, for example, quick frozen, high-pressured and/or mild heat treatments may be applied in order to reduce levels of *V. parahaemolyticus* and/or *V. vulnificus*, but not to eliminate them completely while sensory characteristics of live bivalve molluscs are essentially retained in the bivalve molluscs even after the application of such the treatments.

### **Conclusions**

Codex elaborated a risk management document which focused on the specific control measures for pathogenic *V. parahaemolyticus*, *V. vulnificus* and choleraogenic *V. cholerae*.. By the application of these Guidelines by countries, with necessary modifications and amendments, taking into account regional differences such as the prevalence of pathogenic *Vibrio* spp., water temperatures and salinity, risk associated with pathogenic *Vibrio* spp. in seafood should be mitigated.

### **References**

Codex, 2009, Report of the 41<sup>st</sup> session of the CCFH, Alinorm 10/33/13