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CONSULTATIONS AND WORKSHOPS

Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods

Hazard identification, exposure assessment and hazard characterization of *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood

WHO Headquarters, Geneva, Switzerland
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FOOD SAFETY PROGRAMME
DEPARTMENT OF PROTECTION OF THE HUMAN ENVIRONMENT
WORLD HEALTH ORGANIZATION

ACKNOWLEDGEMENTS

The Food and Agriculture Organization of the United Nations and the World Health Organization would like to express their appreciation to the expert drafting groups (see Annex 3) for the time and effort which they dedicated to the preparation of thorough and extensive technical documents on exposure assessment and hazard characterization. The deliberations of this expert consultation were based on these documents.

The documents on which this report was based will undergo further development, a public comment period and a scientific peer review. Therefore, the information made available through this report and other sources is subject to revision until the risk assessments have been finalized and published by FAO and WHO. FAO and WHO declines any responsibility for errors and omissions in the information and data provided.

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1. INTRODUCTION

The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) convened an Expert Consultation on Risk Assessment of Microbiological Hazards in Foods in WHO Headquarters, Geneva, Switzerland from 23 - 27 July 2001. The list of participants is presented in Annex 1.

Dr Jørgen Schlundt, Coordinator, Food Safety Programme, Department of Protection of the Human Environment, Sustainable Development and Healthy Environments Cluster in WHO opened the consultation on behalf of the two sponsoring organizations. In welcoming the participants Dr Schlundt stated that FAO and WHO are in the forefront of the development of risk based approaches for the management of public health hazards in food. In doing so, they are extending the experience and expertise developed in risk assessment of chemical hazards to microbiological hazards.

There is heightened global awareness of microbiological food safety and the need to reduce significantly the occurrence of foodborne illnesses. Dr Schlundt noted that the highest governing body of WHO, the World Health Assembly, recognized this fact when it met in May 2000 and for the first time issued a resolution that focused on the microbiological problems relating to food safety. The resolution also highlighted the need for science based involvement of public health considerations within the future standardization work in this area. Dr Schlundt also highlighted the activities of the Codex Alimentarius Commission (CAC) in the area of microbiological risk assessment. In response to requests from the CAC as well as to the needs of their member countries, FAO and WHO had embarked on a programme of activities with the objective of conducting risk assessments on specific pathogen-commodity combinations.

The consultation elected Dr Servé Notermans (the Netherlands) as Chairperson of the expert consultation. Dr Henrik Wegener (Denmark) was appointed as Rapporteur. The consultation also appointed a chairperson and rapporteur for each of the working groups. Professor Tom Humphrey (United Kingdom) and Dr George Nasinyama (Uganda) were nominated as Chairperson and Rapporteur respectively for the working group on *Campylobacter* spp. in broiler chickens. Professor Tom McMeekin (Australia) and Dr Ron Lee (United Kingdom) were nominated as Chairperson and Rapporteur respectively for the working group on *Vibrio* spp. in seafood.

2. BACKGROUND

Risk assessment of microbiological hazards in foods has been identified as a priority area of work for the CAC. At its 32nd session the Codex Committee on Food Hygiene (CCFH) identified a list of pathogen-commodity combinations for which it required expert risk assessment advice. In response, FAO and WHO jointly launched a programme of work with the objective of providing expert advice on risk assessment of microbiological hazards in foods to their member countries and to the CAC.

Dr Hajime Toyofuku, WHO, and Dr Sarah Cahill, FAO, provided participants with history of the FAO, WHO and Codex activities on microbiological risk assessment including the background to the current work. In their presentation, they also highlighted the objectives and expected outcomes of the current meeting. Dr Jean-Louis Jouve, Chief, Food Quality and Standards Service, FAO, provided the expert consultation with guidance on how to conduct their review and evaluation of the background documents.

The FAO/WHO programme of activities on microbiological risk assessment aims to serve two customers - the CAC and the FAO and WHO member countries. The CAC, and in particular the CCFH, has requested sound scientific advice as a basis for the development of guidelines and recommendations as well as the answers to specific risk management questions on certain pathogen-commodity combinations. Member countries on the other hand need specific risk assessment tools to use in conducting their own assessments and, if possible, some modules that can be directly applicable to a national risk assessment.

To implement this programme of work, FAO and WHO are convening a series of joint expert consultations. To date two expert consultations have been convened to address risk assessment of *Salmonella* spp. in broiler chickens and eggs and *Listeria monocytogenes* in ready-to-eat foods. In March 2001 FAO and WHO initiated risk assessment work on *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood, both of which were identified as priority issues by the CCFH (see Annex 2). Two *ad hoc* expert drafting groups were established to examine the available relevant information on the above-mentioned pathogen-commodity combinations. These groups prepared background documentation on hazard identification, exposure assessment and hazard

characterization of *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood. These documents were reviewed and evaluated by the joint expert consultation.

The purpose of this report is to present the summary of the draft documents on hazard identification, hazard characterization and exposure assessment on *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood as well as the discussions and recommendations of the expert consultation.

3. OBJECTIVES OF THE CONSULTATION

The consultation examined the information provided by the expert drafting groups on hazard characterization and exposure assessment of *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood with the following objectives;

1. To critically review the documents prepared by the *ad hoc* expert drafting groups giving particular attention to:
    - the scope of the work and the approach taken or the proposed approaches to undertake the risk assessments of these pathogen-commodity combinations;
    - the assumptions on which the exposure assessments and hazard characterizations are or will be based;
    - the associated uncertainty and variability;
    - the data needed to improve and complete the work.
2. To provide scientific advice to FAO and WHO member countries on the risk assessment of *Campylobacter spp.* in broiler chickens and *Vibrio* spp. in seafood based on the available documentation and the discussions during the expert consultation.
3. To identify the areas in which risk management guidance is needed from the CCFH to further define the future direction of the work.

4. SUMMARY OF THE GENERAL DISCUSSIONS

The drafting groups presented overviews of the hazard identification, exposure assessment and hazard characterization components of the risk assessments on *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood to the expert consultation. A summary of this and the discussions of the expert consultation are given in sections five and six of this report.

The expert consultation acknowledged and expressed its appreciation for the body of work that had been carried out by the drafting groups and the quality of the material presented.

The consultation formed two working groups addressing *Campylobacter* and *Vibrio* respectively. The composition of the two working groups is outlined in the tables below.

Campylobacter spp. in broiler chickens

Independent experts	Expert members of the drafting groups
Louis Anthony Cox, United States	Bjarke Bak Christensen, Denmark
Marja-Liisa Hänninen, Finland	Aamir Fazil, Canada
Tom Humphrey, United Kingdom	Emma Hartnett, United Kingdom
Servé Notermans, The Netherlands	Anna Lammerding, Canada
Susana María de los Milagros Jiménez, Argentina	Greg Paoli, Canada
Paul Mead, United States	Hanne Rosenquist, Denmark
George Nasinyama, Uganda	
Henrik Wegener, Denmark	

Vibrio spp. in seafood

Independent experts	Expert members of the drafting groups
Awa Kane Aïdara, Senegal	Angelo DePaola, United States
Dorothy-Jean McCoubrey, New Zealand	I. Karunasagar, India
Ron Lee, United Kingdom	Ken Osaka, Japan
Tom McMeekin, Australia	John Sumner, Australia
Noel Murray, New Zealand	Mark Walderhaug, United States
Mitsuaki Nishibuchi, Japan	
Mark Tamplin, United States	
Paul Brett Vanderlinde, Australia	
Shigeki Yamamoto, Japan	

The expert consultation discussed the approaches taken by the two expert drafting groups to respond to the risk management questions posed by the 33rd session of the CCFH and found that the approaches in general were sound. It was recognized that there are inherent challenges and problems relating to developing "globally applicable risk assessments" based on national risk assessments, or, in the absence of national risk assessments, from relevant data available in different countries. Also, the expert consultation realized that the current FAO/WHO microbiological risk assessment work could not reach the level of detail achievable in national microbiological risk assessment work. This was due to the need for it to be widely applicable but also due to the limited resources available to the sponsoring organizations.

The expert consultation recognized that the availability of suitable data for microbiological risk assessment was a critical issue. For example, it identified data in relation to food consumption patterns and food handling practices in different countries as a very important issue for the development of internationally applicable risk assessment tools. In relation to data availability the expert consultation noted that the FAO/WHO "Calls for data" were attempting to address this. However, it felt that the current process had limitations and was unlikely to reach the attention of all relevant data contributors due to language barriers and the fact that their distribution was almost exclusively by electronic means. It was considered that this process could be improved by addressing the language and distribution issues and also by providing potential contributors with detailed guidelines for data collection and a template for data submission.

The expert consultation recommended that dialogue between risk assessors and risk managers should be enhanced to provide timely feedback on model creation and documentation and to better serve the needs of the risk managers. The consultation suggested that presentations by a representative member of the expert drafting groups at the CCFH would be a productive means of increasing understanding of the potential uses and limitations of microbiological risk assessment among risk managers and enabling the CCFH to better identify their risk assessment needs.

The consultation noted that currently the risk assessment work that had been carried out on both *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood was weighted towards the situation in developed countries, primarily due to differences in data availability in developing and developed countries. However, due to the international nature of this work the expert consultation recommended that both expert drafting groups attempt to further include the situation in developing countries in the draft risk assessments.

4.1 *CAMPYLOBACTER* SPP. IN BROILER CHICKEN

The expert consultation found that the approach taken and the assumptions made in the draft *Campylobacter* risk assessment were acceptable. However, it was noted that there were a large number of uncertainties relating to important areas in the farm-to fork model, primarily due to lack of data to develop and validate the models.

The expert consultation acknowledged that in the current draft of the *Campylobacter* farm-to-table model the various components were not yet fully integrated, and needed further development before estimates of the risk to public health and the efficacy of interventions to reduce *Campylobacter* could be generated. Although, this was felt to be a limitation in reviewing the model, the expert consultation recognized the capacity of the farm-to-table model to identify gaps in data and felt that it could be used to stimulate relevant research on *Campylobacter*.

Furthermore, when finalized and further validated the expert consultation was of the opinion that it would constitute an important contribution to the management of risks to public health posed by *Campylobacter* spp. in broiler chickens.

The expert consultation identified several areas in which it recommended the expert drafting group should focus particular attention in completing the risk assessment. These included the introduction of *Campylobacter* in poultry flocks, the application of specific interventions in poultry processing plants and the preparation of meals outside the home. Furthermore, it recommended that FAO and WHO identify means of validating the model when completed.

The expert consultation noted that risk management questions posed by the CCFH in relation to *Campylobacter* spp. in broiler chickens were identical to those formulated for *Salmonella* spp. in broiler chickens. However, due to the significant differences between these two pathogens the consultation felt that the preparation of a risk profile prior to the formulation of the risk management questions could have focused these questions to better address the particularities of *Campylobacter*.

4.2 *VIBRIO* SPP. IN SEAFOOD

The expert consultation accepted the logic of using an available model (that of *Vibrio parahaemolyticus* in United States oysters) as the basis for the development of globally applicable models for the same organism in oysters and other seafood products, and for its extension to other *Vibrio* spp. It was stressed that appropriate data from a number of countries needed to be included in order to achieve this.

The expert consultation noted that appropriate data were needed in order to include differences in seafood consumption and preparation patterns, aquaculture and harvesting practices as well as biological effects introduced by different species of shellfish, crustacea and fish in the model. These were in addition to the more readily identifiable variables of water and air temperature, water salinity, prevalence and number of pathogenic vibrios in the environment and the proportion of strains presumed to be pathogenic.

It was noted that only example mitigations had been included in the model for *V. parahaemolyticus* in oysters in order to demonstrate the way in which these could be incorporated. There was a need for the risk managers to identify the various mitigations that should be included. It might not be necessary to have comprehensive models in order to identify the relative effects of different intervention strategies.

The expert consultation recognized the considerable resources needed for completion of the four separate *Vibrio* risk assessments identified to date and the difficulty of completing all of these to a satisfactory standard in the identified timeframe. There was a need to review the work involved and resources available and for the CCFH to identify which of the assessments were of greatest importance.

5. HAZARD IDENTIFICATION, HAZARD CHARACTERIZATION AND EXPOSURE ASSESSMENT OF *CAMPYLOBACTER* SPP. IN BROILER CHICKENS

5.1 EXECUTIVE SUMMARY