



JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD HYGIENE

Forty-seventh Session

Boston, Massachusetts, United States of America, 9 – 13 November 2015

PROGRESS REPORT ON THE JOINT FAO/WHO EXPERT MEETINGS ON MICROBIOLOGICAL RISK ASSESSMENT (JEMRA) AND RELATED MATTERS

INTRODUCTION

1. As Codex endeavours to provide risk management guidance on a wide range of issues pertinent to the safety and quality of food in international trade in order to protect consumer health, FAO and WHO aim to provide the relevant scientific advice in a timely manner. This paper describes the scientific advice as well as related information and resources that FAO and WHO have developed relevant to the specific Agenda items of the CCFH47.

A) RECENT FAO/WHO ACTIVITIES RELEVANT TO THE ONGOING WORK OF CCFH

A.1 Control of Non-typhoidal *Salmonella* spp. in Beef and Pork Meat (*Relevant to agenda Item 4*)

2. CCFH46 requested FAO and WHO to provide scientific advice on this matter by 1) conducting a systematic literature review to ensure that any relevant measures for control of *Salmonella* in beef and pork are identified, and 2) convening an Expert Meeting to review the technical basis of the mitigation/intervention measures proposed by the CCFH physical working group (pWG).

3. In response to the request, FAO and WHO conducted a systematic review to provide preliminary inputs to the pWG which took place in Brussels, Belgium (6-9 May 2015). Due to the time constraints, the systematic review only included the publicly available scientific literature on mitigation/intervention measures to control *Salmonella* in fresh beef and pork meat. The review covered interventions from farm to the end of processing.

4. The pWG refined the request to the Expert Meeting to: 1) advise on the most appropriate point(s) of application of specific interventions and decontamination treatments; 2) verify, based on the available data, their efficacy in terms of reduction of *Salmonella*; and 3) advise where possible and with some level of confidence on the quantifiable level of reduction that the intervention achieves, and whether these are appropriate to include in the Codex guideline.

5. FAO and WHO convened an Expert Meeting in Rome, Italy on 28 September to 2 October 2015. The expert meeting considered any intervention for which there was available evidence that it could be applied to reduce or control *Salmonella* in the production and processing of fresh beef or pork. The focus was on identified hazard-based interventions, however, the experts emphasized that these interventions must not be considered in isolation, but rather as an integral part of an overall meat hygiene programme. It was noted that there are a range of contextual factors that will guide decisions on whether a particular intervention is implemented and that efficacy will also vary according to the conditions at the point of implementation. It was agreed that all interventions should be verified at the point of application.

Hazard-based interventions during primary production and processing of beef

6. No *Salmonella* specific interventions were identified in primary production of beef, although the experts agreed that biosecurity could contribute to general on-farm control of *Salmonella* and other zoonotic foodborne infections.

7. Decontamination treatments of cattle hides using chemical washes, including organic acids and other chemicals, were recommended for consideration as potential hazard-based interventions for the control of *Salmonella* when applied post-exsanguination and before dehiding. However, decontamination of the hides of live animals was not recommended for consideration due to a lack of confidence in supporting evidence and concerns for animal welfare.

8. Carcass decontamination treatments were recommended for consideration as potential hazard-based interventions for the control of *Salmonella* after hide removal and before chilling. Decontamination treatments recommended by the experts included hot washes and steam pasteurization that achieve a carcass surface temperature of at least 70°C and chemical washes (including organic acids and other chemicals with proven efficacy). Additionally, chemical washes with proven efficacy were recommended for consideration as potential hazard-based interventions for the control of *Salmonella* in fabricated beef.

Hazard-based interventions during primary production and processing of pork

9. The experts agreed that biosecurity is an important good farming practice that can help to prevent the introduction of *Salmonella* to *Salmonella*-negative farms and to reduce the *Salmonella* prevalence in finisher pigs in infected farms. Other potential on-farm hazard-based interventions for the control of *Salmonella* include feed management, such as feeding meal vs. pellets, and acidification of feed and water using organic acids. Vaccination could be considered as a potential hazard-based intervention for the control of *Salmonella* on farm; however, the experts also identified a number of factors that need to be considered if vaccination is used as a food safety measure. Moreover, if measures are taken only pre-harvest, then there may be a limited effect on the reduction of *Salmonella* on carcasses.

10. Scalding and singeing are process steps that were recommended for consideration as potential hazard-based interventions for the control of *Salmonella* due to the extensive evidence for reductions in *Salmonella* concentration on pork carcasses during these process steps. Carcass decontamination treatments with proven efficacy were recommended for consideration as potential hazard-based interventions before chilling. These included hot water washes and steam pasteurization achieving a carcass surface temperature of at least 70°C during treatment, and organic acid washes.

Good hygienic practices (GHPs) during primary production and processing of beef and pork

11. For both beef and pork it was acknowledged that other steps during processing are also important for reduction of *Salmonella*; however a lack of consistent and credible evidence and insufficient evidence of efficacy specifically for *Salmonella* meant that they could not be considered as potential hazard-specific interventions. Instead, several of these were considered as important GHP measures, including: hygiene during transport to slaughter and in lairage to limit the spread of *Salmonella*; hygiene during carcass dressing to minimize contamination; binging to reduce faecal spillage during processing; carcass trimming and steam vacuuming to remove visible contamination; chilling to prevent growth of *Salmonella*; and practices to prevent carcass cross-contamination in the chilling room. In addition, during pork processing, GHPs should be applied during dehairing and polishing to reduce cross- and re-contamination of carcasses, and full carcass steam vacuuming was recommended for consideration as a GHP-based control measure in small establishments with limited resources.

Post-processing interventions for Salmonella control in beef and pork

12. During packaging, the experts recommended that irradiation should be considered as a potential hazard-based intervention for the control of *Salmonella* in beef and pork products. In terms of post-packaging interventions, it was noted that there were a number of interventions that could be applied from product distribution to consumption, but these varied widely and limited information was available for their consideration. However, the experts highlighted some key areas in terms of *Salmonella* control, including the importance of cold chain management and application of hazard analysis critical control point (HACCP)-based principles and hygiene prerequisites.

Follow-up action by CCFH

13. The CCFH is invited to consider the aforementioned conclusions and recommendations in the preliminary report of the meeting¹ when making risk management decisions in the development and implementation of the Proposed Draft Guidelines for Control of Non-typhoidal *Salmonella* spp. in Beef and Pork Meat. FAO and WHO would welcome feedback from the Committee on the report such as inputs on the communication aspects, which could be considered before final publication of the report.

¹ <http://www.codexalimentarius.org/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-712-47%252FSalmonella%2Bexpert%2Bmeeting%2Breport%2B-%2BOct%2B20%2B%25282%2529.pdf>

A.2 FAO/WHO Expert meeting on the microbiological safety of lipid based ready to use foods for management of moderate and severe acute malnutrition (Relevant to agenda item 6)

14. FAO/WHO convened an expert meeting in Rome, Italy from 8 to 11 December 2014 to revisit the issue of the microbial safety of lipid-based ready to use foods (RUF) for the nutritional management of moderate acute malnutrition and severe acute malnutrition, in children (6 to 59 months of age), within the context of emergency feeding programmes supervised by WFP, UNICEF, Médecins Sans Frontières, governments, and other non-governmental organizations.

15. The meeting undertook a risk assessment based on the accrued microbiological data on the products, newly published reports on immunology and infectious diseases in malnourished populations, and additional information on low moisture foods. It confirmed *Salmonella* as the primary microbiological pathogen of concern in these products, and based on available data estimated the consuming population to be on average 3.5 times more susceptible to foodborne diseases than the healthy population of equivalent age.

16. The meeting emphasised preventive controls, the application of a GHP/HACCP-based food safety management system, and intervention technologies where feasible as critical to ensure that microbiological hazards are controlled. In this context the meeting provided three approaches which could be used to establish a microbiological criterion for these products. In the first approach reference is made to existing criteria for analogous low moisture foods and the susceptibility of the consuming population which led to a recommendation of an $n= 30 \times 25$ g, $c = 0$ sampling scheme. It was noted that this does not take into consideration product specific data. The second approach, which considered existing product data, knowledge of risk to the consuming population and on using testing as a means of assuring that the process is operating consistently on a lot by lot basis recommended an $n= 10 \times 25$ g, $c = 0$ sampling scheme. A third approach, that can be highly effective, particularly in manufacturing facilities that apply proactive prevention or intervention steps to reduce or minimize *Salmonella* levels is the use of process control verification testing. This can further reduce the amount of testing and could employ a “moving window” sampling plan and highlights an alternative way in which the information from that testing is considered and acted upon.

17. Finally the meeting noted that end-product ‘hold-and-release’ testing provides less assurance of product safety than establishing and maintaining a safe process through specification of raw material safety, process design, and process operating parameters that prevent, or greatly reduce *Salmonella* contamination of the product during manufacture. Therefore, procurement from manufacturers that can document that these procedures are consistently followed and documented for every production run is key to ensuring safe product.

B) OTHER RELATED ISSUES

B.1 Microbiological criteria

18. A special volume of Food Control will be issued in December 2015 (volume 58) on Development of Microbiological Criteria for Food. This volume brings together a number of papers outlining examples of how microbiological criteria can be developed and applied for different purposes and in different situations. The papers are based on the work of the CCFH working groups on microbiological criteria who developed the initial examples to support the revision of the *Principles and Guidelines for the Establishment and Application of Microbiological Criteria Related to Foods (CAC/GL 21-1997)*. FAO and WHO would like to express their appreciation to the authors of all these papers who have invested a significant amount of time to prepare these examples for widespread distribution through the peer reviewed literature.

19. With regard to the “Risk Managers guide on the statistical aspects of microbiological criteria related to foods” which was considered by the CCFH46, FAO and WHO would like to acknowledge the feedback received from Members and note that this feedback was reviewed and incorporated as appropriate in the finalization of the document which is currently in the publication process.

B.2 Technical Guidelines for development and implementation of bivalve sanitation programme

20. FAO and WHO are undertaking a programme of work to develop technical guidance on the development of shellfish sanitation systems within the framework of Section 7 of *the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003)*. In developing these guidelines, FAO and WHO are aiming to build upon the experiences and data of member countries to develop technically and scientifically sound guidance.

21. Following a call for data and the establishment of a core group of experts to support this work, an initial meeting of the Core Group of Experts was convened in Rome, Italy on 26-28 November, 2014 to develop the scope and annotated outline of the Technical Guidelines. This was presented for stakeholder consultation at the 10th International Conference on Molluscan Shellfish Safety held at Puerto Varas, Chile (15 - 20 March, 2015). The preliminary version is expected to be finalized at an expert meeting to be held in Rome, Italy on 24 to 27 November, 2015. The scoping document can be accessed online².

22. Pilot implementation of the Technical Guidelines is being planned in selected countries in southern Africa and potentially in some countries in Latin America during 2016. Feedback from the pilot implementation will be taken into consideration in the finalization of the guidance.

B.3 Antimicrobial resistance

23. The past year has also seen a lot of discussion on antimicrobial resistance (AMR) at international level on the urgent need to tackle this issue. Particular highlights of the past year include:

- The adoption of a resolution on AMR by the 67th Session of World Health Assembly (WHA) in May 2014.
- The adoption by the 68th WHA in May 2015 of a Global Action Plan (GAP)³ to combat AMR, which lays out five strategic objectives: i) Improve awareness and understanding on AMR; ii) Strengthen knowledge through surveillance and research; iii) Reduce incidence of infection; iv) Optimize use of antimicrobials and v) Ensure sustainable investment in countering AMR.
- The discussions by Member countries of the role of FAO in addressing AMR at the governing body level that resulted in the adoption of an FAO Resolution on AMR in food and agriculture by the 39th FAO conference in June 2015⁴
- The recognition that food systems need to contribute to preventing and addressing infectious diseases, including zoonotic diseases, and tackling AMR was recognized in the Rome Declaration on Nutrition⁵ and related Framework for Action adopted by the Second FAO/WHO International Conference on Nutrition (ICN2, 19-21 November 2014) and endorsed by the 68th WHA (May 2015) and 39th Session of the FAO conference (June 2015).
- The development of a five-year strategic plan by the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (WHO-AGISAR), to support implementation of the Global Action Plan on Antimicrobial Resistance, and to review progress and lessons learnt from the AGISAR pilot projects.
- The continued implementation of country pilot projects on integrated surveillance of AMR in the Middle East, Asia, Africa and Latin America by WHO-AGISAR and FAO.
- The development of a technical Paper on “The Global State of Antimicrobial Resistance in Food and Agriculture 2015: Impact, trends, data gaps and recommendations” which will be published in early 2016.

24. A key theme among the above in addressing AMR is the need to recognize that both the contributing factors and the consequences, including economic and others, go beyond health, and that a coherent, comprehensive and integrated “One Health” approach, involving different actors and sectors such as human and veterinary medicine, agriculture, finance, environment and consumers, and strengthened tripartite collaboration between FAO, OIE and WHO for combating antimicrobial resistance is required. Further details are available in CX/CAC15/38/16 Add.1. (ftp://ftp.fao.org/codex/meetings/cac/cac38/cac38_16_add1e.pdf).

² Report of the JOINT FAO/WHO EXPERT MEETING ON GUIDANCE FOR THE DEVELOPMENT OF SHELLFISH SANITATION PROGRAMS can be accessed at <ftp://ftp.fao.org/codex/meetings/ccffp/ccffp34/Shellfish%20Sanitation%20Initiation%20meeting%20Report%20%20final%20for%20CCFFP.pdf>

³ http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_20-en.pdf

⁴ <http://www.fao.org/3/a-mo153e.pdf> (See paras 43-45)

⁵ Rome Declaration on Nutrition. Available at <http://www.fao.org/3/a-ml542e.pdf>

B.4 Joint FAO/WHO Expert Meeting on Hazards Associated with Animal Feed was held in Rome, Italy, 12 – 15 May

25. The objective of this meeting, which was convened in response to a request from the Codex ad hoc task force on animal feed, was to provide FAO and WHO Member Countries with an updated overview of the current state of knowledge on hazards associated with feed and feed ingredients (including feed additives, but not veterinary drugs), and particularly with feed sources and feed production technologies of increasing relevance, such as insects, former food and food processing by-products and biofuel by-products. The meeting also provided guidance on the most appropriate use of this information for risk analyses purposes; it identified knowledge gaps and highlighted future work needs relevant to the identification, assessment and management of potential hazards of key global concern from the perspective of human and animal health. The Executive Summary including recommendations is available online at <http://www.fao.org/3/a-az851e.pdf>. The results and follow-up of the meeting will be presented at CCFH in a side event on Hazards Associated with Animal Feed on 9 November 2015.

B.5 FAO/WHO Histamine sampling tool

26. Since its launch the histamine tool has received constant positive feedback from the users and has provided support in discussions related to histamine sampling plans. Based on the feedback received the tool has recently been updated to expand the range of sampling plan options offered. In particular the following changes have been made:

- The maximum number of samples (n_{max}) supported by the tool has been increased from 50 to 1000
- The maximum level of protection supported by the tool has been increased to 1 in 1000000
- The default level of protection has been set to 1 in 10000
- A tabular numeric output has been added to the “Analyze a Plan” section in addition to the existing charts
- The confidence level limits in the “Design a Plan” section have been modified to allow lower values (e.g. 20%).
- The Acceptable number of samples above little m (c) supported by the tool has been increased from 5 to 200

27. The tool is available at www.fstools.org/histamine

B.6 Guidance on the design and implementation of modern risk-based meat inspection systems

28. FAO is in the process of completing the above mentioned guidance which aims to provide member countries with an up to date reference on the development and implementation of risk-based meat inspection systems. While acknowledging that innovative approaches and new scientific knowledge are continually leading to sharper insights and more targeted control measures, the guidance also aims to provide smaller and less developed countries and slaughterhouse facilities with key guidance for the modernization of their meat inspection systems.

B.7 FAO International symposium on the impact of WGS on food safety management, 23-25 May 2016

29. FAO will organize and host an international symposium on the impact of Whole Genome Sequencing (WGS) on food safety management in conjunction with the ninth meeting of Global Microbial Identifier (GMI9), at FAO headquarters, Rome on 23-25 May 2016. The symposium, which targets food safety managers and assessors around the world, aims to provide an opportunity to exchange information on the potential use and impact of WGS on food safety management, and discuss the opportunities, challenges, concerns and solutions it may present in the context of consumer protection, trade facilitation and food security. Specific considerations will be given to the potential benefits and impact of WGS for developing countries, with burgeoning food safety systems and limited resources. For more information please contact WGS@fao.org.

Follow up action by CCFH

30. The Committee is invited to note the information above. To facilitate the transfer and uptake of the relevant scientific advice by Codex, the FAO/WHO Secretariats of these activities make every effort to attend Codex working groups and Codex committee meetings. FAO and WHO would like to thank all those who supported the programme of work to provide the above-mentioned scientific advice and in particular the various experts from around the world and the donors who contributed financially and in kind to the programme either through or outside the Global Initiative for Food-related Scientific Advice (GIFSA).

C) PUBLICATIONS

31. All the publications in Microbiological Risk Assessment (MRA) Series are available on the FAO (<http://www.fao.org/food/food-safety-quality/scientific-advice/jemra/en/>) and WHO (www.who.int/foodsafety/publications/micro/en/index.html) websites.

32. Forthcoming publications in this series include:

- *Risk Assessment tools for Vibrio parahaemolyticus and Vibrio vulnificus associated with seafood: Meeting report.* Microbiological Risk Assessment Series 20 - FAO/WHO
- *Salmonella spp. in bivalve molluscs: Meeting report.* Microbiological Risk Assessment Series 21 - FAO/WHO
- *Guidance on the selection and application of methods for the detection and enumeration of human pathogenic Vibrio spp. in seafood.* Microbiological Risk Assessment Series 22 - FAO/WHO
- *Risk manager's guide to the statistical aspects of microbiological criteria related to foods.* Microbiological Risk Assessment Series 24 - FAO/WHO.
- *Risk-based examples for control of Trichinella spp. and Taenia saginata in Meat.* Microbiological Risk Assessment Series 25 - FAO/WHO.
- *Ranking of low moisture foods in support of microbiological risk management.* Microbiological Risk Assessment Series 26 - FAO/WHO.
- *Microbiological hazards associated in spices and dried aromatic herbs.* Microbiological Risk Assessment Series 27 - FAO/WHO.
- *The microbiological safety of lipid based ready to use foods for management of moderate and severe acute malnutrition – Report of the first meeting.* Microbiological Risk Assessment Series 28 - FAO/WHO.
- *The microbiological safety of lipid based ready to use foods for management of moderate and severe acute malnutrition - Report of the second meeting.* Microbiological Risk Assessment Series 29 - FAO/WHO.
- *Control of nontyphoidal Salmonella spp. in beef and pork meat from primary production to processing: interventions and mitigations.* Microbiological Risk Assessment Series 30 - FAO/WHO.

D) Schedule for providing Scientific Advice (Relevant to Agenda Item 9)

33. In recent years the time frame between the request for scientific advice by the Committee and the expected delivery date has become increasingly shorter, and the requests are often received later in the standard setting process requiring urgent scientific advice to complete the process. The JEMRA secretariat makes every effort to meet the needs of the Committee in this context; however in order to provide optimal scientific which involves collection and analysis of globally available data (including those not in the public domain), engagement of experts to undertake assessments and provide expert opinion in cases of limited or no data, and documentation the output in a transparent and understandable manner, this time frame presents some constraints. Other considerations include the need to provide adequate time for review by member states before the Session, and retain the potential to have an iterative process with the Committee (particularly in the absence of a pWG). As the process of generating scientific advice may vary according to the request flexibility is key to responding to requests in a timely manner. To facilitate this, FAO and WHO invite the Committee to request scientific advice as soon as new work is agreed with a very clearly defined purpose and set of questions to be addressed.

Follow-up action by CCFH

34. The Committee is invited to consider requesting scientific advice as early in the standard setting process as possible and applying this in a more systematic manner to ensure that it can continue to adhere to its underlying principles of science based standards.