CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 3a

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**JOINT FAO/WHO FOOD STANDARDS PROGRAMME**

**CODEX COMMITTEE ON FOOD HYGIENE**

**Forty-ninth Session**

**Chicago, Illinois, United States of America, 13 - 17 November 2017**

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

Prepared by FAO and WHO

## INTRODUCTION

1. This paper describes the scientific advice as well as related information and resources that the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have developed relevant to the specific agenda items of the 49th Session of the Codex Committee on Food Hygiene (CCFH).

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

### A.1 Control of Shiga toxin-producing *Escherichia coli* (STEC)

2. At its 47th Session[1], the CCFH agreed on the importance of addressing STEC in foods and requested the FAO and WHO to develop a report compiling and synthesizing available relevant information on foodborne STEC, using existing reviews where possible. The CCFH noted that the nature and content of the work to be undertaken by CCFH, including the commodities to be focused on, would be determined based on the outputs of the FAO/WHO consultation. The information requested by CCFH was divided into three main areas: the global burden of disease and source attribution, hazard identification and characterization, and monitoring, including the status of the currently available methods.

3. To facilitate this work FAO and WHO issued two calls for data, convened a first expert meeting on 19 - 22 July 2016 (Geneva, Switzerland) and a second meeting on 25 – 29 September 2017 (Rome, Italy). The first meeting addressed the scope of the work, approaches and the methodologies and the forward work plan, and the report[2] was presented to the 48th Session of the CCFH. The second meeting reviewed a number of background papers prepared in the course of 2017 together with any other pertinent information. An overview of its deliberations and outputs are provided below. A report of the work is under finalization and will be shared as soon as it is completed.

### The Global burden of foodborne STEC disease

4. In 2015, WHO published the first estimates of the global burden of foodborne disease, which indicated that in 2010 more than 600 million people fell ill from foodborne disease caused by 31 microbiological and chemical agents, including STEC, resulting in 420,000 deaths and 33 million Disability Adjusted Life Years (DALYs). These estimates, generated by the Foodborne Disease Burden Epidemiology Reference Group (FERG) estimated that foodborne STEC caused more than 1 million illnesses, resulting in more than 100 deaths and nearly 13,000 DALYs. While these are the best estimates currently available, the Committee should be aware that the STEC estimates are subject to several limitations, including modelling assumptions as well as the lack of data from many countries and sub-regions.

[1] Report of the 47th Session of the CCFH available at: http://www.fao.org/fao-whocodexalimentarius/download/report/931/REP16_FHe.pdf

[2] Available at: http://www.who.int/foodsafety/areas_work/microbiological-risks/JEMRA-report.pdf?ua=1 and http://www.fao.org/3/a-bq529e.pdf.

5. It was noted that compared with other foodborne hazards considered, the global burden of STEC was moderate. Despite a high incidence (2.5 million cases in 2010), both the probability of developing significant sequelae and the case-fatal ratio were low, resulting in a low population-level disease burden. This, however, does not minimize the significant burden on individual patients and their families, nor does it capture the economic or trade impacts. After considering additional data on human STEC illness, it was noted that human STEC illnesses have been found in most countries. In addition, STEC poses an economic impact in terms of disease prevention and treatment, and has implications for domestic and international trade. Because of its potential spread via international trade, STEC has the potential to become a risk management priority in countries in which it is not currently a public health priority.

**Food Source Attribution**

6. Following a review of the available approaches for source attribution, the focus for this work was to use available data from outbreaks and case control studies. In addition, the results of the WHO FERG work on source attribution, which was based on expert elicitation, were also considered. It was deemed important to reiterate that not all STEC illnesses are foodborne and in fact the work of FERG estimated that only approximately 50% are foodborne.

7. The expert meeting, based on its analyses of the results from the expert elicitation and outbreak data, recommended that a range of foods should be considered when managing the risk of foodborne STEC infection. Overall, beef, vegetables/fruits, dairy and small ruminants' meat were identified as the most important food sources of STEC. The ranking of the top-five food categories differed somewhat across regions, which may be explained by cultural food preparation and consumption differences. For instance, while beef as a source was identified as the most important food category in the African, Americas, European and Eastern Mediterranean regions, analysis of the outbreak data indicated that fresh produce (i.e. fruits/vegetables) were almost as important a source in North America and Europe. Meat from small ruminants as a source was most important in the South East Asian region. However, it should be noted that despite several calls for outbreak surveillance data, the data obtained remained limited. As a result, the analysis of outbreak data primarily reflects the situation in countries which currently consider STEC to be a significant public health concern. More globally representative data and well-designed studies may improve the accuracy of the source attribution estimates. Analysis of case-control studies of sporadic infections is ongoing and may contribute to further refinement of the source attribution estimates. However, further outbreak data, particularly from countries from which data have not been available to date, would strengthen the analysis.

8. It was noted that as food preferences change over time, these estimates may change. The association of specific food categories with STEC illness reflects the historical practices of food production, distribution and consumption. Therefore, changes in production, distribution and consumption may result in changes in STEC exposure. Consequently, microbial risk management will need to be informed by an on-going awareness of current local sources of STEC exposure.

**Hazard Identification and Characterization**

9. An extensive scientific review was undertaken to underpin the development of a set of criteria for categorizing STEC on a risk basis and interpretation of the categories. While there are hundreds of STEC serotypes, the serotype of the STEC strain should not be considered a virulence criterion (encoded by genes). Not all STEC strains with the same serotype should be assumed to carry the same virulence genes and to pose the same risk, as many STEC virulence genes are mobile and can be lost or transferred to other bacteria. Serotype can be useful in epidemiological investigations, but is not very reliable for risk assessment.

10. It was concluded that the risk of severe illness from STEC infections is best predicted based on virulence factors identified for a STEC strain. Based on present scientific knowledge, STEC strains with *stx2a* and adherence genes, *eae* or *aggR*, have the strongest potential to cause diarrhoea, bloody diarrhoea and haemolytic uremic syndrome (HUS). Strains of STEC with other *stx* subtypes may cause diarrhoea but their association with HUS is less certain and can be highly variable. The risk of severe illness may also depend on virulence gene combinations and gene expression, the dose ingested, and the susceptibility of the human host.

11. The expert meeting recommended a set of criteria for categorizing the potential risk of severity of illness associated with a STEC in food based on evidence of virulence gene profiles and associations with clinical severity. The criteria could be applied by risk managers in a risk-based management approach to control STEC in food. This could also be used in interpretation of the potential risk associated with a STEC strain detected in a food. The set of criteria includes five5 risk levels (highest to lowest) based on virulence gene combinations, which can be used to identify risk management goals for STEC and the testing regimes that would be needed to monitor achievement of these goals. While providing a new approach to guide risk management of STEC, it was noted that there are nonetheless complexities associated with the criteria described and their application in food safety risk management. Thus to facilitate their use, a strategy for practical application of the criteria when testing for STEC in food is also proposed.

**Current Monitoring and Assurance Programs (including methodology)**

12. From the data provided by Codex member countries, the main food commodity groups that are being monitored are meat (mainly beef), dairy, produce, nuts, and sprouted seeds. The number of food items identified as at risk for STEC transmission has increased over time. Baseline studies and targeted surveys are conducted along the food chain to provide data on prevalence and level of contamination and identify risk factors. These data are used together with public health surveillance data in risk assessments and risk profiles of STEC/food combinations to prioritize foods and STEC of the highest risk, to identify points in the food chain for effective risk reduction and control, to assess the effectiveness of microbiological risk management (MRM) measures, and to identify changing trends and emerging STEC risks.

13. In many countries, it is a requirement for food processors, including slaughterhouses and meat processing establishments, to implement food safety programs. Many countries routinely use enumeration of sanitary and hygiene indicator bacteria in food and processing environments, and measurements of critical processing parameters at critical control points to monitor process performance control. Periodic process performance verification testing is conducted for STEC in products. In countries where a regulation requires absence of STEC in a food (e.g. ground beef and precursors), testing for STEC is required usually together with sanitary and hygiene indicators. Where a country is exporting food to a country that has a domestic regulatory requirement for the absence of STEC in that food, the exporter is required to meet these requirements even if there is no such requirement in their domestic market. This is common for beef exporting countries that may have monitoring programs for STEC in export slaughter establishments only for international market access purposes. From the data provided, adoption of a risk-based approach to risk reduction and monitoring is most evident for produce and dairy products to prioritize those products of high risk and to establish risk-based controls as the individual product items in these groups are very diverse.

14. The experts recommended that where countries identify STEC as a food safety risk, monitoring for STEC should be an essential activity in MRM in initially establishing risk management options, measuring their effectiveness, and identifying emerging issues. Monitoring programs of STEC control measures should be based on health risks assessed within a country, should target identified high risk foods and the STEC of highest health risk, and be conducted at points identified in the food chain where effective intervention to reduce risk is possible. The utility of testing for STEC presence/absence as part of monitoring programs for food safety assurance in processing is limited by the typically low levels and prevalence of STEC in food. Process performance monitoring may be accomplished more effectively and efficiently by quantitatively monitoring sanitary and hygiene indicator organisms. These indicator organisms do not indicate pathogen presence, instead they provide a quantitative measure of the control of microbial contamination in the product and processing environment. Periodic testing for high risk STEC can also be conducted for verification of process performance. The significance of the detection of an STEC strain in a food should be considered on a case by case basis considering the potential health risk associated with the specific STEC strains detected and the food profile

15. Monitoring programs for MRM include microbial testing to provide evidence for risk-based decision-making. This may involve testing of food, environmental and clinical samples for the presence of specific pathogens or indicator organisms. The choice of analytical method should reflect the purpose to which the data collected will be applied. There are a number of analytical methods for STEC, that can be used to support monitoring programs and a summary table of current technologies for this purpose was developed during the meeting. The expert meeting recommend analytical methods should be selected on the basis that they are fit for purpose, will provide answers to risk management questions, and are within the resources of governments. Analytical methods used for testing should be periodically assessed and evaluated to ensure that they remain fit for purpose. The increasing availability of novel analytical technologies which may possess significant advantages over established technologies was also noted; however, until the reliability of a technologies and associated test methods results are well documented, the results should be interpreted carefully.

***Follow-up action by CCFH***

16. The CCFH is invited to consider the aforementioned information in determining the next steps to address foodborne STEC. FAO and WHO would welcome feedback from the Committee on the report above and also any considerations by the Committee on any other aspects that should be considered by JEMRA in relation to risk management of STEC.

### A.2 Water quality (Relevant to Agenda Item 4)

17. Following a presentation on the of available resources developed by each of the organizations in relation to water quality and safety[3], the Committee, at its 48th session, requested FAO and WHO to provide guidance for those scenarios where the use of clean water was indicated in Codex texts, in particular, irrigation water, clean water, clean seawater, and on the safe re-use of processing water. In response to this request, FAO and WHO have established a core group of experts and convened a first meeting of this group on the Safety and Quality of Water Used in Food Production and Processing on, 21-23 June 2017 (Bilthoven, the Netherlands).

18. In addressing the request of the Committee, the expert meeting considered that the quality of clean water must be defined in context, with consideration given to a number of aspects including the nature of the food being produced/processed, where in the food chain it is being used, and the nature of subsequent food processing steps. Bearing this in mind the expert meeting proposed that water used in food production or processing should be characterized in terms of 'fitness-for-purpose' as this concept articulates the inextricable connection between the objective for water use and the related desirable or required water quality. Achieving 'fitness-for-purpose' requires risk assessment of the water source and required level of treatments etc. While this does not conflict with the current Codex definition for clean water, it means that defining the specifications of clean water at global level is not feasible, rather this must be addressed with a specific context and use in mind.

19. Keys steps to ensure water is 'fit-for-purpose' were highlighted : creating awareness about the role of water in food safety management, understanding the available water sources and their quality, undertaking an appropriate risk assessment to determine the need for treatment, and selection and implementation of appropriate treatments. It was acknowledged that the complexity of these steps will vary according to the stage of production/processing, how the water is being used and the type of food being produced and hence the development of case studies to illustrate the implementation of these steps in different contexts was considered essential.

20. The expert meeting identified the following case studies to illustrate the above: a) water use in the primary production/irrigation and post-harvest for fresh produce, b) post-harvest water use in handling and processing of fish and fishery products, c) water re-use in food processing establishments, and d) water use in street-vended foods. The expert meeting agreed to prioritise the work on areas (a) and (c) in view of the relevance to (i) international trade, (ii) health protection (e.g. irrigation is a major use of wastewater), and (iii) emerging importance for the food industry (water reuse).

21. This proposed approach is also in line with those approaches used in the WHO Guidelines for Drinking-Water Quality. A review of existing guidance documents highlighted the adaption of a HACCP-like approach for managing water quality. In addition risk assessment frameworks are being developed at the global level to provide national, regional and local authorities with the tools to optimally manage their water supplies. Noting that the approaches to food safety management have been adopted to the water safety environment, the meeting highlighted the strong existing synergies between the two areas. It was also noted that in the context of food processing, an important aspect of water quality, like with food ingredients, is the nature of the relationship with the water supplier, who in certain cases can be an important source of information in undertaking the aforementioned steps.

22. Thus in conclusion there is no universal definition of clean water. Currently FAO and WHO are working with the experts to continue to extract the relevant guidance from existing documents and other relevant data from the identified sectors as the basis for the development of sector specific examples and guidance documents that will serve to illustrate the implementation of the approach to define and achieve 'fit-for-purpose' water.

***Follow-up action by CCFH***

23. The CCFH is invited to consider the information provided to date and provide FAO and WHO with additional guidance on what would optimally serve the needs of the Committee. Such feedback will be used to refine the ongoing work and development of a report on this issue in the coming months.

[3] Available at http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-712-48%252FOverview_of_Existing_FAO_and_WHO_resources_on_Water_Quality.pdf

**A.3 Histamine in fish and fishery products (relevant to Agenda Item 5)**

24. Following a request from the 48th Session of the Committee FAO and WHO conducted a comprehensive literature review to assess the scientific evidence regarding the risk of histamine development in fish of the family *Salmonidae*. The full report of the review is available at http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-712-49%252FWD%252FHistamine_in_Salmonids.pdf.

25. The review collected and reviewed the available and accessible information on Scombroid Fish Poisoning (SFP) and SFP-like illness linked to Salmonidae, including experimental studies, details on any cases (including the potential reason for causing illness and in the case of mixed meals the degree of certainty/uncertainty that the Salmonidae was the source of the illness) and any other relevant information. It also considered other relevant aspects such as histidine levels in Salmonidae and how that relates to histamine formation, and the risk of histamine illness linked to Salmonidae, global production and trade in Salmonidae and any rejections linked to histamine.

26. SFP is most commonly linked to fish that have a high level of free histidine. Histamine formation is then dependent on the time/temperature conditions under which the fish is handled. The available data suggest that high histamine levels are a result of gross time/temperature abuse during handling and storage, even in fish with high levels of free histidine. Compared with scombroid fish which have free histidine levels ranging from approximately 5000 mg/kg to 20,000 mg/kg, most species in the Salmonidae family have less than 1000mg/kg histidine. Thus most members of the Salmonidae family have somewhere between 10 and 200 times less free histidine than scombroid fish.

27. There is clear evidence that under certain conditions the development of histamine can occur in at least two species of the Salmonidae family namely Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorynchus mykiss*). This is based on inoculation studies under laboratory-controlled conditions. There is insufficient evidence regarding other genera within the family to indicate whether they are more or less susceptible to histamine development. Numerous storage trials on salmon and trout have sought to characterise the development of histamine during its shelf-life under different conditions. The available evidence indicates that whilst histamine can develop, in many trials it was not detected, or if it was, only in relatively low concentrations, well below current Codex limits of 200mg/kg set for other species such as tuna, and if at all towards the end or beyond limits of sensory acceptability. In 21 shelf-life studies reviewed, only one study reported samples that exceeded the Codex limit but the samples were also recorded as spoiled at this point.

28. Two market level surveys (Iran and Lithuania) found that 12.5% and 16% respectively of Salmonidae sampled had levels of histamine which exceeded regulatory limits and reference in the literature was also made to unpublished evidence that samples of salmon from the Danish market had been detected with high (but unspecified) levels of histamine. However, market sampling exercises in six other countries failed to detect histamine in Salmonidae, or if they did so, at levels below the Codex limit.

29. The evidence suggests that the typical bacterial flora associated with histamine development in fish, are not always present or dominant in the spoilage of fresh, smoked or salted Salmonidae, but that when they are, histamine can develop.

30. The epidemiological evidence for the pathogenesis of histamine in Salmonidae is scant. The review identified a small number (eleven) of documented confirmed cases of histamine intoxication linked to human consumption of Salmonidae over a span of 40 years. One of these involved low levels of histamine (mean 1.9 mg/kg) and another involved quite high levels (mean 434 mg/kg, in excess of regulatory limits set for tuna). There is no data on histamine levels in the other cases. An additional 46 suspected cases of histamine poisoning from salmon were reported between 1976 and 2015, two in the USA and 42 in the UK (some the latter involving canned and smoked fish). However, no further data on these are available. Furthermore, one author suggested that the low level of histamine in the implicated product in one of the documented cases suggests that other factors may also be involved in development of toxicity symptoms in humans and thus the conclusions of the review reiterate the recommendation of the FAO/WHO Expert meeting on the Public Health Risks of Histamine and other Biogenic Amines from Fish and Fishery Products (FAO/WHO, 2013) that "*Studies are needed to investigate and clarify the SFP-like syndrome reported to be associated with consumption of salmonid species".*

31. While more than eighty percent of global production of Salmonidae enters international trade there have been no reported cases of rejections of consignments traded internationally (although this could also reflect a low frequency of surveillance).

32. To conclude, based on the controlled spoilage studies it appears that histamine concentrations in Salmonidae in general seem to increase only after excessive storage times at the temperatures selected, and days to weeks past sensory shelf-life. With inoculation studies, histamine concentrations in Salmonidae did not appear to increase substantially until after extreme abuse conditions. Although extensively traded globally, there are no reports of Salmonidae being rejected based on histamine levels. Thus, while it is noted that under certain conditions histamine development can occur, the available evidence highlights that under appropriate time-temperature control, and within the sensory shelf-life of the product, histamine development in Salmonidae to the level that cause SFP is unlikely to occur.

33. The data on SFP-like illness associated with Salmonidae is not extensive. Histamine levels are only available for some of the cases and often below those known to cause SFP. The low frequency of confirmed cases of toxicity in relation to the high volume of production, trade and consumption of Salmonidae suggests that the hazard is not a significant threat to human health.

34. The currently available evidence thus suggests that there is not a basis to include Salmonidae in the same risk category for SFP as other more commonly implicated species.

***Follow-up action by CCFH***

35. The CCFH is invited to consider the information provided.

**B) OTHER RELATED ISSUES**

**B.1 Guidance on Shellfish Sanitation Program**

36. The FAO and WHO technical guidance on the development and implementation of shellfish sanitation systems within the framework of Section 7 of *the Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003) have been finalised. Following their initial development, pilot testing of the guidance in southern Africa continued in 2017. The guidance was also presented to a wide group of stakeholders at the International Conference on Molluscan Shellfish Sanitation in May 2017. The feedback from these processes was discussed by the expert group and incorporated into the guidance. The guidance is being edited and is expected to be published in December 2017. Work will continue to develop additional resources to support its implementation at national level and these will be made available as a web-based resource.

**B.2 Risk Assessment Methodology Work**

37. In addition to the scientific advice requested directly, the FAO/WHO secretariats have been working to update risk assessment methodologies, taking into account recommendations from expert meetings and the latest scientific developments. This is mission-critical effort to assure that the scientific advice provided is always based on up-to-date methodology and the latest scientific knowledge. In this context, review and updating of the existing JEMRA guidance documents on microbiological risk assessment methodology are under way. The work will be implemented over 2 to 3 years. Regular updates will be provided to the Committee.

**B.3 Antimicrobial resistance**

38. An update of the FAO and WHO activities on AMR was presented to the 40th session of the Codex Alimentarius Commission in June 2016 and the relevant information is available in CX/CAC 17/40/14 Add. 14. AMR remains a high priority and FAO and WHO in collaboration with OIE are highly active in the area. Aspects of specific interest to the Committee may include the following. The new concept note entitled "The Tripartite's Commitment: Providing multi-sectoral, collaborative leadership in addressing health challenges"[5] was published jointly with FAO, OIE and WHO in October 2017. In this document, three organizations reaffirmed their commitment to combat antimicrobial resistance at human-animal-ecosystems interface

[4] Available at: http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-701-40%252FWD%252Fcac40_14Add1e.pdf

[5] http://who.int/zoonoses/tripartite_oct2017.pdf?ua=1

39. FAO and WHO have issued a Call for experts in the area of AMR and a Call for data on foodborne AMR to support their work to provide scientific advice in line with the needs of the Codex ad hoc Task Force on AMR and its revision of the Codex code of practice to minimize the development and transmission of foodborne AMR and development of new guidance on surveillance of food borne AMR. The Call for Experts and Call for Data are available on the FAO and WHO websites[6].The deadline for submission of expressions of interest and data is 31st December 2017. Delegations are encouraged to disseminate these to relevant experts, researchers and data generators within their countries.

40. World antibiotic awareness week takes place on 13-19 November 2017 where the key messages is to think twice about antibiotic use and seek advice before use. FAO, WHO and OIE will be presenting a One Health-based campaign highlighting the importance of all stakeholders to think about this issue, get advice from experts and follow internationally developed good practices, including in food production and processing. Information, including infographics relevant to different sectors including the food sector will be made available on the organizations webpages[7].

41. In light of the importance of biocides (disinfectants, sanitizers) in achieving and maintaining microbiological food safety and in response to requests for information on biocide use FAO convened a technical meeting on AMR and biocides in food production and processing on 18-19 October 2017 to review the available information on this issue and discuss follow-up actions. Noting the limited data on the issue and also the important role of biocides in food safety it was agreed that there was a need for greater awareness on good practices in relation to sanitation and disinfection to ensure this valuable resource are used optimally and effectively. Key aspects of such guidance was developed in the course of the meeting and this will be further developed in the coming months.

42. FAO also convened a meeting to begin looking at the issue of AMR linked to antimicrobial use in horticulture on 1-3 October 2017. A review of the literature was undertaken in advance and is now been finalized based on inputs form the expert meeting. The meeting also considered data from some 30 countries provided in response to a call for data on antimicrobial use in plant production. However the paucity of data in the area of AMR and horticulture was also noted. This issue will be further addressed in ongoing work on AMR. Nevertheless the importance of good practice to minimize antimicrobial use and ensure appropriate use when needed were highlighted.

43. Under the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR), implementation of activities planned under the 5-Year Strategic Framework 8 is on-going, including the development of global protocol on Extended-spectrum beta-lactamases (ESBL) Escherichia coli surveillance programme, national capacity building pilot projects to strengthen the integrated surveillance of AMR in foodborne bacteria. WHO guidelines on use of medically important antimicrobials in food-producing animals are being finalized and will be available in November on the WHO website9. The objective of the guidelines is to preserve the effectiveness these antimicrobials taking into consideration the WHO list of critically important antimicrobials for human medicine[10].

44. A detailed update on all FAO, WHO and OIE AMR related activities will be made available in advance of the upcoming codex ad hoc Task force on AMR[11].

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[6] Call for experts: FAO:
http://www.fao.org/fileadmin/user_upload/agns/pdf/Call_for_data_experts/EXPERTS_Foodborne_AMR.pdf
WHO: http://www.who.int/foodsafety/Call_for_experts_oct2017.pdf
Call for data:
FAO: http://www.fao.org/fileadmin/user_upload/agns/pdf/Call_for_data_experts/DATA_Foodborne_AMR.pdf
WHO: http://www.who.int/foodsafety/DATA_Foodborne_AMR.pdf
[7] FAO AMR Website: http://www.fao.org/antimicrobial-resistance/en/
WHO AMR website: http://www.who.int/campaigns/world-antibiotic-awareness-week/en/
OIE AMR website: http://www.oie.int/for-the-media/amr/
[8] WHO Advisory Group on Integrated Surveillance of Antimicrobial resistance: 6th meeting report is available at: http://who.int/foodsafety/publications/agisar6_2015/en/
[9] http://who.int/foodsafety/areas_work/antimicrobial-resistance/cia_guidelines/en/index.html
[10] http://who.int/foodsafety/areas_work/antimicrobial-resistance/cia/en/
[11] The relevant papers will be available at http://www.fao.org/fao-who-codexalimentarius/meetings-reports/detail/en/?meeting=TFAMR&session=5

**B.4 Whole Genome Sequencing (WGS) and food safety**

45. In November 2016, WHO and FAO cosponsored an international INFOSAN meeting on *New Science for Food Safety: Supporting food chain transparency for improved health* organized and hosted by the Nanyang University Food Technology Centre of Singapore. The meeting brought together experts and participants from more than 30 countries from all regions to discuss regional perspectives and recent scientific advancements related on a number of food safety issues including the application of next generation sequencing (NGS) in food safety, risk assessment and sustainability and food fraud, the role of INFOSAN and the implications of new technologies/initiatives for the detection and response to food safety emergencies and mitigation of foodborne disease. A parallel training on the use of WGS and analysis of WGS data was conducted for meeting participants.

46. During the past year, INFOSAN has facilitated response to some 40 international food safety events and has shared the whole genome sequences of implicated organisms for a few of these. WGS is increasingly being used by several national food safety authorities in outbreak investigations, surveillance and inspection activities and thus increasingly sequence data are shared during events managed with support from INFOSAN. This work would benefit enormously from having a global mechanism for sharing sequences and related data.

47. WHO and PAHO convened a meeting in January 2017 hosted by the US Government on the application of WGS as a tool to strengthen foodborne disease surveillance in developing countries. During the meeting practical guidance for ministries of health, aimed at supporting countries' plans for the implementation of WGS, was discussed and a guideline document is under preparation.

48. During CAC in July 2017, The Joint FAO/WHO INFOSAN Secretariat hosted in collaboration with USFDA a side event on "The Global benefit of Using Whole-Genome Sequencing on Foodborne Pathogens". The event focused on the expanding role of WGS technology as part of foodborne disease surveillance and outbreak response. It presented how WGS data are already being shared and used at the international level through the INFOSAN network and discussed the need for more global and formalized repository and sharing mechanisms as well as possible future Codex related work.

**B.5. Good Hygiene Practices**

49. FAO continues to develop resources to support countries in the application of good hygiene practices and HACCP. Based on its work at country level, FAO is developing an online resource "FAO Good Hygiene Practices (GHP) Toolbox", a practical resource on good hygiene practices along the food chain for food safety trainers of small and medium sized businesses. An example of some of the materials to be provided therein can be currently accessed at http://www.slideshare.net/FAOoftheUN/tag/ghp.

**B.6. Risk-based meat inspection**

50. FAO has initiated a risk-based meat inspection (RBMI) project to build capacity of developing countries on the improvement of meat inspection systems. The overall objective is to engage senior management in the process of developing and implementing risk-based meat inspection, to communicate key information on the concept and principles of RBMI, and to advocate for a change of attitudes toward the acceptance of a science-based approach to meat inspection. A senior management workshop on RBMI was organized in Harare, Zimbabwe on 23 - 25, August 2017 to enable initiation of plans and development of a road-map at national and regional level for the implementation of RBMI. A guidance document on RBMI is being developed.

***Follow up action by CCFH***

51. The Committee is invited to note the information above. 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.

**C) PUBLICATIONS**

52. 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 (http://www.who.int/foodsafety/publications/risk-assessment-series/en/) websites.