CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS

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Information on activities of FAO and WHO relevant to the work of CCFFP

FAO/WHO Report of the Expert Meeting on Ciguatera Poisoning

1. The issue of Ciguatera poisoning (CP) was raised at CCCF11 (2017) and the Committee agreed to request scientific advice from FAO/WHO to enable the development of appropriate risk management options. Based on this request, FAO and WHO convened an expert meeting on 19-23 November 2018 in Rome. Although there were many gaps in the available information about CP, some needs required urgent attention regarding both risk management and research. The main needs for risk management were for the definition of clear protocols to avoid the risk of consuming toxic seafood, mainly by local people and tourists, but also consumers purchasing imported seafood from certain areas. This included a well-defined information and outreach programme, and a clear identification of the geographic distribution of fisheries resources and causative organisms, as well as ciguatoxins presence and concentration in different tissues and anatomic parts of the affected fisheries resources. The main research needs referred to detection methods, both screening and analytical, and the need to have a stable supply programme of analytical standards. The FAO-WHO Report of the Expert Meeting on Ciguatera Poisoning is available on the FAO and WHO websites[1].

2. Building on the above-mentioned report, FAO, in collaboration with International Atomic Energy Agency (IAEA) and Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), developed an e-learning course on monitoring and preventing ciguatera poisoning that is now available online: https://elearning.fao.org/course/view.php?id=648. This e-learning course targets food safety and fishery authorities, policy-makers, doctors and health managers. The course is also designed for trainers and students interested in ciguatera poisoning, and for fishing and fish processing workers.

FAO's work on bivalve mollusc sanitation

3. International trade has been the main driving factor for the rapid growth of the bivalve mollusc production industry during the last six decades, growing from nearly one million tonnes in 1950 to 17.3 million tonnes in 2018. According to FAO statistics, the export value of bivalve mollusc trade reached US$ 4.26 billion in 2018. However, there are a very limited number of countries with effective monitoring programmes for bivalve mollusc.

4. The need for developing an international guidance for implementation of bivalve mollusc sanitation programmes within the framework of the Section 7 of the Codex Code of Practice for Fish and Fishery Products (CCFFP) was identified by the representatives of 15 major bivalve producing and trading countries participating in the 2nd International Workshop on Molluscan Shellfish Sanitation: Application of Sanitary Surveys, held from 24–28 September, 2012, in Newport, USA. CCFFP33 and the FAO Committee on Fisheries Sub-Committee on Fish Trade (COFI-FT) supported the development of international guidance by FAO/WHO.

5. The Joint FAO-WHO Technical guidance for the development of the growing area aspects of Bivalve Mollusc Sanitation Programmes[2] was developed by a team of international experts representing different geographical regions and different bivalve mollusc production systems and was piloted in a number of

[1] http://www.fao.org/documents/card/en/c/ca8817en/
https://apps.who.int/iris/handle/10665/332640

[2] The Joint FAO-WHO Technical guidance for the development of the growing area aspects of Bivalve Mollusc Sanitation Programmes: http://www.fao.org/documents/card/es/c/ca1213en/

countries.

6. The guidance is serving as the basis for the development of a Joint FAO-UK Centre for Environment Fisheries and Aquaculture Science (Cefas) e-learning Course on Bivalve Sanitation consisting of three modules. The first module on "Growing area risk profile" (https://elearning.fao.org/course/view.php?id=481) and the second on "Growing area assessment and review" (https://elearning.fao.org/course/view.php?id=629) are available online. The last module is under development. The target audience of the course is policy makers, development practitioners and programme managers, sectoral specialists and researchers, bivalve farmers, trainers and extension agents.

7. Over the last two years, FAO, in collaboration with the FAO Reference Centre for Bivalve Mollusc Sanitation, the Centre for Environment, Fisheries, and Aquaculture Science (Cefas)[3], has delivered a number of capacity building activities for the provision of guidance on relevant laboratory protocols, accreditation and use of methods for bivalve mollusc testing.

8. During the different capacity building activities on bivalve sanitation delivered over the last 2 years, the lack of guidance on biotoxins monitoring for the development of bivalve mollusc sanitation programmes has been highlighted. FAO considers that there is a value in complementing this effort and is developing guidance on biotoxins monitoring to support countries in the production of safe bivalve molluscs and to promote trade of this important commodity.

FAO's work on early warning systems for harmful algal blooms

9. Harmful algal blooms (HABs) have significant impacts on food safety and security through contamination or mass mortalities of aquatic organisms. Indeed, if not properly controlled, aquatic products contaminated with HAB biotoxins are responsible of potentially deadly foodborne diseases and when rapidly growing, HAB consequences include reduced dissolved oxygen in the ocean, dead zones and mass mortalities of aquatic organisms. Improving HAB forecasting could be an opportunity to develop early warning systems for HAB events such as food contamination, mass mortalities or foodborne diseases.

10. Surveillance systems have been developed to monitor HABs in many countries; however, the lead-time or the type of data (i.e. identification at species level, determination of toxicity) may not be sufficient to take effective action for food safety management measures or for other reasons, such as transfer of aquaculture products to other areas. Having forecast or early warning systems could help mitigate the impact of HABs and reduce the occurrence of HAB events. In this regard, FAO is taking the lead in the development of a Joint FAO-IAEA-IOC Technical Guidance for the Implementation of Early Warning Systems for HABs. The document will guide competent authorities and relevant institutions involved in consumer protection or environmental monitoring to implement early warning systems for HABs present in their areas (marine and brackish waters), specifically for those affecting food safety or food security (benthic HABs, fish-killing HABs, pelagic toxic HABs and cyanobacteria HABs).

Joint FAO/WHO's work on seaweed safety

11. The world production of marine macroalgae, or seaweed, has more than tripled, up from 10.6 million tonnes in 2000 to 32.4 million tonnes in 2018. Increased cultivation and utilization of seaweed are expected to be important pillars of sustainable food security and a robust aquatic economy in the near future. Many factors can affect the presence of hazards in marine macroalgae and seaweed, including seaweed type, physiology, season, production waters, harvesting methods and processing. Several hazards, among them heavy metals and marine biotoxins, have been reported to be (potentially) associated with seaweed. However, legislation and guidance documents on seaweed production and utilization are generally still lacking. In this regard, FAO and WHO are developing a background document that identifies food safety hazards (chemicals, pathogens and toxins) linked to the consumption of seaweed and aquatic plants. This will provide the basis for undertaking further work in this area. FAO and WHO consider that there may be value in developing relevant Codex guidance on this subject and is presenting this issue for consideration by the Committee.

FAO's work on microplastics and food safety

12. The Global Oceans Action Summit for Food Security and Blue Growth[4] requested that the FAO, the International Maritime Organization (IMO) and the United Nations Environment Programme (UNEP) work together with the Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) to improve the knowledge base on microplastics in the marine environment and provide policy advice on this

[3] FAO Reference centre work programmes and annual reports:
https://www.cefas.co.uk/icoe/seafood-safety/designations/fao-reference-centre-for-bivalve-mollusc-sanitation/fao-reference-centre-work-programmes-and-annual-reports/

[4] http://www. globaloceansactionsummit.com/

topic. As a result, UNEP approached GESAMP, FAO and other partners with a proposal to contribute to the global assessment on sources, fate and impacts of microplastics on the marine environment and resources, with funding provided by the Government of Norway. FAO was requested to contribute specifically on fisheries and aquaculture. FAO worked closely with key partners and academia resulting in a report on ¨Microplastics in fisheries and aquaculture¨.[5] The document describes the status of knowledge on the occurrence of microplastics in the aquatic environment and the implications for aquatic organisms and food safety. It contains a set of recommendations and best practices to reduce the possible impact of microplastics on fish populations and stocks, as well as on food safety issues arising from seafood consumption. However, fisheries and aquaculture products are not the only contributor to the dietary exposure of microplastics and COFI-FT, in its seventeenth session, requested FAO to work jointly with WHO to carry out an exposure assessment that includes other relevant food commodities. In this regard, FAO is developing a background document that compiles information on the occurrence of microplastics in all commodities, microplastics contamination along food value chains, and plastic migration from food contact materials and packaging, as well as a review of the existing literature on the toxicity of the most common plastic monomers, polymers, and additives (plasticisers, flame retardants, pigments and dyes, stabilizers, etc.). This process will set up the basis to evaluate if a risk assessment exercise is viable and whether the information can be used for the provision of risk management options.

FAO's work on marine biotoxins in water from desalinization plants

13. The majority of drinking water is supplied by ground or surface water from freshwater sources. Desalination technologies may also be used to obtain drinking water and irrigation from non-conventional water resources such as brackish water, estuarine water or seawater. These technologies have been used for decades to provide drinking water in arid regions, and in certain regions they are the primary, if not only, source of drinking water (WHO, 2011). However, to overcome increasing drought conditions, the use of desalination is now expanding to semi-arid areas as an alternate solution. Desalination is also critical in small island States facing shortages of fresh water (Jones *et al*. 2019). Five percent of the world's population, of whom half are in the Near East and North Africa, are supplied with desalinated water. There are today about 16 000 desalination plants, producing about 100 million m^3/day of drinking water. Since 2018, more than 400 new desalination projects have been contracted worldwide (FAO 2020). While some food safety hazards associated with water from desalinization plants are already well understood and handled, the risk of exposure to biotoxins associated with marine HABs via desalinated drinking water consumption has not yet been evaluated. The 13th Session of the IOC Harmful Algal Bloom Programme (IPHAB) held at UNESCO Headquarters in 2017 expressed its interest to cooperate with FAO and WHO on a risk assessment of marine toxins in drinking water from desalination plants. FAO, jointly with IOC-UNESCO, are developing a background document that will provide the basis for evaluation as to whether a risk assessment exercise is viable and the information can be used for the provision of risk management options.

FAO's publication on Food Safety and Climate Change

14. Climate change is causing unprecedented damage to our ecosystems. Various climate change-related phenomena, for instance, increasing temperatures, ocean warming and acidification, severe droughts, wildfires, altered precipitation patterns, melting glaciers, rising sea levels and amplification of extreme weather events, have severe implications on our food systems. While the impacts of such environmental drivers on food security are well known, the effects on food safety receives less attention. In this regard, the FAO's publication "*Climate Change: Unpacking the Burden on Food Safety*" was written to identify and attempt to quantify some current and anticipated food safety issues that are associated with various climate change-related drivers. The food safety hazards that are considered in the publication are food-borne pathogens and parasites, harmful algal blooms, heavy metals (with emphasis on methylmercury), pesticides and mycotoxins. By raising awareness of the issues, it is hoped that the document will not only help in improving our understanding of the climate change implications on food safety, but also aid in fostering stronger international cooperation in reducing the global burden of these concerns. The publication concludes with a focus on the benefits of combining forward-looking approaches, such as foresight, with scientific innovations, not only to anticipate future challenges but also to build resilient systems that can be continually updated as more knowledge is assimilated. The report is available at http://www.fao.org/3/ca8185en/CA8185EN.pdf. A webinar to disseminate the major findings of the publication was held in November, 2020. The recording can be found here. A short video on how climate change is threatening the safety of our food is also available at https://www.youtube.com/watch?v=oEgqEtnMems&t=1s

FAO Risk profile - Group B *Streptococcus* (GBS) – *Streptococcus agalactiae* sequence type (ST) 283 in freshwater fish"

15. In Singapore, Group B *Streptococcus* (GBS) sequence type 283 (ST283) caused, in 2015, the only reported foodborne outbreak of invasive GBS disease. Over 20 percent of cases were healthy adults without

[5] http://www.fao.org/3/a-i7677e.pdf

comorbidities, which is unusual for GBS. The outbreak was linked to the consumption of raw freshwater fish. Subsequent investigations found that ST283 GBS had been common among GBS-causing disease in humans and in tilapia across Southeast Asia for at least 20 years, whereas it was almost non-existent outside this region. Given the novelty of the outbreak, FAO carried a risk profile[6], which resulted in a document that consolidates the current knowledge, identifies data gaps about GBS ST283 along the freshwater fish supply chain in Southeast Asia and provides risk management options.

Joint FAO/WHO work on advances in science and risk assessment tools for *Vibrio parahaemolyticus* and *V. vulnificus* associated with seafood

16. Globally, *Vibrio parahaemolyticus* and *Vibrio vulnificus* represent important human pathogens associated with the consumption of seafood. In order to provide an update on the state-of-the-art advice regarding risk assessment for V. parahaemolyticus and V. vulnificus in seafood, an expert meeting was convened at Cefas, Weymouth, the United Kingdom, on 13-15 May 2019. Several critical developments in the last decade were subsequently noted by the expert working group: 1) the emergence of highly pathogenic strains; 2) in response to climate change, there has been a significant geographical spread regarding when and where these seafood-associated *Vibrio* infections occur; 3) demographic considerations are very important; 4) a range of new approaches for best practice; and 5) a range of new methods, such as those utilising genomics and satellite imagery. The report is available in the FAO and WHO websites[7].

Joint FAO/WHO work on safety and quality of water used in food production and processing

17. The Codex Committee on Food Hygiene (CCFH) noted the importance of water quality in food production and processing and requested FAO and WHO to provide guidance for those scenarios where the use of "clean water" was indicated in Codex texts, in particular, for irrigation water, clean seawater, and on the safe reuse of processing water. To facilitate this work, and to build on previous work in this area that resulted in the publication of a Joint FAO-WHO Meeting Report on Safety and Quality of Water Used in Food Production and Processing[8], FAO and WHO established a group of experts and convened expert meetings during July 2021. The expert group develop of a fit-for-purpose concept and decision support system approach to safe water use within different sectors, including fisheries and aquaculture. The report of the on-going meeting will be published in the coming months.

New food sources and production systems

18. An increasing recognition of the challenges related to feeding a growing global population, and at the same time producing food more sustainably, is spurring food system innovations that are shaping our future agri-food landscape. Some of these 'game-changing' technologies are already under various stages of development across the world, making it critical to objectively assess the benefits they might bring as well as any risks associated with them - including food safety and quality concerns. One such emerging area is "new food sources and production systems" (NFSPS), an area that is already growing fast and it is very likely to grow even more over time. Some of these topics within NFSPS relate to fisheries and aquaculture products, for example: seaweed; microalgae; cell culture-based food products, including fish; 3-D printed foods, etc. Food safety and quality concerns associated with NFSPS must be given due consideration as those might not only have implications for public health, but also on regulatory frameworks and trade. FAO has been tracking a number of emerging opportunities and challenges affecting agri-food systems with relevance to food safety through the FAO foresight[9] programme. While recognizing the need to address these emerging issues in a prioritized manner, FAO believes that topics such as NFSPS will benefit from attention at the Codex level and therefore asks the Committee to consider this matter as it relates to fisheries and aquaculture products.

Joint FAO/WHO's work on risks and benefits of fish consumption

19. New evidence has become available regarding risks and benefits of fish consumption. For this reason, FAO and WHO will update the Report of the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption[10]. This will be done through an expert consultation that will draw a number of conclusions regarding the health benefits and health risks associated with fish consumption and recommend a series of

[6] https://doi.org/10.4060/cb5067en

[7] Advances in science and risk assessment tools for Vibrio parahaemolyticus and V. vulnificus associated with seafood (fao.org)

[8] Safety and Quality of Water Used in Food Production and Processing (fao.org)

[9] Foresight is a forward-thinking and structured approach for gathering and interpreting intelligence, which can be used for the development of proactive strategies to identify and address emerging issues. Foresight-based approaches are gaining prominence as early identification, evaluation and prioritization of medium to long -term issues are important components of the food safety decision-making process.

[10] Report of the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption. rome, 25029 january 2010

steps that Member States should take to better evaluate and manage the risks and benefits of fish consumption and more effectively communicate these risks and benefits to their citizens. The output of the Expert Consultation will set a framework for assessing the net health benefits or risks of fish consumption and that will also provide guidance to the Codex Alimentarius Commission in their work on managing risks, taking into account the existing data on the benefits of eating fish.

WHO's work on dioxin and dioxin-like compounds

20. Since the early 1990s, WHO has organized expert meetings with the objective to harmonize the toxic equivalency factors (TEFs) for dioxin and dioxin-like compounds on the international level, thereby giving recommendations to national regulatory authorities. TEF expresses the toxicity of dioxins, furans and PCBs in terms of the most toxic form of dioxin, 2,3,7,8-TCDD. The latest WHO TEFs for dioxin and dioxin-like compounds were established by WHO through expert consultations in 2005.

21. Since then, new data including data on relative potencies (REPs) have been published and compiled into REP databases. TEFs are determined using a database of REPs that meet WHO established criteria using different biological models or endpoints. The new data indicate a need to update the 2005 WHO TEFs and therefore WHO has established an advisory group of international experts. The experts will support WHO in setting-up the criteria for the REP database to be used. To manage the technical handling of the REP database, WHO will collaborate with the European Food Safety Authority (EFSA). When EFSA has compiled the data from the refined REP database, based on the criteria established by WHO, the data will be used by WHO to re-evaluate the TEFs. It is expected that the refined REP database will be ready during the autumn of 2021 at which time WHO will organize expert consultations aiming at re-evaluating the TEFs for dioxin and dioxin-like compounds.

Sources:

FAO. 2020. The State of Food and Agriculture. Rome. https://doi.org/10.4060/cb1447en.

Jones, Edward, Manzoor Qadir, Michelle T H Van Vliet, Vladimir Smakhtin, Seong-Mu Kang, and M Qadir. 2019. "The State of Desalination and Brine Production: A Global Outlook." Science of the Total Environment 657: 1343–56. https://doi.org/10.1016/j.scitotenv.2018.12.076.

WHO. 2011. "Safe Drinking-Water from Desalination." World Health Organization https://www.who.int/publications/i/item/WHO-HSE-WSH-11.03