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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

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

1. New evidence has become available regarding risks and benefits of fish consumption since the Report of the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption was published in 2010¹. In October 2023, FAO and WHO held a second Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption. This consultation focused on the health benefits of fish consumption, the toxic effects of dioxins and dl-PCBs, the toxic effect of Methylmercury and its interactions with Selenium. The exercise was supported by a Background Document on the Risks and Benefits of Fish Consumption, containing information resulting from a systematic literature review. Three main objectives guided the expert consultation to set a framework for assessing the health benefits and risks of fish consumption and to provide guidance to the Codex Alimentarius Commission in their work on managing risks, taking into account the existing data on the risks and benefits of consuming fish: i) examine the results of recent systematic literature reviews on health risks and benefits of fish consumption; ii) draw conclusions regarding the health benefits and risks associated with fish consumption; and iii) recommend a series of steps that Member States could take to better assess and manage the risks and benefits of fish consumption. For the report, the term “fish” is defined as finfish (vertebrates) and shellfish (invertebrates), whether of marine or freshwater origin, farmed or wild. Marine mammals and algae are outside the scope of the report. Both Background document and the FAO/WHO Report of the expert consultation on the risks and benefits of fish consumption are available online.

FAO's work on harmful algal blooms and biotoxins

2. 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, mass mortalities of aquatic organisms and human intoxications. Improving HAB forecasting could be an opportunity to develop early warning systems for HAB events such as food contamination, mass mortalities or foodborne diseases.

3. 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 took the lead in the development of a Joint FAO-IAEA-IOC Technical Guidance for the Implementation of Early Warning Systems for HABs². 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

¹ [Report of the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption. rome, 25029 january 2010](https://www.fao.org/documents/card/en/c/cc4794en)

² <https://www.fao.org/documents/card/en/c/cc4794en>

brackish waters), specifically for those affecting food safety or food security (benthic HABs, fish-killing HABs, pelagic toxic HABs and cyanobacteria HABs).

4. In addition to this work, over the past seven years, FAO and IOC/UNESCO have had a very productive partnership in many areas related to HABs, and FAO was invited to join the Secretariat of the Intergovernmental Panel on Harmful Algal Blooms (IPHAB)³ to formalize the collaboration. The IOC-FAO IPHAB, first established in 1991 as the organizational framework for a global partnership, encompasses decision-makers, policymakers, managers, scientists, international organizations, and non-governmental organizations (NGOs) to address the problem of harmful microalgae. Further work is envisaged for the development of a Joint FAO-IOC/UNESCO Technical Guidance for the development of marine biotoxins monitoring systems. This would complement recent work carried out recently on ciguatera poisoning^{4, 5} and bivalve mollusc sanitation.

FAO's work on bivalve mollusc sanitation

5. International trade has been the main driving factor behind the rapid growth of the bivalve mollusc production industry during the last six decades. However, a very limited number of countries have effective monitoring programmes for bivalve molluscs. FAO and WHO addressed the need to develop international guidance for implementing such programmes through the Joint FAO-WHO Technical Guidance for the Development of the Growing Area Aspects of Bivalve Mollusc Sanitation Programmes. To ensure the utility of the guidance, FAO and the Centre for Environment Fisheries and Aquaculture Science (Cefas) of the United Kingdom of Great Britain and Northern Ireland in its role as FAO Reference Centre for Bivalve Sanitation updated its content, and the second edition is available in English⁶, Spanish⁷ and French⁸. The guidance also served as the basis for developing an e-learning course series titled "Bivalve Mollusc Sanitation"⁹, which aims to guide practitioners in implementing the Codex Alimentarius guidance and standard in their specific contexts and how to establish and monitor a bivalve mollusc growing area. The focus of the series is the primary production of bivalve molluscs for consumption as live or raw bivalves and, in particular, how to manage microbiological hazards at this stage. The first two courses are being translated into French¹⁰ and Spanish¹¹.

Joint FAO/WHO's work on seaweed safety

6. 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 held an expert meeting in October 2021 that resulted in the Report of the Expert Meeting on Food Safety for Seaweed¹². This document identifies food safety hazards (chemicals, pathogens and toxins) linked to the consumption of seaweed and aquatic plants and provides 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

7. Noting that aquatic products are not the only contributor to the dietary exposure of microplastics, the 17th Session of FAO Subcommittee on Fish trade (COFI:FT) requested FAO to conduct an exposure

³ <https://hab.ioc-unesco.org/ioc-intergovernmental-panel-on-harmful-algal-blooms-iphab/>

⁴ <https://doi.org/10.4060/ca8817en>

⁵ <https://elearning.fao.org/course/view.php?id=648>

⁶ <https://www.fao.org/documents/card/en/c/cb5072en/>

⁷ <https://www.fao.org/documents/card/es/c/CB5072ES>

⁸ <https://www.fao.org/documents/card/es/c/CB5072FR>

⁹ [Course: Bivalve mollusc sanitation: Growing area risk profile \(fao.org\)](#)

¹⁰ [Cours : Contrôle sanitaire des mollusques bivalves: profil de risques des zones de production conchylicole \(fao.org\)](#)

¹¹ [Curso: Saneamiento de moluscos bivalvos: perfil de riesgo de la zona de cría \(fao.org\)](#)

¹² <https://www.fao.org/3/cc0846en/cc0846en.pdf>

assessment that includes all relevant food commodities. In this regard, FAO developed a background document compiling information on the occurrence of microplastics in all commodities, microplastic 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. During an expert meeting in Rome in January 2022, the background document was consolidated into the FAO report *Microplastics in Food Commodities*, which provides the basis for future risk assessment exercises and information to assess risk management options¹³. In addition, FAO conducted a scientific literature review to characterize the current understanding on the effects of microplastics on the gut microbiome and potential health implications and published a report titled “The Impact of Microplastics on the gut microbiome and health”¹⁴.

Joint FAO/WHO’s work on food safety of cell-based food

8. Cell-based food production, which is the development of animal-based agricultural products directly from cell cultures, has been explored as a possible sustainable alternative to conventional production systems. As commercial cell-based food production expands, the urgency to address food safety also increases. Thus, FAO, in collaboration with WHO, published the report *Food Safety Aspects of Cell-based Food*¹⁵ to engage with Members and relevant stakeholders by sharing the current knowledge to identify concrete ways to inform consumers and other stakeholders about the food safety considerations for cell-based food products, including those originated from aquatic products¹⁶. In the FAO stakeholder meeting reports¹⁷, there are few cell-based fish products introduced with the explanations of their specific production processes.

FAO’s work on import notifications for fisheries and aquaculture products

9. Diverse inspection frameworks and requirements to assure consumer protection in importing countries pose one of the most significant challenges for food exporters of aquatic products. Exporters frequently struggle to comprehend import controls, resulting in food products being rejected, detained, or destroyed. Since 2016, FAO has analysed import notifications of aquatic products from the leading importing countries and made them publicly available to promote transparency and disseminate information. The resulting data is organised into six risk categories: chemical, microbiological, histamine, toxins, parasites, and a broad category known as “other causes”. The analysis is available on the [FAO GLOBEFISH website](https://www.fao.org/globefish/), and raw data on import notifications is publicly available in FAO FishstatJ¹⁸. The FAO FishstatJ database contain rejections, detentions, recalls, and issues reported by competent authorities in Australia from 2019 to 2024 and in the European Union, Japan, and the United States of America from 2016 to 2024.

10. There is a very limited number of countries having e-notification systems for food control. To this end, FAO developed *Technical Guidance for the Implementation of E-Notification Systems for Food Control*¹⁹, which provides guidance for designing and implementing such systems, including their legal basis, structure, operational parameters, infrastructure, and human resource requirements.

FAO's work on food fraud for fisheries and aquaculture products

11. The fisheries and aquaculture sector is one of the food sectors most subject to fraud. This is due both to consumer demand, increasingly oriented towards processed products and therefore more difficult to recognize, and to the nature of the perishable product. In 2018, FAO published a report named “Overview of food fraud in the fisheries sector” to highlight the consequences of fraud for the fish sector, providing examples of the causes of fraud and highlighting the importance of legislative instruments and the Codex Alimentarius. Building on this effort, FAO decided to develop a report to showcase the most common frauds in the fisheries and aquaculture sector and available tools to prevent it. Experts on different areas are involved in the development of the case studies and chapters for the provision of available tools. The report will be published in 2024.

¹³ <https://doi.org/10.4060/cc2392en>

¹⁴ <https://www.fao.org/3/cc5294en/cc5294en.pdf>

¹⁵ <https://www.fao.org/documents/card/en/c/cc4855en>

¹⁶ <https://www.fao.org/documents/card/en/c/cc6967en>

¹⁷ <https://www.fao.org/documents/card/en/c/cd0311en>

¹⁸ <https://www.fao.org/fishery/en/statistics/software/fishstatj>

¹⁹ <https://doi.org/10.4060/cb5072en>

Joint FAO/WHO's work on food allergens

12. In response to the requests by Codex Committees on Food Hygiene (CCFH) and the Codex Committees on Food Labelling (CCFL) for scientific advice on food allergens and evidence related to the consumers understanding of the issue, FAO and WHO convened a series of expert meetings on the risk assessment of food allergens since 2020.

13. The experts recommended the global priority food allergens: cereal containing gluten (i.e. wheat and other *Triticum* species, rye and other *Secale* species, barley and other *Hordeum* species, and their hybridized strains), **crustacean**, egg, **fish**, peanut, milk, tree nuts (hazelnut, cashew, walnut, pistachio, pecan, almond), sesame²⁰. Through risk assessment, reference doses, based on health-based guidance values for each of the priority and other allergens were recommended²¹. The evidence in support of precautionary allergen labelling to address unintended allergen presence in foods were established²². The expert meeting also discussed whether it was scientifically justifiable that containing certain ingredients derived from priority allergenic foods could be exempted from mandatory declaration on packaged foods²³.

JEMRA's work on fisheries and aquaculture products

14. In response to the request by CCFH53, JEMRA had two meetings on microbiological risk assessment of viruses in 2023 and 2024. The Expert Committee: 1) reviewed the relevant scientific literature and available surveillance databases; 2) ranked the relevant food commodities of highest public health concern; 3) discussed methods for virus testing performed for outbreak investigation and product testing; 4) reviewed current and potential indicators for viral contamination; 5) deliberated on the developments that have occurred in control of foodborne viruses in the relevant food supply chains since 2008; and 6) identified the most promising approaches to further protect the food supply chain from virus contamination.

15. The Expert Committee considered commodities from a global perspective, and identified the virus-commodity pairs of highest global public health burden associated with specific viruses:

Norovirus	Hepatitis A virus	Hepatitis E virus
1. Prepared food	1. Shellfish*	1. Pork
2. Frozen berries*	1. Frozen berries*	2. Wild game
2. Shellfish*	1. Prepared foods*	

*Substantial regional differences were noted.

16. More detail related to testing methods, indicator and control measurements of foodborne viruses could be found from the published Summary reports of these meetings ²⁴.

JEMRA's work on microbiological risk assessment of *Listeria monocytogenes* in foods

17. In response to the request by CCFH52, JEMRA had two meetings on microbiological risk assessment of *Listeria monocytogenes* in 2022 and 2023. In the first meeting, the expert group elaborated formal models for the risk assessment of *L. monocytogenes* for lettuce, cantaloupe, frozen vegetables and **ready-to-eat (RTE) fish** and it was concluded that these models should be programmed, tested and reviewed. In the second meeting the expert group tested and evaluated the risk assessment models with different scenarios including factors related to climate change to characterize the risk of listeriosis due to the consumption of diced RTE cantaloupe, frozen vegetables, and **cold-smoked RTE fish**. From the application of the risk assessment models it was concluded that increased levels of *L. monocytogenes* on incoming fish and poor environmental hygiene practices at filleting and slicing stage of fish increased the risk of listeriosis.

²⁰ Part 1 Priority food allergens. <https://doi.org/10.4060/cb9070en>

²¹ Part 2 Threshold for the priority food allergens. <https://doi.org/10.4060/cc2946en> and Part 5 Threshold for other food allergens. <https://doi.org/10.4060/cc8387en>

²² Part 3 Precautionary labelling. <https://doi.org/10.4060/cc6081en>

²³ Part 4 Exemptions. <https://doi.org/10.4060/cc9554en>

²⁴ Part 1 food attribution, analytical methods, and indicators. <https://www.fao.org/3/cc8193en/cc8193en.pdf>; Part 2 prevention and intervention measures. <https://www.fao.org/3/cc9953en/cc9953en.pdf>

18. Summary reports^{25,26} were published and the meeting reports are in development.

WHO's work on dioxin and dioxin-like compounds

19. 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. Previous WHO TEFs for dioxin and dioxin-like compounds were established by WHO through expert consultations in 2005.

20. 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 indicated a need to update the 2005 WHO TEFs and therefore WHO has established an advisory group of international experts. On 17 to 21 October 2022 WHO held an ad-hoc expert consultation in Lisbon, Portugal during which the 2005 WHO toxic equivalency factors (TEFs) for dioxin-like compounds, including some polychlorinated biphenyls (PCBs), were re-evaluated.

21. There was consensus among the invited experts that the updated REP database indicated a need to re-evaluate the 2005 WHO TEF values for dioxins, furans, and dioxin-like PCBs. It was furthermore decided that the Bayesian method should be applied to validate the REP database which resulted in higher confidence and certainty in the outcome of the 2022 expert consultation.

22. The outcome, details, and the updated WHO 2022 TEF values for dioxin and dioxin-like compounds coming out of this expert consultation was published in Regulatory Toxicology and Pharmacology in January 2024²⁷.

WHO's work on healthy diets guidelines

23. The WHO is developing guidelines on animal-source foods (ASF), aiming to provide evidence-based recommendations on the optimal intake ranges of red and processed meat, dairy, **fish**, poultry, and eggs relative to each other and plant-based options. These guidelines will consider overall health risk and benefits at different stages of the life course and in consideration of recently updated WHO guidance on macronutrient intakes. Additionally, the WHO is working on risk-benefit models to evaluate nutritional, microbiological and chemical risks associated with ASF consumption from different regions of the world. These models will provide scenario-based implementation guidance on intake levels.

24. The guidelines will be developed following the WHO guideline development process which includes the convening of a multidisciplinary group of experts from all regions of the globe to serve on the guideline development group (GDG). The GDG's conclusions and recommendations will be based on the evidence gathered and reviewed, as well as models developed by a risk-benefit assessment technical group (RBAG).

²⁵ <https://www.fao.org/3/cc2966en/cc2966en.pdf> and <https://www.who.int/publications/m/item/jemra-of-listeria-monocytogenes-in-foods>

²⁶ <https://www.fao.org/3/cc6993en/cc6993en.pdf> and <https://www.who.int/publications/m/item/jemra-of-listeria-monocytogenes-in-foods-part-2-risk-assessment-models>

²⁷ The 2022 world health organization re-evaluation of human and mammalian toxic equivalency factors for polychlorinated dioxins, dibenzofurans, and biphenyls, RTP Volume 146, January 2024, 10525.
<https://www.sciencedirect.com/science/article/pii/S0273230023001939>