CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 3 **CX/CF 22/15/3(REV1)**

April 2022

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

15th Session
(virtual)
9-13 May and 24 May 2022

MATTERS OF INTEREST ARISING FROM FAO AND WHO INCLUDING JECFA

(Prepared by the Joint FAO/WHO JECFA Secretariats)

1. This document provides information on FAO and WHO activities in the area of provision of scientific advice to Codex, other UN agencies and FAO and WHO Member countries which are of interest to the Codex Committee on Contaminants in Foods (CCCF) and provides an update since the last session of the Committee.

2. This document should be read in conjunction with Agenda Items 19 and 20 as appropriate.

Joint FAO/WHO Expert Committee on Food Additives

3. Since the last session of CCCF, two JECFA meetings (i.e. JECFA92[1] and JECFA93) have been convened in a virtual format. These meetings addressed food additives and contaminants.

4. Of particular relevance to CCCF were the 93rd meeting of JECFA. The agenda of JECFA93 included the toxicological evaluation of trichothecenes. The summary of this meeting will be published in April 2022 and submitted by FAO/WHO as Conference Room Document (CRD) once available. All available full reports and the detailed monographs are accessible at the relevant FAO and WHO sites:

   - FAO: http://www.fao.org/food-safety/resources/publications/en/
   - WHO: www.who.int/foodsafety/publications/jecfa/en/

   For convenience, the summary and conclusions of JECFA93 is presented in the Appendix to this document.

5. Future meetings:

   JECFA94 is scheduled for 16–27 May 2022, in a virtual format. The meeting is dedicated to the evaluation of a number of residues of veterinary drugs.

   JECFA95 is scheduled for 7–18 June 2022, in a virtual format. The meeting is dedicated to the evaluation of a number of food additives and enzyme preparations.

   The call for data and draft agenda for JECFA94 and JECFA95 are available on the respective FAO and WHO websites:

   - FAO: https://www.fao.org/food-safety/scientific-advice/calls-for-data-and-experts-expert-rosters/en/
   - WHO: https://www.who.int/groups/joint-fao-who-expert-committee-on-food-additives-(jecfa)

WHO work on dioxin and dioxin-like compounds

6. Since the early 1990's, 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 where established by WHO through expert consultations in 2005. Since then new data including data on relative potencies (REPs) have been published and complied 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.

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1 Joint FAO/WHO Expert Committee on Food Additives. 92nd Meeting. Summary and conclusions. https://www.who.int/publications/m/item/ninety-second-meeting-joint-fao-who-expert-committee-of-food-additives-(jecfa); https://www.fao.org/3/cb5597en/cb5597en.pdf

7. To manage the technical handling of the REP database WHO is collaborating with the European Food Safety Authority (EFSA). Once EFSA has complied 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. An expert ad-hoc consultation aiming at re-evaluating the TEFs for dioxin and dioxin-like compounds is planned for Q4 of 2022.

Requests for scientific advice

8. Both organizations continue to prioritise jointly the requests for scientific advice taking into consideration the criteria proposed by Codex as well as the requests for advice from Member Countries and the availability of resources.

9. In scheduling the JECFA meetings and developing the agenda, the Joint FAO/WHO Secretariat has to take into account the priorities requested by the Committees on Food Additives (CCFA), Contaminants in Foods (CCCF) and Residues of Veterinary Drugs in Foods (CCRVDF), and occasionally other committees (e.g. CCFO). Due to the increasing requests for scientific advice to JECFA, not all requests can be addressed in the subsequent meeting.

10. To facilitate provision of extra-budgetary resources for scientific advice activities, please contact Dr Markus Lipp, FAO Food Safety and Quality Unit (jecfa@fao.org) and Mr Kim Petersen Department of Nutrient and Food Safety, WHO (jecfa@who.int).

Global Food Consumption Databases and ongoing activities to support countries to generate and to use data for risk analysis purposes

11. Reliable information on food consumption, collected at individual level, is needed to estimate dietary exposure to chemicals and biological agents in the general population and in vulnerable population groups. To address the issue of insufficient access to such data, FAO and WHO have continued the work on the two following tools (initiated in 2014), to develop global food consumption databases.

12. The FAO/WHO Global Individual Food Consumption Data Tool (FAO/WHO GIFT)[2] is currently sharing 34 datasets (including 10 nationwide datasets) and aims to have at least 50 datasets by the end of 2022. The database provides not only access to all microdata but also provides useful food-based statistics in the field of nutrition and food safety. FAO/WHO GIFT utilizes FoodEx2 as categorization tool, which has been upgraded for use at global level as the result of a collaboration between FAO, WHO and the European Food Safety Authority (EFSA). FAO/WHO GIFT also provides an up-to-date global inventory of individual quantitative food consumption surveys conducted, planned and ongoing, with detailed information on over 302 identified studies. The platform is available online.

13. A recently published report, co-published by FAO and Intake Center of dietary assessment, details the relevance and need for dietary data worldwide and is available online "Global report on the state of dietary data."[3]

14. CIFOCOss (FAO/WHO Chronic Individual Food Consumption Data summary statistics) contains in 2022 the summary statistics of 67 datasets from 37 countries and is regularly updated.

- The GEMS/Food database was transferred to the new WHO IT platform and continues to actively support the work of CCCF by supporting several electronic working groups (EWGs) in the collection and analysis of global food contamination data to derive recommendations for maximum levels (MLs).
- These data on food consumption (CIFOCOss) and food contamination (GEMS/Food contaminants) are available on the same platform [4] and offer the possibility to use a harmonized food classification/description system (FoodEx2).

FAO's publication on Food Safety Foresight

15. The FAO publication, "Thinking about the future of food safety – A foresight report,"[5] was released on 7 March 2022. The report outlines how major global drivers and trends will shape food safety in tomorrow's world.

16. All food needs to be safe for human consumption; thus, appropriate food safety measures must form the core of food production in our agrifood systems. As agrifood systems are transformed to meet the 2030 Agenda for Sustainable Development, there is need to develop and maintain a deep understanding of the future opportunities, threats, and challenges ahead of us.

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2 https://www.fao.org/gift-individual-food-consumption/en/
3 https://www.fao.org/3/cb8679en/cb8679en.pdf
4 http://apps.who.int/foscollab
5 https://www.fao.org/documents/card/en/c/cb8667en

17. The publication discusses some of the most important emerging issues in food and agriculture with a focus on food safety implications, including climate change, changing consumer behaviour and food consumption patterns, new food sources and food production systems (namely edible insects, jellyfish, seaweed, plant-based alternatives, and cell-based food production), technological innovations and scientific advances, microbiome science, circular economy, and food fraud. FAO has issued a press release on the report.[6]

Other issues of potential interest to the Committee

Update from FAO

FAO's work on "Food safety considerations to achieve best health outcomes under limited food availability situations

18. Food security means that all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their food preferences and dietary needs for an active and healthy life. Food safety is interlinked with and essential to achieving food security.

19. In times of food insecurity, humanitarian relief in the form of food aid is often distributed by specialized organizations, such as the United Nations World Food Programme (WFP). Under conditions of food assistance there are food safety considerations that must be taken in account so as to carefully evaluate the impact on food availability while minimizing the risk of exposure to foodborne contaminants among the receiving population, who may already be vulnerable to malnutrition.

20. FAO's report on "Food safety considerations to achieve best health outcomes under limited food availability situations[7]" has been published in 2022 and lays out case studies for food safety consideration that might be helpful in situations where the impact of limited food availability is mitigated through food aid, which is meant to ensure acceptable health using two scenarios– lead in maize and fumonisins in cereal grains. Risk management and recommendations are also provided on how to address these food safety issues.

FAO's work on bivalve mollusc monitoring

21. International trade has been the main driving factor for the rapid growth in the production of bivalve molluscs during the last six decades. However, only a very limited number of countries have effective monitoring programmes for bivalve molluscs. In this regard, the need for developing international guidance for implementation of bivalve mollusc sanitation programmes was addressed by FAO and WHO through the development of the Joint FAO-WHO Technical guidance for the development of the growing area aspects of Bivalve Mollusc Sanitation Programmes, recently updated by FAO and the FAO Reference Centre for Bivalve Sanitation, the United Kingdom Centre for Environment Fisheries and Aquaculture Science (Cefas), updated the content and the second edition is available online in English and Spanish[8].

22. The guidance also serves as the basis for developing a three module e-learning course on bivalve sanitation, jointly developed by FAO and Cefas targeting policymakers, development practitioners and programme managers, sectoral specialists and researchers, bivalve farmers, trainers and extension agents. The first two modules are available online: "Growing area risk profile"[7] and "Growing area assessment and review"[9].

23. Over the last three years, FAO in collaboration with its Reference Centre for Bivalve Mollusc Sanitation, the Centre for Environment, Fisheries, and Aquaculture Science (Cefas)[10], 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. Annual activities can be found in yearly reports[11].

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6 https://www.fao.org/newsroom/detail/fao-report-future-food-foresight/en

7 https://www.fao.org/documents/card/en/c/cb8715en

8 English version https://fao.org/documents/card/en/c/cb5072en/ and Spanish version https://fao.org/publications/card/es/c/CB5072ES/

9 https://elearning.fao.org/course/view.php?id=629

10 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/

11 FAO Reference Centre work programmes and annual reports - Cefas (Centre for Environment, Fisheries and Aquaculture Science)

Early warning systems for harmful algal blooms (HAB)

24. HABs have a significant impact on food safety and security due to contamination or mass mortality of aquatic organisms. Having forecast or early warning systems could help mitigate the effects of HABs and reduce the occurrence of HAB events. Surveillance systems have been developed to monitor HABs in many countries. However, the lead time or the type of data collected may not be sufficient to effectively take action for food safety management measures or other purposes, such as transferring aquaculture products to other areas. In this regard, FAO is leading 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 in specific areas that may affect food safety or food security, and it will be published in 2022.

25. In addition, WHO published 'Toxic cyanobacteria in water - Second edition'[12] in 2021, which includes information that may be useful for the development of the planned guidance, such as occurrence, assessment and management of waterbodies for aquaculture (section 5.3) and the alert level frameworks developed for drinking-water and recreational water (sections 5.1.2.2 and 5.2.3.2, respectively). An alert level framework enables early-warning and short-term management responses in waterbodies. The alert level framework primarily uses levels of cyanobacterial biomass to trigger responses when biomass reaches levels at which concentrations exceeding cyanotoxin alert values can no longer be excluded.

Microplastics

26. Considering that fisheries and aquaculture products are not the only contributors to the dietary exposure of microplastics, the 17th Session of the COFI Sub-Committee on Fish Trade requested FAO to carry out an exposure assessment to include other 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, plastic migration from food contact materials and packaging, and a review of the existing literature on the toxicity of the most common plastic monomers, polymers, and additives. The report was consolidated during an expert meeting held in January 2022 and will be published in 2022. This process set up the basis for future risk assessment exercises and provided information that can be used for the formulation of risk management options.

Fish consumption

27. New evidence has become available regarding the 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 published in 2010[13]. This will be done through an expert consultation that will draw a number of conclusions on the health benefits and risks associated with fish consumption and recommend a series of steps that Members should take to evaluate and manage them better, more effectively communicating these risks and benefits to their citizens. It will also set a framework for assessing the net health benefits or risks of fish consumption, providing guidance to the Codex Alimentarius Commission in managing risks, taking into account the existing data on the benefits of eating fisheries and aquaculture products.

Seaweed and food safety

28. Increased cultivation and utilisation of seaweed are expected to be essential pillars of sustainable food security and become an integral part of the aquatic economy shortly. Many factors can affect the presence of hazards in seaweed. However, legislation and guidance documents on seaweed production and utilisation are generally lacking. In this regard, FAO and WHO developed a background document identifying food safety hazards linked to the consumption of seaweed and aquatic plants, which can serve as a basis for undertaking further work in this area.

29. The 35th Session of the Codex Committee on Fish and Fishery Products agreed on considering additional work in the area, as presented by FAO and WHO and based on the background document, to develop relevant Codex guidance. The document was consolidated during an expert meeting held in October 2021 and will be published in 2022.

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12 https://www.who.int/publications/m/item/toxic-cyanobacteria-in-water---second-edition

13 Report of the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption. Rome, 25-29 January 2010

FAO Strategic Priorities for Food Safety within the FAO Strategic Framework 2022-2031

30. Following the request of the 27th session of the FAO Committee on Agriculture (COAG), and taking into account the global strategic context, FAO developed a set of strategic priorities for its work on food safety while maintaining the vision to provide "Safe food for all people at all times" and the mission "To support Members in continuing to improve food safety at all levels by providing scientific advice and strengthening their food safety capacities for efficient, inclusive, resilient and sustainable agrifood systems."

31. These strategic priorities are articulated around four Strategic Outcomes that result from an iterative consultative process led by FAO with its Members and international partner organizations, including, notably, WHO. FAO and WHO have been working for many decades through a longstanding partnership to implement the Food Standards Programme (Codex Alimentarius), provide scientific advice, strengthen the capacities of FAO Members for a better participation in standard-setting processes of Codex Alimentarius, and for strengthening their national food control systems. During the development of the FAO Food Safety Priorities and the WHO Global Food Safety Strategy, FAO and WHO maintained a standing and rigorous information sharing and discussion mechanism. Both organizations have committed to plan the development of a joint framework for implementation, following the endorsement of the respective strategic directions.

32. FAO expects the Strategic Priorities for Food Safety to act as an instrument that will spur investments and secure adequate human and financial resources for FAO to successfully implement its food safety programme and to provide international guidance, policy and advocacy for policy-makers. These strategic priorities encourage a more consistent integration of food safety in the development of sustainable and inclusive agrifood systems, food security and nutrition policies and agriculture development strategies.

33. The FAO Strategic Priorities for Food Safety will be discussed at the upcoming session of COAG (July 2022) prior to be submitted for consideration to the FAO Council in December 2022.

Update from WHO

34. Microplastic in the environment is an emerging contaminant that has generated intense public concern, questions to WHO from Member States and recurring queries from the media. Questions have been asked about the human health impacts of the exposure to microplastic particles, from the polymers themselves, to the monomers as well as additives used to make the plastic material, adsorbed chemical contaminants and associated biofilms.

35. Recognizing this, WHO has reviewed the state of evidence on microplastic in drinking-water and published a report assessing the risks to human health in August 2019[14]. To continue WHO's effort to assess the potential health risks associated with exposure to microplastic, a project aiming at widen the scope of the assessment from a drinking-water focus to the environment, including exposure via food, water and air has been undertaken. Working with a group of international experts WHO has assessed human health risks arising from exposure to microplastic particles from the environment, identified research needs and outlined the scope of future work needed on microplastic particles. A virtual expert consultation was held in March 2022 and a final report has been adopted by the working group. The report has been prepared for publication and is expected to be published early summer 2022.

Drinking water quality

36. On 21 March 2022, WHO published the updated Guidelines for drinking-water quality [15] (4th edition incorporating the 1st and 2nd addenda). Of relevance to the Codex standard on natural mineral water, WHO re-established a guideline value for manganese. In this updated guideline, a provisional guideline value of 0.08 mg/L was established. The guideline value is designated as provisional due to the high level of uncertainty in the database, as reflected in the composite uncertainty factor of 1000 applied to derive the guideline value. See the manganese fact sheet in chapter 12 of the Guidelines for summary information on the basis of the guideline value and considerations for management. Further information on the history of guideline value development and the background document that provides the scientific basis for the guideline value update can be accessed on WHO homepage[16].

14 https://apps.who.int/iris/handle/10665/326499

15 https://www.who.int/publications/i/item/9789240045064

16 https://www.WHO.int/teams/environment-climate-change-and-health/water-sanitation-and-health/chemical-hazards-in-drinking-water/manganese

WHO Global Strategy for Food Safety

37. The WHO Global Strategy for Food Safety 2022-2030 was endorsed by the WHO Executive Board 150 in February 2022. It updates the last strategy in order to address current and emerging challenges, incorporate new technologies, and include innovative approaches for strengthening national food safety systems. This request was made by Member States in recognition that food safety remains a public health priority with a critical role in the 2030 agenda for sustainable development.

38. In developing this strategy WHO has had the support from the Technical Advisory Group on Food Safety: Safer Food for Better Health, consulted widely with scientific experts, with WHO regional advisers in food safety, international partners such as FAO and OIE, and Member States. Regional food safety action plans and food safety strategies were also taken into account, as well as the recommendations and guidelines of the Codex Alimentarius and the new FAO Food Safety Strategy.

39. The WHO Global Strategy for Food Safety has been developed to guide and support Member States in their efforts to prioritize, plan, implement, monitor and regularly evaluate actions towards the reduction of the burden of foodborne diseases by continuously strengthening food safety systems and promoting global cooperation.

Burden of foodborne diseases

40. Given a new WHO mandate to update its global burden estimates of foodborne diseases by 2025, WHO re-established in May 2021 its technical advisory group, "Foodborne Disease Burden Epidemiology Reference Group (FERG)"[17] with 26 new members advise WHO under a specific terms of reference.[18] Two expert meetings were organized in July and October 2021 respectively, and the third meeting will be held in April 2022. FERG is finalizing its three-year strategic framework on three primary activities, including (1) estimating the global burden of foodborne diseases, (2) providing country supports on the national estimation of foodborne disease burden, and (3) developing a methodology to monitor progress against the new global food safety strategy with appropriate indicators and targets. WHO plans to expand a list of hazards that will be included in the next estimates, including chemicals and toxins, expecting to further improve the methodology to understand the burden including through newly commissioned literature reviews and source attribution studies.

41. WHO published in June 2021 a new guidance entitled, "Estimating the burden of foodborne diseases: A practical handbook for countries", aiming to help Member States assess causes, magnitude and distribution of foodborne diseases through the estimation of the public health burden of foodborne diseases at the national level.[19] The handbook also aims to promote national studies in order to better allocate resources efficiently for prevention, intervention and control measures. English, French, Spanish and Russian versions are already available, and executive summary is available in all 6 UN languages. Presentation modules are ready for use in English, and 5 other UN language versions are underway for publications in 2022.

17 https://www.who.int/groups/foodborne-disease-burden-epidemiology-reference-group-(ferg)

18 https://cdn.who.int/media/docs/default-source/food-safety/call-for-experts/tor-for-reference-ferg-31aug2020.pdf?sfvrsn=b0a3d1f_8

19 https://www.who.int/publications/i/item/9789240012264

APPENDIX
ORIGINAL LANGUAGE ONLY

Food and Agriculture Organization of the United Nations

World Health Organization

JOINT FAO/WHO EXPERT COMMITTEE ON FOOD ADDITIVES

Ninety-third meeting

Virtual meeting, 24, 25, 29, 30 March and 1 April 2022

SUMMARY AND CONCLUSIONS

Issued on 12 April 2022

A meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA) was held on a virtual online platform from 24 March to 1 April 2022. The purpose of the meeting was to evaluate the safety of certain food contaminants, specifically the trichothecenes T-2, HT-2 and 4,15-diacetoxyscirpenol (DAS). The exposure assessment and the chemical characterization had already been carried out at the ninetieth meeting of the Committee. Therefore, the purpose of this meeting was to review the toxicological data on the trichothecenes T-2, HT-2 and DAS and conduct a safety evaluation and a re-evaluation of the combined dietary exposure. The present meeting was the ninety-third in a series of similar meetings.

Because of the travel restrictions and lockdowns due to the COVID-19 pandemic in many countries, it was not possible for the joint FAO/WHO JECFA secretariat to convene an in-person meeting. Therefore, the meeting was held as a videoconference. In view of the time differences in the countries of origin of the invited experts, the only possible time for a videoconference was restricted to a 3-hour time slot (12:00–15:00 CEST) each day.

Dr D.J. Benford served as Chairperson.

Dr U. Mueller served as Rapporteur.

The full toxicological evaluation and overall risk characterization of the trichothecenes T-2 and HT-2 was originally scheduled for the ninetieth meeting of JECFA, which was held in 2020. However, it became apparent during that meeting that there was insufficient time for the evaluation, and it was agreed to schedule it for a future meeting.

The report of the meeting will be published in the WHO Technical Report Series. The report will summarize the main conclusions of the Committee regarding the group acute reference dose (ARfD) and tolerable daily intake (TDI) for T-2, HT-2 and DAS, as well as the risk characterization and recommendations. Its presentation will be similar to that of previous reports. An annex will include a summary (similar to the summary in this report) of the main conclusions of the Committee's toxicological and safety recommendations.

The participants are listed in Annex 1 to this summary document. Future work and recommendations arising from the meeting are summarized in Annex 2. Annex 3 summarizes observations by experts with regard to the practicability of holding these expert meetings online rather than in-person.

Toxicological and dietary exposure monographs on the contaminants considered will be published in FAS 84.

More information on the work of JECFA is available at:

http://www.fao.org/food-safety/scientific-advice/jecfa/en/

and

https://www.who.int/foodsafety/en/

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Toxicological and dietary exposure information and conclusions
Contaminants evaluated

Review of toxicological data on the trichothecenes T-2, HT-2 and DAS and re-evaluation of the combined dietary exposure

At its ninetieth meeting, JECFA reviewed the information that had become available after the fifty-sixth meeting on T-2 and HT-2 concerning analytical methods, sampling, effect of processing, prevention and control, occurrence in food commodities and dietary exposure. The toxicological data were addressed at the current meeting and the combined dietary exposure was re-evaluated.

Following acute and short-term intake in multiple species, T-2 exposure induces emesis, reduced feed intake, reduced body weight gain, immunotoxicity and haematotoxicity. No suitable long-term studies were identified for establishing a tolerable intake for T-2 and HT-2. Nonetheless, based on the critical effects seen in several acute and short-term studies, the Committee concluded that the safety of food contaminated with T-2 or HT-2 could be evaluated.

Furthermore, as previously recommended, the current Committee considered the issue of additivity with respect to DAS exposure. In particular, the current Committee noted that additivity is supported by more recent acute toxicity data indicating that DAS exhibits similar emetic effects in mink via a similar mode of action to T-2 and HT-2, but at a lower relative potency. Additionally, there is limited evidence that DAS can be detected as a co-contaminant with T-2 and HT-2, particularly where analytical methods with low limits of detection (LODs) are used.

Although the effects and proposed mechanisms elicited by other trichothecenes appear similar, the current Committee concluded that, with the exception of DAS, the evidence for grouping other trichothecenes or establishing relative potency factors, was inadequate and beyond the scope of this addendum.

Group acute reference dose (ARfD)

Emesis is a common effect of acute trichothecene exposure in both humans and experimental animals. On this basis, the Committee established a group ARfD for T-2, HT-2 and DAS using the lower 95% confidence limit on the benchmark dose for a 10% response ($BMDL_{10}$) of 2.6 µg/kg bw for emesis in mink following acute gavage exposure to T-2 or HT-2 as the point of departure. Based on the available evidence, the Committee decided that an uncertainty factor of 8 (2.5 for interspecies variability in toxicodynamics and 3.16 for intra-human variability in toxicodynamics) was sufficiently protective on the basis that:

1. The mechanisms for emesis in mink are likely to be similar to the mechanisms for emesis in humans (for example, activation of receptors in both the gastrointestinal tract and central nervous system).
2. The speed to onset (approximately 30 minutes) and the duration of T-2- and HT-2-induced emesis is proportional to the administered dose suggesting that it is likely to be dependent on the maximum (or peak) concentration in serum or plasma (C_{max}) rather than area under the concentration–time curve.
3. The point of departure is based on a gavage study where higher C_{max} are expected compared with equivalent dietary exposures.

DAS also induces emesis in mink via a similar mode of action, but at a relatively lower potency than T-2 and HT-2. Furthermore, similar to T-2 and HT-2, DAS has also induced reduced feed intake in mice via a similar mode of action.

Accordingly, the Committee established a group ARfD for T-2, HT-2 and DAS of 320 ng/kg bw (rounded down).

Considering the highly comparable nature of the methods used in studies concerning the emetic effects of T-2, HT-2 and DAS in mink, the Committee recommended a relative potency factor of 0.2 for acute exposure to DAS.

Group tolerable daily intake (TDI)

The Committee concluded that the most sensitive, reliable and reproducible effects observed following repeated dietary exposure were reported in the 3-week toxicity study in juvenile pigs. This study adequately characterized the test material and background exposure to common mycotoxins detected in feed and examined critical toxicological effects at relatively low doses (for example, <25 µg/kg bw per day). The Committee also noted that juvenile pigs have been identified previously as a species sensitive to the emetic and haematotoxic effects of trichothecenes. Dose–response analysis of body weights, daily body weight gain and daily feed intake was conducted and a $BMDL_{10}$ of 1.8 µg/kg bw per day based on reduced daily body weight gain was selected as the most appropriate point of departure for establishing a health-based guidance value.

Considering that the critical effect (i.e. nausea-induced reductions in feed intake resulting in decreased body weight gain) is likely to be C_{max}-dependent and given the Committee's low confidence in the overall toxicological database, a composite uncertainty factor of 72 was considered appropriate (eightfold as for the group ARfD; threefold for extrapolation from subacute to chronic exposure and threefold for other uncertainties in the database). Accordingly, the Committee established a group TDI of 25 ng/kg bw for T-2, HT-2 and DAS, alone or in combination. The previous group provisional maximum tolerable daily intake (PMTDI[1]) of 60 ng/kg bw for T-2 and HT-2, established at the fifty-sixth meeting and amended at the eighty-third meeting to include DAS, was withdrawn.

Although comparative longer-term data on T-2, HT-2 and DAS are not available, the Committee concluded that the relative potency factor of 0.2 is applicable for exposure durations longer than acute, due to the similar critical effects observed following acute and repeated oral exposures. The relative potency factor of 0.2 should be applied in comparing dietary exposure to DAS with the group TDI.

Risk characterization

Acute dietary exposure

Acute dietary exposure to the sum of T-2 and HT-2 was previously evaluated at the ninetieth meeting of the Committee. The highest upper bound (UB) 95th percentile exposure estimate of 170 ng/kg bw was reported for infants in European countries. The Committee also noted that the acute dietary exposure estimates decreased with increasing age. The current Committee noted that acute exposure to DAS was not evaluated at its eighty-third meeting.

There is insufficient information available to estimate combined acute exposure to T-2, HT-2 and DAS. The dietary exposure estimates for T-2 and HT-2 calculated by the Committee at its ninetieth meeting are below the ARfD of 320 ng/kg bw. UB estimates of acute dietary exposure to the sum of T-2 and HT-2 (first tier) indicate no health concern, but estimates of dietary exposure to DAS in combination with T-2 and HT-2 should be carried out at a future meeting of the Committee when sufficient and suitable data on DAS become available.

[1] "Historically, JECFA has used the term 'provisional', as there is often a paucity of reliable data on the consequences of human exposure at low levels, and new data may result in a change to the tolerable level. However, as any HBGV would be revisited if new data indicated the need for a change, and as the word maximum is redundant, it is recommended that the terms 'provisional' and 'maximum' no longer be used – that is, using only the terms tolerable daily intake (TDI), tolerable weekly intake (TWI) and tolerable monthly intake (TMI), as appropriate. Tolerable intake values are expressed as an amount (often in micrograms) per kilogram of body weight, as a single value and not a range, and normally using only one significant figure". World Health Organization/International Programme on Chemical Safety (2020). Principles and methods for the risk assessment of chemicals in food. Environmental Health Criteria 240, Chapter 5 (second edition). Geneva: World Health Organization (https://cdn.who.int/media/docs/default-source/food-safety/publications/chapter5-dose-response.pdf?sfvrsn=32edc2c6_5).

1.

Chronic dietary exposure

The estimates of dietary exposure to the sum of T-2 and HT-2 reviewed mainly related to European and north African countries. The estimates of chronic dietary exposure to the sum of T-2 and HT-2 derived from the literature for the general population for the lower bound (LB) mean ranged from 0.3 to 53 ng/kg bw per day and for the LB 95th percentile from 1.9 to 210 ng/kg bw per day. The Committee concluded that dietary exposure estimates for the sum of T-2 and HT-2 at the mean and at the 95th percentile are higher than the group TDI of 25 ng/kg bw, indicating a possible health concern. Estimates of chronic dietary exposure to DAS in combination with T-2 and HT-2 should be carried out at a future meeting of the Committee when sufficient and suitable data on DAS become available.

Recommendations

The Committee recommended the following:

1. development of analytical multi-mycotoxin methods and standards for the quantification of type A trichothecenes and their various metabolites that occur in planta;
2. research on the spatial distribution of T-2 and HT-2 in agricultural commodities to ensure standard sampling methods for mycotoxins are appropriate;
3. that occurrence data for T-2, HT-2 and DAS from a wider range of countries be generated using analytical methods with suitably low LODs, to decrease the uncertainty in dietary exposure estimates and confirm the geographical distribution of these toxins;
4. conducting chronic toxicity studies of T-2, HT-2 and DAS with adequate characterization of T-2, HT-2 and DAS doses as well as the background concentrations of other related mycotoxins in the basal feed; and
5. additional information on the toxicity of relevant (for example, those that co-occur) mycotoxin mixtures.

1.

Annex 1

Ninety-third meeting of the Joint FAO/WHO Expert Committee on Food Additives

Virtual meeting, 24, 25, 29, 30 March and 1 April 2022

Members

Dr A. Agudo, Unit of Nutrition and Cancer, Catalan Institute of Oncology, Barcelona, Spain

Dr S. Barlow, Brighton, East Sussex, England

Dr D.J. Benford, Cheddington (Bucks), England (*Chairperson*)

Dr N. Fletcher, Food Standards Australia New Zealand, Canberra, ACT, Australia

Dr U. Mueller, Perth, Australia (*Rapporteur*)

Mr M. Feeley, Ottawa, Canada

Dr G.S. Shephard, Cape Town, South Africa

Dr J. Schlatter, Zurich, Switzerland

WHO temporary advisers

Mr A. Afghan, Health Products and Foods Branch, Health Canada/Government of Canada, Canada

Mr P.J. Cressey, Institute of Environmental Science and Research Limited (ESR), Christchurch, New Zealand

Dr L. Edler, Dudenhofen, Germany

Dr Y. Kiparissis, Health Products and Foods Branch, Health Canada/Government of Canada, Canada

Dr E. Kirrane, US Environmental Protection Agency's Center for Public Health and Environmental Assessment, Research Triangle Park, NC, United States of America

Dr J.-C. LeBlanc, Laboratory for Food Safety, French Agency for Food, Environmental and Occupational Health and Safety (ANSES), Maisons-Alfort Cedex, France

Dr M. Wheeler, NIH/NIEHS Biostatistics and Computational Biology Branch, Research Triangle Park, NC, United States of America

FAO experts

Professor S. Edwards, Harper Adams University, Shropshire, England

Professor P.W. Li, Oil Crops Research Institute, Chinese Academy of Agricultural Sciences, Wuhan, China

Secretariat

Dr V. Fattori, Food Systems and Food Safety Division, Food and Agriculture Organization of the United Nations, Rome, Italy (*FAO Secretariat*)

Ms N.Y. Ho, Department of Nutrition and Food Safety, World Health Organization, Geneva, Switzerland (*WHO Joint Secretariat*)

Dr M. Lipp, Food Systems and Food Safety Division, Food and Agriculture Organization of the United Nations, Rome, Italy (*FAO Secretariat*)

Mr K. Petersen, Department of Nutrition and Food Safety, World Health Organization, Geneva, Switzerland (*WHO Joint Secretary*)

Ms S. Kaplan, Bern, Switzerland (*WHO Technical Editor*)

1.

Annex 2

Future work and recommendations

The Committee recommended the following:

1. Development of analytical multi-mycotoxin methods and standards for the quantification of type A trichothecenes and their various metabolites that occur in planta;
2. Research to investigate the spatial distribution of T-2 and HT-2 in agricultural commodities to ensure standard sampling methods for mycotoxins are appropriate;
3. That occurrence data for T-2, HT-2 and DAS from a wider range of countries be generated using analytical methods with suitably low LODs, to decrease the uncertainty in dietary exposure estimates and confirm the geographical distribution of these toxins;
4. Conducting chronic toxicity studies of T-2, HT-2 and DAS with adequate characterization of T-2, HT-2 and DAS doses as well as the background concentrations of other related mycotoxins in the basal feed; and
5. Additional information on the toxicity of relevant (for example, those that co-occur) mycotoxin mixtures.

Annex 3

Procedural matters

The ninety-third meeting of JECFA was held on 24, 25, 29, 30 March and 1 April 2022. Because of the travel restrictions and lockdowns due to the COVID-19 pandemic in many countries, it was not possible to convene an in-person meeting and the meeting was held online by video-conferencing. In view of the time differences in the countries of origin of the invited experts, the only possible time for a videoconference was restricted to a 3-hour time slot (12:00–15:00 CET) each day. This allowed only 30% of the usual daily length (8–10 hours) of a JECFA meeting.

Although the experts participated fully, they noted that an online meeting does not permit the necessary in-depth, robust scientific discussions and that online meetings are therefore not a suitable substitute for face-to-face meetings for JECFA. In particular, the experts felt that the online format did not foster the atmosphere of trust, inclusiveness and openness that has marked all JECFA meetings. The experts considered that the success of the ninetieth meeting was due to a large extent to the cohesion between them, which resulted from the trust generated during previous face-to-face meetings.

The experts decried the significant difficulty of meeting informally outside the scheduled meeting times because of the widely differing time zones. They noted that such informal interactions during physical meetings are instrumental to solving problems and to discussing issues in depth, bilaterally or in small groups, and added that such informal meetings often gave rise to solutions to stubborn problems. The inability to hold such meetings was considered to have impeded progress at the current meeting, as lack of sufficient time for discussion had slowed progress in developing safety evaluations.

The experts emphasized further that an invitation to a physical JECFA meeting at FAO or WHO headquarters gives rise to significantly more recognition by the expert's employer of the weight, reach, responsibility and workload required for full participation in a JECFA meeting. The same degree of recognition was not granted by employers for this online meeting, as the experts remained available locally. This lack of recognition of the workload and significance of participation in a JECFA meeting led to an increase in other demands on experts, resulting in distraction and more frequent scheduling conflicts. The experts concluded that, cumulatively, such factors would be counterproductive for participation in future JECFA meetings if FAO and WHO maintained the online-only format.

In recognition of the difficulties and the tremendous effort made, the joint FAO/WHO Secretariat expresses its deep gratitude to all the experts for their commitment and flexibility, not least as the scheduled meeting times were exceedingly inconvenient for many.

The meeting report was adopted on 1 April 2022.