

Codex Alimentarius: Guidelines for rapid risk analysis following instances of detection of contaminants in food where there is no regulatory level

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Disclaimer

Views expressed in this presentation are those of the author and do not necessarily reflect the views or policies of the Food and Drug Administration.



Today's talk

- Codex Alimentarius Commission
 - What it is, what it does, the Codex process
- Codex Committee on Contaminants in Foods
 - Terms of reference
- Recently adopted “Guidelines for rapid risk analysis following instances of detection of contaminants in food where there is no regulatory level”



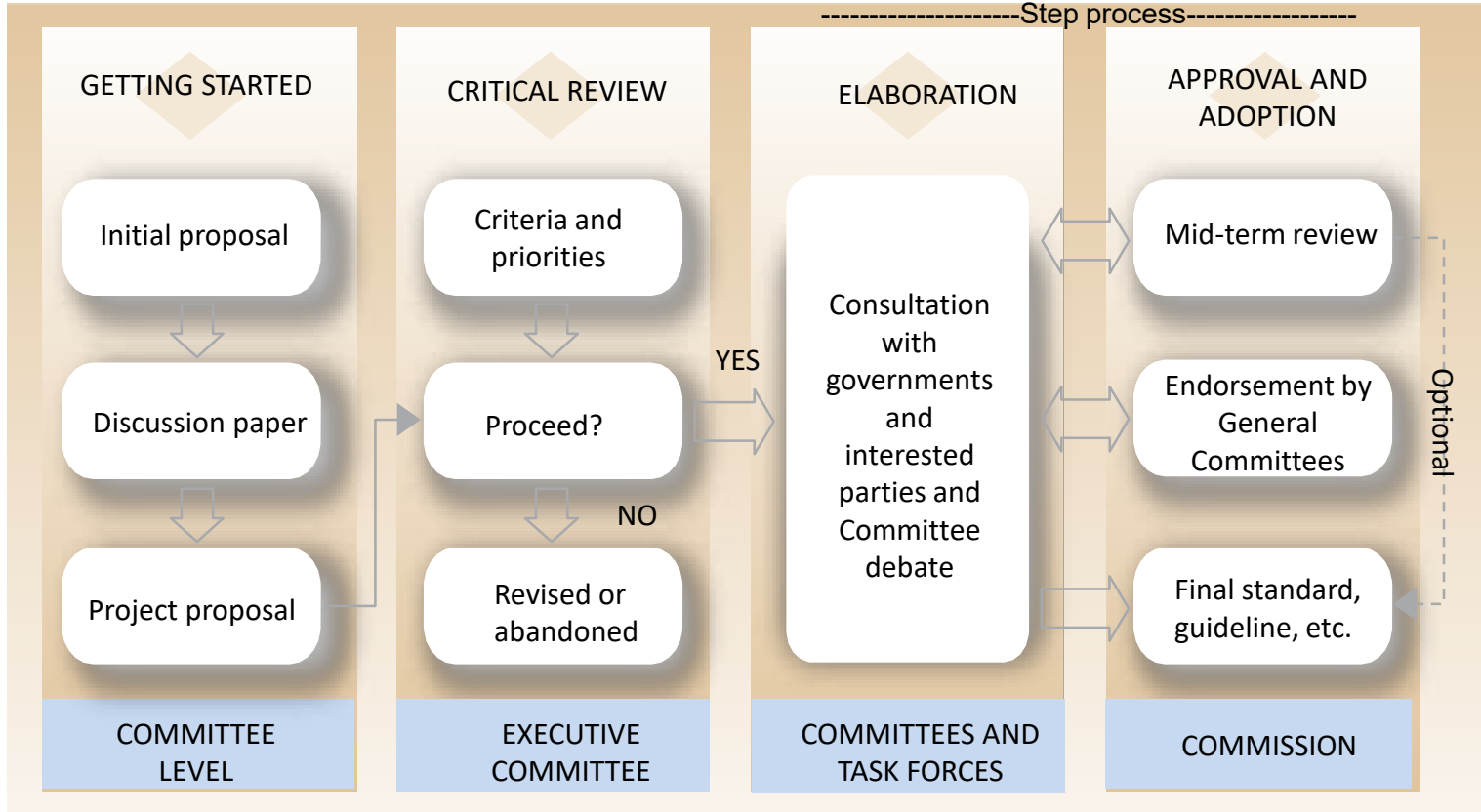
Codex Alimentarius Commission (CAC)

- Established by Food and Agriculture Organization (FAO) and World Health Organization (WHO) in 1963
- Goals
 - To protect the health of consumers
 - To ensure fair practices in the food trade
- Develops harmonized international food standards, guidelines and codes of practice for publication in the Codex Alimentarius
 - Documents and Codex information online at <http://www.fao.org/fao-who-codexalimentarius/en/>

Codex Committees

- CAC establishes subsidiary committees, including general and commodity committees.
 - General committees: Contaminants, Food Hygiene, Pesticide Residues, Food Additives, Food Labeling, Methods of Analysis and Sampling, Vet Drugs, General Principles, Nutrition, and Import/Export Certification
 - Commodity committees (active): Sugars, Cereals/Pulses/Legumes, Fats and Oils, Spices and Culinary Herbs, Processed Fruits and Vegetables, Fresh Fruits and Vegetables
 - Coordinating committees and task forces
- U.S. Codex Office in USDA is central Codex contact point
- Delegates and alternate delegates come from FDA, USDA, EPA, and Commerce.

Codex Standards Process



Codex Step Process





Codex Committee on Contaminants in Foods (CCCF)

- FDA leads US Delegation to CCCF (alternate delegate from FSIS)
- CCCF Terms of reference:
 - to establish or endorse permitted maximum levels or guideline levels for contaminants and naturally occurring toxicants in food and feed
 - to consider and elaborate standards or codes of practice for related subjects
 - to consider methods of analysis and sampling for the determination of contaminants and naturally occurring toxicants in food and feed

CCCF and JECFA

- CCCF Terms of reference (continued)
 - to prepare priority lists of contaminants and naturally occurring toxicants for risk assessment by the Joint FAO/WHO Expert Committee on Food Additives (JECFA)
 - to consider other matters assigned by the Commission
- JECFA
 - International expert scientific committee administered jointly by FAO and WHO.
 - Performs risk assessments and provides advice to FAO, WHO and CAC, including CCCF



CCCF Develops MLs and COPs

- CCCF standards work is codified in General Standard for Contaminants and Toxins in Food and Feed (GSCTFF, CODEX STAN 193-1995)
 - Lists maximum levels (MLs) and guideline levels (GLs), and associated sampling plans of contaminants and natural toxicants in food and feed recommended by the CAC to be applied to commodities moving in international trade.
 - Covered contaminants include metals, mycotoxins, radionuclides.
 - Also includes main principles recommended in dealing w/contaminants, e.g., criteria for setting MLs.
- Codes of Practice on preventing and reducing contaminants in foods, including arsenic, lead, mycotoxins, dioxins, hydrocyanic acid, MCPD, 3-MCPD and glycidyl esters.
- First CCCF “Guidelines” document adopted in 2019.

PROVISIONAL AGENDA



Agenda
CCCF 2019

Agenda Item	Subject Matter	Doc. Reference No.
1	Adoption of the Agenda	CX/CF 19/13/1
2	Matters referred to CCCF by CAC and/or its subsidiary bodies	CX/CF 19/13/2
3	Matters of interest arising from FAO and WHO (including JECFA)	CX/CF 19/13/3
4	Matters of interest arising from other international organizations	CX/CF 19/13/4
Industrial and Environmental Contaminants		
5	Proposed draft MLs for lead in selected commodities in the GSCTFF (CXS 193-1995) (at Step 4)	CL 2019/07-CF CX/CF 19/13/5
	- Comments at Step 3	CX/CF 19/13/5-Add.1
6	Proposed draft MLs for cadmium in chocolate and cocoa-derived products (at Step 4)	CL 2019/08-CF CX/CF 19/13/6
	- Comments at Step 3	CX/CF 19/13/6-Add.1
7	Draft Code of practice for the reduction of 3-MCPDEs and GES in refined oils and food products made with refined oils (at Step 7)	CL 2019/09-CF CX/CF 19/13/7
	- Comments at Step 6	CX/CF 19/13/7-Add.1
Toxins		
8	Proposed draft ML for total aflatoxins in ready-to-eat peanuts and associated sampling plan (Held at Step 4)	REP18/CF, para. 115 Appendix VII
9	Proposed draft MLs for total aflatoxins and ochratoxin A in nutmeg, dried chili and paprika, ginger, pepper and turmeric and associated sampling plans (Held at Step 4)	REP18/CF, para. 119 Appendix VIII
Other issues		
10	Draft Guidelines for risk analysis of instances of contaminants in food where there is no regulatory level or risk management framework established (at Step 7)	CL 2019/10-CF CX/CF 19/13/8
	- Comments at Step 6	CX/CF 19/13/8-Add.1



Agenda CCCCF 2019

Agenda Item	Subject Matter	Doc. Reference No.
Discussion Papers		
11	Establishment of new MLs for lead in commodities according to a prioritization approach	CX/CF 19/13/9
12	Lead and cadmium in quinoa	CX/CF 19/13/10
13	Revision of the <i>Code of Practice for the Prevention and Reduction of Lead Contamination in Foods</i> (CXC 56-2004)	CX/CF 19/13/11
14	Development of a Code of practice for the prevention and reduction of cadmium contamination in cocoa	CX/CF 19/13/12
15	Establishment of MLs for methylmercury in additional fish species	CX/CF 19/13/13
16	Establishment of MLs for HCN in cassava and cassava-based products and occurrence of mycotoxins in these products	CX/CF 19/13/14
17	Establishment of MLs for total aflatoxins in cereals (wheat, maize, sorghum and rice), flour and cereal-based foods for infants and young children	CX/CF 19/13/15
General Issues		
18	General guidance on data analysis for ML development	CX/CF 19/13/16
19(a)	Priority list of contaminants and naturally occurring toxicants for evaluation by JECFA	REP18/CF, Appendix X
	Comments (in reply to CL 2019/11-CF)	CX/CF 19/13/17
19(b)	Follow-up work to the outcome of JECFA evaluations	See CX/CF 19/13/3
20	Forward workplan for CCCC	CX/CF 19/13/18
21	Other business and future work	
22	Date and place of next session	
23	Adoption of the report	

Guidelines development

- In 2016, New Zealand introduced documents at several Codex committees related to risk management of “detection of chemicals of very low public health concern.”
 - “Significant emerging issue [with] potential to impact on international trade.”
 - Codex should “support the development of an internationally harmonised risk management approach.”
- In 2017, New Zealand submitted an official project document at CCCF11 for new work.
- CCCF11 sent forward and CAC40 (2017) approved the new work on “the development of risk analysis guidelines to address chemicals inadvertently present in food at low levels,” to be carried out by an electronic working group (EWG) chaired by New Zealand and co-chaired by the Netherlands.

Guidelines development



- At CCCF12 (2018), New Zealand presented the draft guidelines, as developed in the EWG and revised in a pre-meeting workshop.
- CCCF12 sent forward and CAC41 (2018) endorsed the revised guidelines at Step 5.
- At CCCF13 (2019), New Zealand presented the draft guidelines, as revised in the EWG and a pre-meeting workshop.
- CCCF13 sent the guidelines forward at Step 8.
- CAC42 (2019) adopted the guidelines.

What's in the Guidelines?

1. Introduction

- The draft guidelines incorporate a rapid risk analysis approach using a cut-off value and the Threshold of Toxicological Concern (TTC), to assess low levels of chemical exposures, and to identify if further data are required to assess human health risk.
- Where detection of a chemical contaminant in food [with] no regulatory level necessitates a rapid risk management response, e.g. to consider import admissibility, a pragmatic risk-based approach should be applied.

2. Purpose

- The guidelines provide an approach to assist governments in the rapid risk analysis of instances of detection of chemical contaminants in food where there is no regulatory level.

What's in the Guidelines?



3. Scope

Included

- Contaminants detected in food where there is no regulatory level
- Contaminants meeting the definitions within the GSCTFF for which there are no specific Codex, regional or national standards, recommendations or guidelines
- Contaminants where the detections have not been previously reported in the food and are unexpected (i.e. not a recurring or an intermittent occurrence)
- Contaminants found within a specific lot or consignment of food or food ingredient

What's in the Guidelines?



3. Scope (cont'd).

Examples

- Contaminants that may occur in materials used or created during processing of food and that may be inadvertently present in the food (e.g. printing inks, etc.)
- Chemicals used to mitigate specific environmental, sustainability and climate change issues, (e.g. nitrification and urease inhibitors), which have not been anticipated to be present in food

Specifically excluded

- Contaminants detected in situations where the risk manager is investigating the possibility of intentional adulteration of food

What's in the Guidelines?



4. Principles
5. Roles
6. Reporting of Detection(s)
7. Application of the Decision Tree for Rapid Risk Analysis (Annex)
8. Further Risk Management Activities
9. Risk Communication



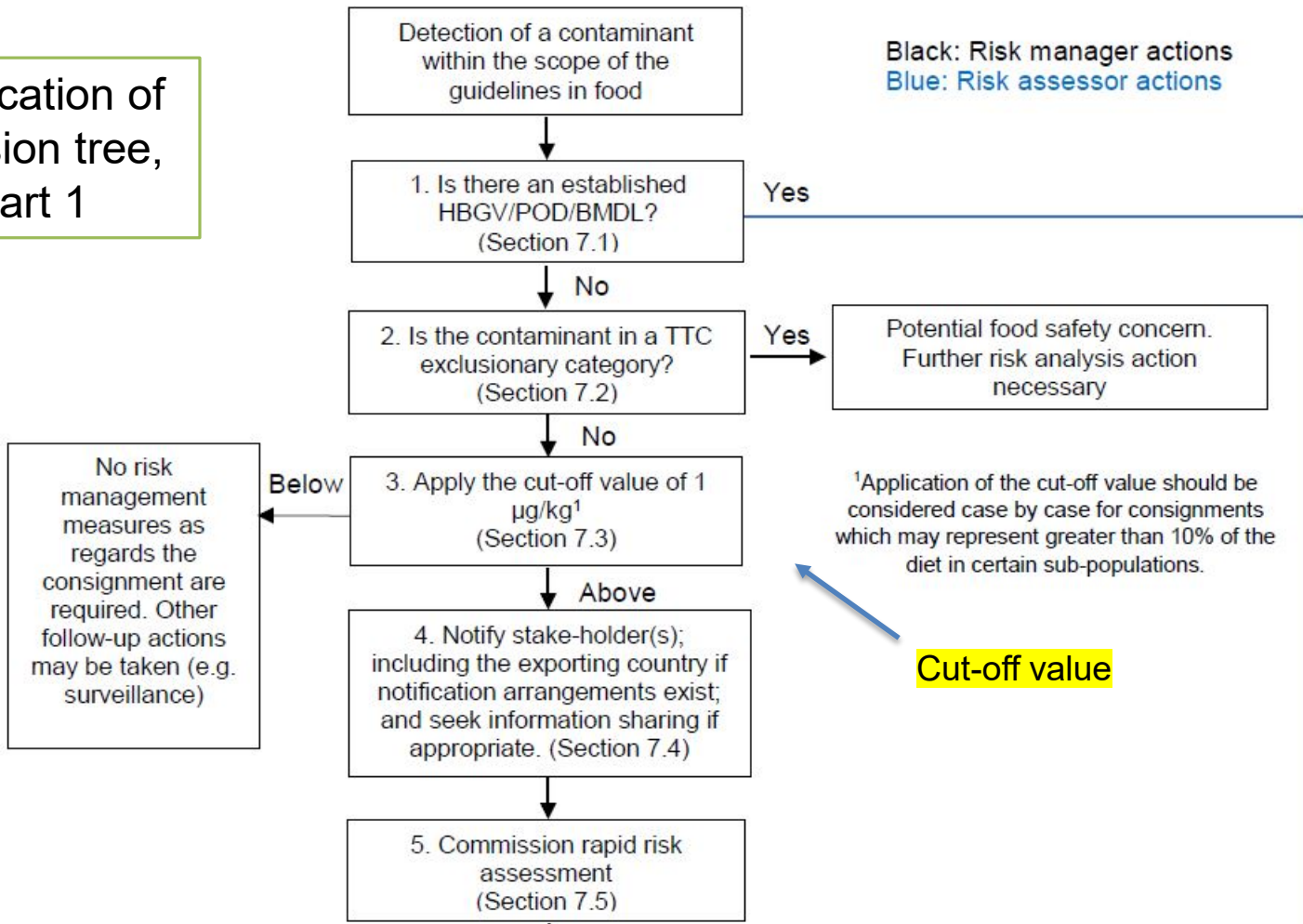
Threshold of Toxicological Concern (TTC)

- Risk characterization approach for chemicals with insufficient tox data
- Identifies an exposure threshold below which there is a low probability of adverse effects
- Based on analysis of available toxicity/structure databases.
- Chemicals are grouped into three structural classes with predicted toxicity and recommended exposure limits.
- User follows a decision tree to identify appropriate class and exposure limit. Some chemicals are excluded altogether (e.g., high potency carcinogens).
- Revisions to the initial TTC construct added structural alerts for genotoxicity and organophosphates.

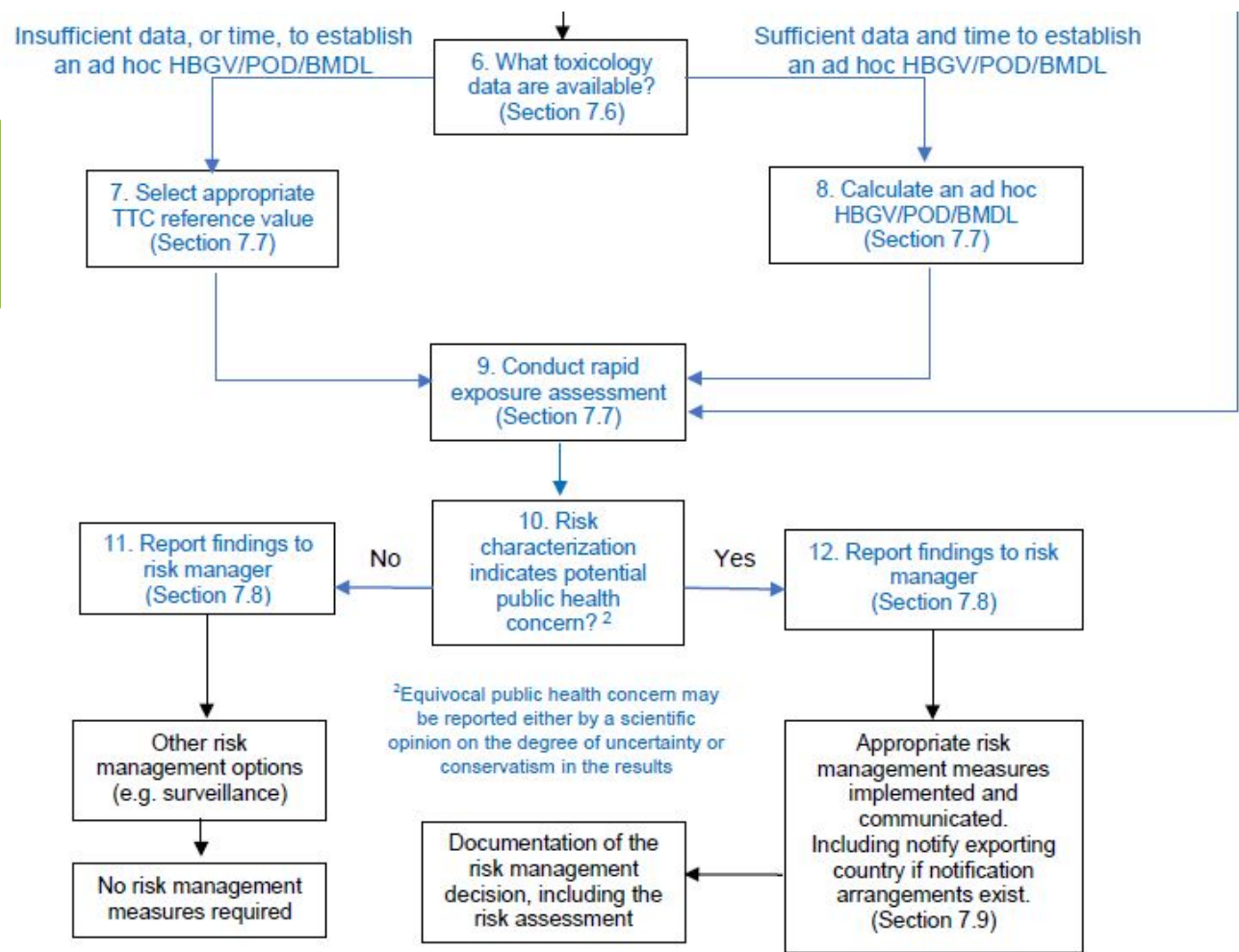
TTC Reference: Principles and methods for the risk assessment of chemicals in food. Environmental Health Criteria 240. Chapter 9.

Black: Risk manager actions
Blue: Risk assessor actions

Application of decision tree, part 1



Application of decision tree, part 2



Black: Risk manager actions
 Blue: Risk assessor actions

Cut-off value



- The cut-off value is a guideline indicating whether or not a specific risk management action might be taken on the basis of the concentration of the contaminant in the consignment tested.
- For values above the cut-off, application of these guidelines would result in the risk manager deciding to progress with a rapid risk analysis.
- For measured levels below the cut-off value, a risk management decision can be made that the consignment does not require a specific risk management response.
 - Even though the consignment does not require a response, other follow-up actions may be taken (e.g., surveillance).
- The cut-off value does not necessitate the analytical laboratory achieving a limit of detection of 1 µg/kg.

Derivation of the cut-off value



- The underlying premise of the cut-off value is that the contaminant is at the time of detection only observed in a single or limited number of consignments, and thus would only be present in a small fraction (e.g., one tenth) of a typical varied diet.
- For certain sub-populations where a consignment could represent more than a tenth of the daily diet intake, for example with foods for infants or sole source nutrition products, the cut-off value may not be appropriate.
- Such instances should be considered on a case-by-case basis and progressed for full risk assessment when there is uncertainty over the proportion of the diet . . . a food consignment may represent for these sub-populations.

Calculation of cut-off value

- Formula based on calculation in GSCTFF for guideline levels for radionuclides in foods following a radiological emergency

$$\text{Cut-off value} = (\text{TTC} / (\text{BWM} \times \text{CAF})) \times \text{CF}$$

$$\text{Cut-off value} = 1 \mu\text{g}/\text{kg} = (0.0025 \mu\text{g}/\text{kg bw}/\text{day} / (25 \text{ g}/\text{kg bw}/\text{day} \times 0.1)) \times 1000$$

- TTC: TTC value for DNA-reactive mutagenic or carcinogenic substances (0.0025 $\mu\text{g}/\text{kg bw}/\text{day}$). This value selected as being the most protective for toxicity in the diet.
- BWM: Body Weight adjusted mass of food consumed per day ($\text{g}/\text{kg bw}/\text{day}$). A value of 25 $\text{g}/\text{kg bw}/\text{day}$ is used based on 1.5 kg daily intake per 60 kg adult.
- CAF: Consignment Adjustment Factor, ratio of maximum mass of the daily diet impacted by unregulated contaminant in a consignment. The value of 0.1 (10%) is used on the basis that in a varied diet a single consignment is unlikely to constitute more than 10% of the total daily intake by an individual.
- CF: Unit conversion factor (1000)

Case studies

- EFSA Panel on Contaminants in the Food Chain (CONTAM), Scientific Opinion on the risks for animal and public health related to the presence of *Alternaria* toxins in feed and food, EFSA J. 2011, 9(10), 2407–2504, <https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2011.2407>
- New Zealand Ministry for Primary Industries occurrence and risk characterisation of migration of packaging chemicals in New Zealand Foods: <http://www.mpi.govt.nz/dmsdocument/21871-occurrence-and-risk-characterisation-of-migration-of-packaging-chemicals-in-new-zealand-foods>
- Found in Annex 3, CX/CF 19/13/8

U.S. Delegation Comments on CCCF13 Draft

- Editorial comments to improve clarity of paper
- Other changes requested to ensure support for draft
- Include language on “instances of detection of contamination” and “rapid” to be consistent with initial impetus of work; i.e., focus on rapid assessment of consignments with contaminants with no regulatory level
- Avoid using the term “unregulated contaminants” because contaminants may be subject to regulatory framework even in the absence of explicit regulation.
- Avoid suggesting that TTC is the only scientifically valid approach that could apply where data are insufficient to establish a health-based guidance value (HBGV).

U.S. Delegation Comments on CCCF13 Draft



- Clarify whether compounds with HBGVs should be included in the decision tree
- Limit the inclusions list to several examples
- Expand exclusions section based on currently available TTC databases
- Include appropriate reference for additional information on TTC to provide further technical guidance
- Avoid nebulous language like “meaningful reductions to adverse impact to public health” and “measures should be proportional to the . . .risk.”
- Clarify steps/flow in decision tree

Industry viewpoints



- This guideline provides an important reference by a respected authority for use in discussion with regulatory agencies that are less familiar with standard food risk assessment practices.
- This guideline, like all Codex texts, creates alignment of practices across the world, which is important for multinational companies interacting with multiple regulatory agencies.
- The establishment of the cut-off value, based on well-founded toxicological principles, should guide development of fit-for-purpose analytical methods that have the goal of ensuring food safety, rather than methods that chase zero and detect concentrations of substances that are not relevant to human health.
 - This is particularly valuable for certain commodities that are disproportionally subjected to increasingly sensitive testing.
- The principles in the guideline enable prioritization of risk from substances found in food, deprioritizing those substances with less risk and thus allowing more resources to be focused on those that present more potential risk.

Concerns expressed at CCCF13/CAC42

- Cuba expressed reservation to the adoption of the Guidelines, noting that many countries are not currently prepared for the implementation of the guidelines, especially due to differences in laboratory capacity. The delegation also requested global assistance from FAO and WHO to assist with implementation of the Guidelines in particular related to the TTC concept.
- Indonesia expressed the view that the Guidelines could potentially cause disruption to international trade, especially due to differences in understanding and technical capacity to apply the principles, especially related to laboratory capacity. This delegation also supported the need for a global effort sponsored by FAO or WHO to assist with implementation of the Guidelines in particular related to the TTC concept.

More information

- USCO:
<https://www.fsis.usda.gov/wps/portal/fsis/topics/international-affairs/us-codex-alimentarius>
 - Delegate's Report, Public Meetings, Stakeholder information
- Codex : www.codexalimentarius.net
- U.S. CCCF Delegation: lauren.robin@fda.hhs.gov,
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Thank you for your attention

Questions?

