



JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING

42nd Session
13-16 June 2023 (physical plenary meeting)
20 June 2023 (virtual report adoption)

MATTERS REFERRED TO THE COMMITTEE BY THE CODEX ALIMENTARIUS COMMISSION
AND/OR ITS SUBSIDIARY BODIES

MATTERS ARISING FROM THE CODEX ALIMENTARIUS COMMISSION AND ITS EXECUTIVE
COMMITTEE

MATTERS FOR INFORMATION

Specific matters

Standards and related texts submitted to CAC for adoption

1. CAC44 (2021) adopted¹:
 - i. the revised *Guidelines on Measurement Uncertainty* (CXG 54-2004) at Step 8;
 - ii. the revised *General Guidelines on Sampling* (CXG 50-2004) at Step 5;
 - iii. methods of analysis and performance criteria in Codex standards as endorsed by CCMAS41 (2021) for inclusion in the *Recommended Methods of Analysis and Sampling* (CXS 234-1999);
 - iv. methods of analysis for provisions for fats and oils (REP21/MAS41, Part 4.3), which had been considered and agreed by CCFO27;
 - v. amendments to provisions for milk and milk products in CXS 234; and
 - vi. the editorial amendment to Section 3.3 of the *Standard for Edible Casein Products* (CXS 290-1995).

Standards and related texts submitted to CAC for revocation

2. CAC44 revoked² methods of analysis related to nutrition and foods for special dietary uses, processed fruits and vegetables and milk and milk products.

General matters

*Application of the Statements of Principle Concerning the Role of Science in the Codex Decision-Making Process and the extent to which other factors are taken into account (SoP)*³

3. CCEXEC83 (2022) noted that the Subcommittee on the SoP had completed its work on guidance for the application of the SoP and therefore agreed to close the discussion on this topic while forwarding the draft guidance to CAC45 for further consideration.
4. CAC45 agreed to refer the draft Guidance for Codex Chairpersons and Members on the Application of the SoP to the chairpersons of Codex subsidiary bodies to facilitate deliberations on matters that fell within the scope of the SoP and urged members to take account of the draft guidance as appropriate during the process of standards development and advancement. CAC further requested the Codex Secretariat to issue a circular letter (CL) inviting Members and Observers to provide specific suggestions to improve the draft guidance, its finalization, and its possible incorporation into guidance documents for Chairpersons and Members.
5. The draft guidance is available as an appendix to the report of CCEXEC83.⁴

¹ REP21/CAC44, paras. 49-52, Appendices III & IV

² REP21/CAC44, para. 53, Appendix V

³ REP21/CAC44, paras. 13-14; REP22/EXEC83, paras. 81-84; REP22/CAC45, para. 22

⁴ REP22/EXEC83, Appendix II

Codex and the pandemic⁵

6. CAC43 (2020) recommended to all subsidiary bodies and Members and Observers to make full use of existing remote working mechanisms such as Electronic Working Groups (EWGs) and CLs and to plan their virtual committee meetings in such a manner as to optimize the possibility to complete their agendas.
7. CAC44 recommended that Rule XI (7) and (8) continue to be interpreted in a manner that includes a virtual setting with respect to sessions of Codex subsidiary bodies, including CCEXEC, and that application of this should take into consideration the criteria⁶ outlined by CCEXEC80 (2021).

60th Anniversary of Codex⁷

8. CAC44 agreed that the celebration of the Codex 60th Anniversary (2023) would be a wonderful occasion to raise awareness about food safety and quality and encouraged all Members and Observers to use the opportunity of the Codex 60th Anniversary to plan and implement activities to build awareness of Codex and to engage high-level political support for Codex work. CAC noted that Codex already had a number of tools at its disposal to facilitate engagement and planning for the Anniversary, including the FAO/WHO Coordinating Committees.
9. CAC45 encouraged Members and Observers to fully engage in the celebrations and to share information on their plans and activities directly and through the Codex Secretariat; and urged Members to commit to advocacy at all levels to ensure both the widest possible participation in the celebrations and the widest possible promotion of the work of Codex. Members and Observers are encouraged to send details of any activities and to celebrate Codex@60 to the Codex Secretariat at Codex@fao.org.

New food sources and production systems (NFPS)⁸

10. CCEXEC81 (2021) discussed a means to investigate potential mechanisms to address cross-cutting, overarching, and emerging issues in Codex, such as edible insects and seaweed. There was consensus that, at the current stage, emerging issues should be addressed through existing mechanisms and committees, with the support of FAO and WHO for scientific advice as appropriate. FAO recalled that the challenge was how these issues could initially be introduced for consideration by Codex noting that these items did not naturally fall within the terms of reference (ToR) of existing committees. CCEXEC agreed to establish a subcommittee to investigate potential mechanisms to address cross-cutting, overarching, and emerging issues in Codex.
11. CCEXEC82 recognized that ongoing work by CCEXEC on “new food sources” did not preclude committees from undertaking new work falling within their respective mandates and agreed that the subcommittee should continue its stepwise consideration of the issue informed by an analysis of the information collected so far and the report of its session.
12. CCEXEC83 recognized that this work had sensitized Codex to the challenges and opportunities arising in relation to NFPS and the potential role Codex could play in addressing any related food safety issues and facilitating fair trade of such commodities. CCEXEC also recognized the need to prepare guidance on how to apply existing procedures to ensure that Members do not perceive procedural obstacles to submitting new proposals for work in this and other areas of Codex.
13. CAC45 recognized the importance of Codex working in a flexible and timely manner to consider NFPS as an important topic in the development of international standards aimed at protecting consumer health and ensuring fair practices in the food trade. CAC encouraged Members to submit proposals related to NFPS using existing Codex mechanisms, and Codex subsidiary bodies to consider NFPS in their deliberations, and requested the Codex Secretariat to send a CL to Members and Observers to identify possible issues related to NFPS that the current structure and procedures could not address and options to address them for discussion at CAC46.
14. CAC45 further acknowledged the role of CCEXEC in ensuring cross-committee coordination, as part of the critical review, noting that this could be of particular relevance for any work on NFPS and strongly encouraged FAO and WHO to continue sharing information on NFPS with CAC and its subsidiary bodies through the agenda item on “Matters arising from FAO and WHO”, to ensure Codex Members were fully aware of upcoming issues in this area and could consider them as appropriate.

⁵ REP20/CAC43, para. 31(ii); REP21/CAC44, para. 12(iii)

⁶ REP21/EXEC80, para. 35

⁷ REP21/CAC44 para. 150; REP22/EXEC82, para. 129; REP22/EXEC83, para. 177; REP22/CAC45, para. 220

⁸ REP21/81, paras. 105, 106, 110; REP22/EXEC82, para. 85; REP22/EXEC83, para. 100; REP22/CAC45, para. 31

Future of Codex⁹

15. CCEXEC82 agreed to establish a subcommittee to develop, in collaboration with the Codex Secretariat, a report including a proposed blueprint for the future of Codex for consideration by CCEXEC84, taking into consideration the views of Members and Observers, FAO and WHO, Chairpersons of Codex Committees, Regional Coordinators and Host Country Secretariats.
16. CCEXEC83 considered procedural issues related to nature of meetings (hybrid/virtual), development of new work and work of electronic working groups. CCEXEC recognized that virtual and hybrid meetings were essential tools for Codex and that practice in relation to these meeting modalities continued to develop; acknowledged the concerns expressed on the complexity of the process for developing new work; and noted the added value new tools provided to the deliberations of EWG. CCEXEC further agreed on a timeline for the way forward up to the publication of the blueprint by mid-May 2023.
17. CAC45 noted that work to date had focused on preparedness in terms of working modalities and the evolution of working practices within Codex related to meeting formats, meeting schedules, and working groups, and other virtual informal working mechanisms. CAC further noted that the future of Codex was a work in progress and that there would be an opportunity in 2023 for all Members and Observers to engage on this topic; and noted the need, in due course, to review the PM to ensure that its provisions enabled and facilitated continued virtual and hybrid meetings.
18. CAC45 requested the Codex Secretariat to consult with the FAO and WHO Legal Offices on a possible amendment to the rules of procedure allowing the Commission to take place virtually if needed and to prepare a paper on this specific issue for consideration by the 33rd Session of the Codex Committee on General Principles (CCGP33, 2023) which in turn should advise CAC46.

Monitoring the use and impact of Codex Standards¹⁰

19. CCEXEC82 discussed a draft mechanism to monitor the use and impact of Codex texts (Goal 3 “increase impact through the recognition and use of Codex Standards”) and
 - recognized the benefits and challenges in monitoring the use and impact of Codex texts, and the importance of engagement as the process evolved and of periodic review;
 - endorsed the proposed approach for building the Codex Monitoring and Evaluation (M&E) framework, noting that 2022 would be a pilot year for the re-designed survey approach and that the preliminary results would be reported at CCEXEC83 and CAC45;
 - encouraged Members and Observers to identify potential resources to support data gathering for this work, particularly through case studies which should be selected according to a set of pre-defined criteria and be clear in terms of scope and context.
20. CCEXEC83, noting the preliminary results of the 2022 pilot survey on the use and impact of Codex texts, and while requesting the Secretariat to further review and streamline the Codex SP monitoring framework, requested to consider the results of the survey in undertaking the elaboration of the next SP with the membership.

MATTERS ARISING FROM OTHER SUBSIDIARY BODIES**MATTERS FOR ACTION OR INFORMATION****Specific matters****Codex Committee on Fats and Oils (CCFO27, 2021)**Replies to questions raised by CCMAS41¹¹

Methods of analysis of fats and oils in the Recommended methods of analysis and sampling (CXS 234-1999), endorsed by CCMAS, for consideration by CCFO¹²

21. See paragraph 1, fourth bullet.
Trade implications of retyping the methods¹³
22. CCFO27 noted that no trade implications on retyping of methods had been reported by any Codex member

⁹ REP22/EXEC82, paras. 99-100; REP22/EXEC83, paras. 114, 118, 121-122; REP22/CAC45, para. 41

¹⁰ REP22/EXEC82, para. 121; REP22/EXEC83, paras. 17-19 and 165; REP22/CAC45, para. 179

¹¹ REP21/MAS41, para. 47

¹² REP22/FO17, paras. 13-14, 22

¹³ REP22/FO27, paras. 15-17, 22

and agreed with the proposed revisions to the Typing of the methods raised by CCMAS41.

23. CCFO27 also agreed to inform CCMAS that the Crismer value and Halphen test in the *Standard for Named Vegetable Oils* (CXS 210-1999) were still in use and request CCMAS to retain these methods.

*Methods of analysis of arsenic in edible oils and fish oils*¹⁴

24. CCFO27 agreed to the use of the performance criteria for inorganic arsenic in fish oils and total arsenic in edible fats and oils respectively, including examples of applicable methods, and to forward the proposed performance criteria for both total arsenic and inorganic arsenic to CCMAS.

Codex Committee on Contaminants in Foods (CCCF15, 2022)

*Methylmercury in fish: Sampling plans*¹⁵

25. CCCF15 agreed to request information on national sampling plans through a circular letter and that the work of CCMAS on the revision of the *General Guidelines on Sampling* (CXG 50-2004) should be considered in the work on sampling plans.
26. Noting that sufficient time should be provided to gather the information on national sampling plans and that CCMAS intended completion of its work on the revision of the *General Guidelines on Sampling* by June 2023, CCCF15 agreed that the recommendations for the sampling plans would be considered at CCCF17 (2024).

*Review of methods of analysis for contaminants*¹⁶

27. CCCF15 agreed to the recommendations as follows:
- i. submit the performance criteria for lead and cadmium to CCMAS for inclusion in the *Recommended Methods of Analysis and Sampling* (CXS 234-1999) (REP22/CF15, Appendix VIII: Part I);
 - ii. request CCMAS to revoke the *General Standard for Methods for Contaminants* (CXS 228-2001), including the methods for copper iron and zinc because analytical methods for these metals in food are already listed in CXS 234; and
 - iii. request CCMAS to:
 - a. remove analytical methods listed in REP22/CF15, Appendix VIII, Part II from CXS 234;
 - b. transfer these methods to the column of “example of applicable methods that meet the criteria” in REP22/CF15, Appendix VIII: Part I if they meet the performance criteria established;
 - c. identify for which commodities the methods AOAC 2015.01 (heavy metals in food by ICPMS) and EN 15763 are applicable considering the performance criteria and include them as examples of methods that meet the performance criteria in REP22/CF15, Appendix VIII, Part I;
 - d. identify and suggest examples of other applicable analytical methods meeting the performance criteria in REP22/CF15, Appendix VIII, Part I; and
 - e. evaluate the appropriateness of replacing the existing performance criteria in CXS 234 for lead and cadmium in natural mineral waters according to REP22/CF15, Appendix VIII, Part I.

Codex Committee on Food Hygiene (CCFH53, 2022)

Review of the methods of analysis for irradiated foods in the General Standard for Methods for the Detection of Irradiated Foods (CXS 231-2001) and their incorporation into the Recommended Methods of Analysis and Sampling (CXS 234-1999)

28. CCFH51 (2019) noted the request from CCMAS40 (2019)¹⁷ to review methods in the *General Methods for the Detection of Irradiated Foods* to determine their fitness for purpose and their possible conversion to performance-based criteria. CCFH51 noted that this request would help make the *Recommended Methods of Analysis and Sampling* a more user-friendly single source of information for all analytical methods in Codex and agreed to transfer the methods in CXS 231 to CXS 234 and to review the methods in CXS 231 to determine their fitness for purpose and their possible conversion to performance-based criteria for consideration by CCFH52 (2022). CCFH51 also noted that this decision would not impact on its terms of

¹⁴ REP22/FO27, paras. 18-19, 22, Appendix II

¹⁵ REP22/CF15, paras. 108-109, 112

¹⁶ REP22/CF15, para. 211, Appendix VIII (Parts I & II)

¹⁷ REP19/MAS40, para. 90

reference with regard to methods of analysis.¹⁸

29. CCFH53 (2022) recalled that, following CCFH51, the methods in the CXS 231 were reviewed to determine their fitness for purpose and their possible conversion to performance-based criteria. After careful review, it was clarified that there was no possibility to convert the methods of analysis in CXS 231 to performance-based criteria for the reasons explained in paragraph 30(i).¹⁹
30. CCFH53 agreed²⁰ to:
- i. inform CCMAS that it was not possible to establish performance criteria for the methods of analysis for irradiated foods contained in the *General Standard for Methods for the Detection of Irradiated Foods* (CXS 231-2001) as they were detection methods recommended solely for the purposes of food labelling and the necessary parameters (e.g., accuracy; applicability; limit of detection; limit of quantification; precision) and the that enable establishment of performance criteria were not available and that the maximum or minimum levels, which were needed to establish performance-based criteria, were not specified in the Codex Standards for the provisions analysed by the methods of analysis in CXS 231;
 - ii. recommend to CCMAS that the methods of analysis for irradiated foods listed in CXS 231 were still fit-for-purpose. CCMAS should consider whether EN 13751 should be specified as a screening method; and the applicability of EN 13783 to raw minced meat since no information was found on validation for this commodity; and that 2-alkylcyclobutanone was also present in some non-irradiated foods and hence EN 1785 may need further consideration as a method for detection of irradiated foods;
 - iii. recommend that the methods in CXS 231 should be included in the *Recommended Methods of Analysis and Sampling* (CXS 234-1999) with the changes as proposed in REP23/FH53, Appendix II, Table 1, subject to confirmation of the assigned method type by CCMAS and resolution of the issues identified in point ii; and
 - iv. recommend that CAC revoke CXS 231 following the inclusion of the methods of analysis for irradiated foods in CXS 234.

Codex Committee on Food Additives (CCFA53, 2023)

Testing methods related to nitrates and nitrites

31. CCFA51 (2019) agreed to take a risk management approach that would establish both ingoing and residue levels for nitrates and nitrites in the *General Standard for Food Additives* (GSFA) (CXS 192-1995).²¹
32. CCFA52 (2021) requested CCMAS to (i) establish criteria for the detection of nitrate and nitrite ions in a variety of food matrices, specifically dairy (cheese), meat, and seafood and (ii) provide information on available methods for detection that met the established criteria, and in addition whether the method can detect both ions and if so whether the method detects each ion separately or only in combination. To support CCMAS's analysis, CCFA52 agreed to forward the following relevant documentation to CCMAS.²²
- CX/FA 21/52/7²³, Appendix 5, paragraphs 9-10 to assist in explaining CCFA's request
 - CX/FA 21/52/7, Appendix 5, Annex 1 to provide information on test method and the background discussion;
 - CX/FA 20/52/7, Appendix 5, Annex 2 to provide information on the lowest proposed residual levels for representative provisions in dairy (cheese), meat, and seafood.
 - GSFA²⁴ (CXS 192-1995) to provide information on the maximum use level in adopted provision for

¹⁸ REP20/FH51, paras. 8-9

¹⁹ REP23/FH53, paras. 10-13

²⁰ REP23/FH53, para. 14, Appendix II

²¹ REP19/FA51, paras. 100-108.

²² REP21/FA52, paras. 174-181, 140-141

²³ <https://www.fao.org/fao-who-codexalimentarius/meetings/detail/en/?meeting=CCFA&session=52>
https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-711-52%252F2021SepWD%252Ffa52_07e.pdf

²⁴ <https://www.fao.org/fao-who-codexalimentarius/committees/committee/related-standards/en/?committee=CCFA>
https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B192-1995%252FCXS_192e.pdf

nitrites in food category FC 01.6.2 "Ripened cheese" and adopted provisions for nitrites in food categories FCs 08.2.2 "Heat treated processed meat, poultry, and game products in whole pieces of cuts", and 08.3 "Processed comminuted meat, poultry, and game products";

33. CCFA53 (2022) agreed to discontinue its efforts on data collection related to nitrates and nitrites and noted that the provisions would be considered when a response to the request to CCMAS on methodology issues had been received.²⁵

RECOMMENDATIONS FOR ENDORSEMENT BY CCMAS

34. CCMAS is invited to:
- i. note the matters for information referred by CAC and CCEXEC;
 - ii. encourage Members and Observers, on the occasion of the 60th anniversary of Codex, to plan and implement activities to build awareness of Codex and to engage high level political support for Codex work and to consider the implementation of a regional event to mark the 60th anniversary;
 - iii. encourage Members and Observers to actively engage in opportunities to contribute to the discussions in CCEXEC and CAC (i.e., the operationalization of the SoP; the future of Codex; new food sources and production systems, and monitoring the use of Codex standards) by providing replies to relevant CLs;
 - iv. note that matters for action arising from CCFA, CCFO and CCFH would be considered under Agenda Item 3 (Endorsement of methods of analysis and sampling); and
 - v. take note of the ongoing work on sampling plans for methylmercury in fish in CCCF.

²⁵ REP23/FA52, paras. 109-113

ANNEX

PART I: CODEX COMMITTEE ON FATS AND OILS

Performance criteria for total arsenic in fats and oil(s) and inorganic arsenic in fish oil

Table 1: Method performance criteria for arsenic

| Commodity: Edible fats and oils | | | | | | |
|--|--------------------|--------------------|---------------------------------------|---------------------|--|---|
| Provision: Arsenic | | | | | | |
| ML (mg/kg): 0.1 mg/kg | | | | | | |
| Min. Appl. Range (mg/kg) | LOD (mg/kg) | LOQ (mg/kg) | Precision (%) No more than | Recovery (%) | Examples of applicable* methods | Principle |
| 0.032–0.17 | 0.01 | 0.02 | 44 | 80-110 | AOAC 963.21 and AOAC 942.17 | Kjeldahl flask digestion and Colorimetry (molybdenum blue) |
| | | | | | AOAC 963.21 and AOAC 952.13 | Kjeldahl flask digestion and Colorimetry (diethyldithiocarbamate) |
| | | | | | AOAC 986.15 | Atomic absorption spectrophotometry |
| | | | | | NMKL 186 / AOAC 2013.06 / EN 15763 | ICP-MS |

* The applicability of the methods has to be verified by the standard developing organisations

Table 2: Method performance criteria for inorganic arsenic

| Commodity: Fish oil | | | | | | |
|-------------------------------------|--------------------|--------------------|---------------------------------------|---------------------|--|---|
| Provision: Inorganic arsenic | | | | | | |
| ML (mg/kg): 0.1 mg/kg | | | | | | |
| Min. Appl. Range (mg/kg) | LOD (mg/kg) | LOQ (mg/kg) | Precision (%) No more than | Recovery (%) | Examples of applicable methods* | Principle |
| 0.032–0.17 | 0.01 | 0.02 | 44 | 80-110 | EN 15517 | Hydride generation atomic absorption spectrometry (HGAAS) after acid extraction |
| | | | | | EN 16802 | Anion-exchange HPLC-ICP-MS |

* The applicability of the methods has to be verified by the standard developing organisations

PART II: CODEX COMMITTEE ON CONTAMINANTS IN FOODS**PART II-A: Numeric performance criteria for lead and cadmium for endorsement and inclusion in the *Recommended Methods of Analysis and Sampling* (CXS 234-1999)**

Numeric performance criteria for lead and cadmium in foods

| Commodity | Provision | ML (mg/kg) | Method performance criteria | | | | | | |
|--|-----------|------------|----------------------------------|----------------------------------|---------------------------------------|--|--------------|--|-----------|
| | | | Minimum applicable range (mg/kg) | Limit of Detection (LOD) (mg/kg) | Limit of Quantification (LOQ) (mg/kg) | Precision (RSD _R) (%) No more than | Recovery (%) | Example of applicable methods that meet the criteria | Principle |
| Berries and other small fruits, except cranberry, currant, and elderberry | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Cranberry | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Currants | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Elderberry | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Fruits, except cranberry, currants, and elderberry | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Brassica vegetables, except kale and leafy Brassica vegetables | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Bulb vegetables | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Fruiting vegetables, except fungi and mushrooms | lead | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Leafy vegetables, except spinach | lead | 0.3 | 0.127 <u>to</u> 0.473 | 0.03 | 0.06 | 38 | 80-110% | | |
| Legume vegetables | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Fresh farmed mushrooms (common mushrooms (<i>Agaricus bisporous</i>), shiitake mushrooms (<i>Lentinula edodes</i>), and oyster mushrooms (<i>Pleurotus ostreatus</i>)) | lead | 0.3 | 0.127 <u>to</u> 0.473 | 0.03 | 0.06 | 38 | 80-110% | | |
| Pulses | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Root and tuber vegetables | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |

| Commodity | Provision | ML (mg/kg) | Method performance criteria | | | | | | |
|---|-----------|------------|----------------------------------|----------------------------------|---------------------------------------|--|--------------|--|-----------|
| | | | Minimum applicable range (mg/kg) | Limit of Detection (LOD) (mg/kg) | Limit of Quantification (LOQ) (mg/kg) | Precision (RSD _R) (%) No more than | Recovery (%) | Example of applicable methods that meet the criteria | Principle |
| Canned fruits | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Jams, jellies, and marmalades | lead | 0.4 | 0.180 <u>to</u> 0.620 | 0.04 | 0.08 | 37 | 80-110% | | |
| Mango chutney | lead | 0.4 | 0.180 <u>to</u> 0.620 | 0.04 | 0.08 | 37 | 80-110% | | |
| Canned vegetables | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Preserved tomatoes | lead | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Table olives | lead | 0.4 | 0.180 <u>to</u> 0.620 | 0.04 | 0.08 | 37 | 80-110% | | |
| Pickled cucumbers (cucumber pickles) | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Canned chestnuts and canned chestnuts puree | lead | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Fruit juices, except juices exclusively from berries and other small fruits | lead | 0.03 | 0.017 <u>to</u> 0.043 | 0.006 | 0.012 | 44 | 60-115% | | |
| Fruit juices obtained exclusively from berries and other small fruits, except grape juice | lead | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Grape juice | lead | 0.04 | 0.022 <u>to</u> 0.058 | 0.008 | 0.016 | 44 | 60-115% | | |
| Cereal grains, except buckwheat, cañihua and quinoa | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Infant formula, formula for special medical purposes intended for infants and follow-up formula | lead | 0.01 | 0.006 <u>to</u> 0.014 | 0.002 | 0.004 | 44 | 60-115% | | |
| Fish | lead | 0.3 | 0.127 <u>to</u> 0.473 | 0.03 | 0.06 | 38 | 80-110% | | |
| Meat of cattle, pigs and sheep | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Meat and fat of poultry | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Cattle, edible offal of | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Pig, edible offal of | lead | 0.15 | 0.054 <u>to</u> 0.246 | 0.015 | 0.03 | 43 | 80-110% | | |

| Commodity | Provision | ML (mg/kg) | Method performance criteria | | | | | | |
|--|-----------|------------|----------------------------------|----------------------------------|---------------------------------------|--|--------------|--|-----------|
| | | | Minimum applicable range (mg/kg) | Limit of Detection (LOD) (mg/kg) | Limit of Quantification (LOQ) (mg/kg) | Precision (RSD _R) (%) No more than | Recovery (%) | Example of applicable methods that meet the criteria | Principle |
| Poultry, edible offal of | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Edible fats and oils | lead | 0.08 | 0.045 <u>to</u> 0.115 | 0.016 | 0.032 | 44 | 60-115% | | |
| Fat spreads and blended spreads | lead | 0.04 | 0.022 <u>to</u> 0.058 | 0.008 | 0.016 | 44 | 60-115% | | |
| Milk | lead | 0.02 | 0.011 <u>to</u> 0.029 | 0.004 | 0.008 | 44 | 60-115% | | |
| Secondary milk products ¹ | lead | 0.02 | 0.011 <u>to</u> 0.029 | 0.004 | 0.008 | 44 | 60-115% | | |
| Natural mineral waters | lead | 0.01 | 0.006 <u>to</u> 0.014 | 0.002 | 0.004 | 44 | 60-115% | | |
| Salt, food grade | lead | 1 | 0.52 <u>to</u> 1.48 | 0.1 | 0.2 | 32 | 80-110% | | |
| Wine (wine and fortified / liqueur wine) made from grapes harvested before July 2019 | lead | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.0400 | 41 | 80-110% | | |
| Wine from grapes harvested after July 2019 | lead | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Fortified / Liqueur wine from grapes harvested after 2019 | lead | 0.15 | 0.054 <u>to</u> 0.246 | 0.015 | 0.03 | 43 | 80-110% | | |
| Brassica vegetables, except Brassica leafy vegetables | cadmium | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Bulb vegetables | cadmium | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Fruiting vegetables, except tomatoes and edible fungi | cadmium | 0.05 | 0.028 <u>to</u> 0.072 | 0.01 | 0.02 | 44 | 60-115% | | |
| Leafy vegetables | cadmium | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Legume vegetables | cadmium | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Pulses, except soya bean (dry) | cadmium | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Root and tuber vegetables, except celeriac | cadmium | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |

¹ Note that CXS 234 has been updated following CAC44 (2021) and contains numeric performance criteria for lead in butter, edible casein products and whey powders. This proposal will allow these numeric performance criteria to apply to methods for determining lead in all secondary milk products (including butter, edible casein products and whey powders)

| Commodity | Provision | ML (mg/kg) | Method performance criteria | | | | | | |
|--|-----------|------------|----------------------------------|----------------------------------|---------------------------------------|--|--------------|--|-----------|
| | | | Minimum applicable range (mg/kg) | Limit of Detection (LOD) (mg/kg) | Limit of Quantification (LOQ) (mg/kg) | Precision (RSD _R) (%) No more than | Recovery (%) | Example of applicable methods that meet the criteria | Principle |
| Stalk and stem vegetables | cadmium | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Cereal grains, except buckwheat, cañihua, quinoa, wheat and rice | cadmium | 0.1 | 0.032 <u>to</u> 0.168 | 0.01 | 0.02 | 44 | 80-110% | | |
| Rice, polished | cadmium | 0.4 | 0.180 <u>to</u> 0.620 | 0.04 | 0.08 | 37 | 80-110% | | |
| Wheat (common wheat, durum wheat, spelt and emmer) | cadmium | 0.2 | 0.078 <u>to</u> 0.322 | 0.02 | 0.04 | 41 | 80-110% | | |
| Marine bivalve mollusks (clams, cockles and mussels), except oysters and scallops | cadmium | 2 | 1.135 <u>to</u> 2,865 | 0.2 | 0.4 | 29 | 80-110% | | |
| Cephalopods | cadmium | 2 | 1.135 <u>to</u> 2,865 | 0.2 | 0.4 | 29 | 80-110% | | |
| Natural mineral waters | cadmium | 0.003 | 0.002 <u>to</u> 0.004 | 0.0006 | 0.0012 | 44 | 40-120% | | |
| Salt, food grade | cadmium | 0.5 | 0.234 <u>to</u> 0.766 | 0.05 | 0.1 | 36 | 80-110% | | |
| Chocolate containing or declaring ≥ 50% to < 70% total cocoa solids on a dry matter basis, including sweet chocolate, Gianduja chocolate, semi – bitter table chocolate, Vermicelli chocolate / chocolate flakes, and bitter table chocolate | cadmium | 0.8 | 0.403 <u>to</u> 1.197 | 0.08 | 0.16 | 33 | 80-110% | | |
| Chocolate containing or declaring ≥ 70% total cocoa solids on a dry matter basis, including sweet chocolate, Gianduja chocolate, semi – bitter table chocolate, Vermicelli chocolate / chocolate flakes, and bitter table | cadmium | 0.9 | 0.461 <u>to</u> 1.339 | 0.09 | 0.18 | 33 | 80-110% | | |
| Chocolate containing or declaring < 30% total cocoa solids on a dry matter basis | cadmium | 0.3 | 0.127 <u>to</u> 0.473 | 0.03 | 0.06 | 38 | 80-110% | | |

| Commodity | Provision | ML (mg/kg) | Method performance criteria | | | | | | |
|---|-----------|---------------|----------------------------------|----------------------------------|---------------------------------------|--|--------------|--|-----------|
| | | | Minimum applicable range (mg/kg) | Limit of Detection (LOD) (mg/kg) | Limit of Quantification (LOQ) (mg/kg) | Precision (RSD _R) (%) No more than | Recovery (%) | Example of applicable methods that meet the criteria | Principle |
| Chocolate containing or declaring $\geq 30\%$ to $<50\%$ total cocoa solids on a dry matter basis | cadmium | 0.7 | 0.346 <u>to</u> 1.054 | 0.07 | 0.14 | 34 | 80-110% | | |

PART II-B: Removal of analytical methods for lead from CXS 234 and transfer to the column of “example of applicable methods that meet the criteria”, if they meet the performance criteria

| <i>Commodity</i> | <i>Provision</i> | <i>Method</i> | <i>Principle</i> | <i>Type</i> |
|---|------------------|--|---|-------------|
| Fats and Oils and Related Products | | | | |
| Fats and Oils (all) | Lead | AOAC 994.02 / ISO 12193 / AOCS Ca 18c-91 | Atomic absorption spectrophotometry (direct graphite furnace) | II |
| Named Vegetable Oils | Lead | AOAC 994.02 / ISO 12193 / AOCS Ca 18c-91 | Atomic absorption spectrophotometry (direct graphite furnace) | II |
| Olive Oils and Olive Pomace Oils | Lead | AOAC 994.02 or ISO 12193 or AOCS Ca 18c-91 | AAS | II |
| Butter | Lead | AOAC 972.25 (Codex general method) | Atomic absorption spectrophotometry | IV |
| Edible casein products | Lead | NMKL 139 (Codex general method) AOAC 999.11 | Atomic absorption spectrophotometry | IV |
| Edible casein products | Lead | NMKL 161 / AOAC 999.10 | Atomic absorption spectrophotometry | IV |
| Edible casein products | Lead | ISO/TS 6733 IDF/RM 133 | Spectrophotometry (1,5-diphenylthiocarbazone) | IV |
| Processed Fruits and Vegetables | | | | |
| Table olives | Lead | AOAC 999.11 NMKL 139 (Codex general method) | AAS (Flame absorption) | II |
| Miscellaneous Products | | | | |
| Food grade salt | Lead | EuSalt/AS 015 | ICP-OES | III |
| Food grade salt | Lead | EuSalt/AS 013 | Atomic absorption spectrophotometry | IV |

PART III: CODEX COMMITTEE ON FOOD HYGIENE

General methods for the detection of irradiated foods

(For recommendation to CCMAS to transfer the methods of analysis to the *Recommended Methods of Analysis and Sampling* (CXS 234-1999))

New texts added are shown in **bold/underlined** font. Texts proposed for deletion are shown in ~~strike through~~.

| Commodity | Provision | Method | Principle | Type |
|---|---|---|--|----------|
| Food containing fat (<u>e.g., raw meat and chicken, cheese, fruits</u>) | Detection of irradiated food - <u>Detection of radiation-induced hydrocarbons</u> | EN 1784 : 1996 | Gas chromatographic analysis of hydrocarbons | Type II |
| Food containing fat (<u>e.g., raw meat and chicken, liquid whole egg</u>) | Detection of irradiated food - <u>Detection of radiation-induced 2-alkylcyclobutanones</u> | EN 1785 ¹ : 1996 | Gas chromatographic/mass spectrometric analysis of 2-alkylcyclobutanones | Type III |
| Food containing bone | Detection of irradiated food - <u>Radiation induced Electron Spin Resonance (ESR) signal attributed to hydroxyapatite (principal component of bones)</u> | EN 1786: 1996 | ESR spectroscopy | Type II |
| Food containing cellulose (<u>e.g., nuts and spices</u>) | Detection of irradiated food - <u>Radiation induced Electron Spin Resonance (ESR) signal attributed to crystalline cellulose</u> | EN 1787: 2000 | ESR spectroscopy | Type II |
| Food containing silicate minerals (<u>e.g., herbs, spices, their mixtures and shrimps</u>) | Detection of irradiated food - <u>Thermoluminescence glow ratio used to indicate the irradiation treatment of the food</u> | EN 1788: 2004 | Thermoluminescence | Type II |
| Food containing silicate minerals (<u>e.g., shellfish, herbs, spices, seasonings</u>) | Detection of irradiated food - <u>Measurement of photostimulated luminescence intensity</u> | EN 13751 ² : 2002 | Photostimulated luminescence | Type III |
| Food containing crystalline sugar (<u>e.g., dried fruits and raisins</u>) | Detection of irradiated food - <u>Radiation induced Electron Spin Resonance (ESR) signal attributed to crystalline sugar</u> | EN 13708: 2004 | ESR spectroscopy | Type II |

| Commodity | Provision | Method | Principle | Type |
|--|--|----------------------------------|---|----------|
| Herbs <u>and</u> spices and raw minced meat. ³ | Detection of irradiated food - <u>Difference between total microorganism count and viable microorganism count</u> | EN 13783:2004 NMKL 231 (2002) | Direct Epifluorescent Filter Technique/Aerobic Plate Count (DEFT/APC) (screening method) | Type III |
| Food containing DNA (e.g., food products, both of animal and plant origin such as various meats, seeds, dried fruits and spices) | Detection of irradiated food - <u>Detection of DNA fragmentation presumptive to irradiation treatment.</u> | EN 13784:2004 | DNA comet assay (screening method) | Type III |

Notes

¹ One Member noted that 2-alkylcyclobutanone was also present in some non-irradiated foods and hence EN1785 may need further consideration as a method for detection of irradiated foods.

² Consideration should be given to whether EN13751 should be specified as a screening method.

³ No information was found on validation of the method for this commodity.