

CODEX ALIMENTARIUS COMMISSION

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Food and Agriculture
Organization of the
United Nations



World Health
Organization

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REP26/MAS

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION

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Geneva, Switzerland
6 - 10 July 2026

REPORT OF THE 45th SESSION OF THE CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING

Budapest, Hungary
9 – 13 March 2026

TABLE OF CONTENTS

Summary and Status of Work.....	page iii
List of Abbreviations	page vi
List of CRDs.....	page viii
Report of the 45th Session of CCMAS	page 1
Paragraphs	
Introduction	1
Opening of the Session	2- 4
Adoption of the agenda (Agenda item 1).....	5
Matters referred to the Committee by the Codex Alimentarius Commission and other subsidiary bodies (Agenda item 2)	6 - 10
Endorsement of methods of analysis provisions and sampling plans in Codex standards (Agenda item 3)	11 - 47
Codex Committee on Contaminants in Foods (CCCF)	12 – 22
FAO/WHO Coordinating Committee for Asisa (CCASIA).....	23 – 34
FAO/WHO Coordinating Committee for the Near East (CCNE).....	35 – 36
Codex Committee on Spices and Culinary Herbs (CCSCH)	37 – 42
Codex Committee on Fats and Oils (CCFO)	43 – 44
Other matters	45 – 46
General Conclusion	47
Matters pending from CCMAS44 (Agenda item 4)	48 - 59
Review of methods of analysis in commodity standards (fish and fishery products, fats and oils, cereals, pulses and legumes and derived products (Agenda item 4.1).....	48 -55
Other matters (Olive oils and pomace olive oils – peroxide value).....	56 - 58
Retyping of ISO 19871 for determining protein in quinoa (Agenda item 4.2)	60 - 65
Review of methods of analysis in CXS 234 (Agenda item 5)	66 - 104
Fruit juices workable package (Agenda item 5.1).....	67 - 71
Cocoa products and chocolate workable package (Agenda item 5.2).....	72 - 74
Sugars and honey workable package (Agenda item 5.3).....	75 - 102
Other matters	103 - 104
Methods of analysis for precautionary allergen labelling (Agenda item 6)	105 - 117
Sampling plans: discussion papers (Agenda item 7).....	118 - 149
Review of sampling plans in CXS 234 (Agenda item 7.1)	118 - 136
Sampling plans for bulk materials / heterogeneous lots including mycotoxins (Agenda item 7.2)	137 - 149
Harmonization of names and format for principles identified in CXS 234 (Agenda item 8).....	150 - 169
Report of an inter-agency meeting on methods of analysis (Agenda item 9).....	170 - 173
Other business and future work (Agenda item 10).....	174 - 183
Activities of the Joint FAO/IAEA Centre relevant to the work of CCMAS	174 - 176
Microplastics in food grade salt	177 - 183
Date and place of next session (Agenda item 11)	184

Appendices**Pages**

Appendix I – List of Participants	22
Appendix II – Methods of analysis / sampling plans (endorsed and recommended for adoption / revocation / editorial amendments).....	34
Appendix III – Methods of analysis for information for CCFO and future adoption and inclusion in CXS 234-1999 upon finalisation of the standard for microbial omega-3 oils by CCFO	64
Appendix IV – Methods of analysis for further consideration (for referral)	65
Appendix V – Response from CCMAS to the request from CCFL47	85
Appendix VI – Information document on the harmonization of names and format for principles in CXS 234-1999	96

SUMMARY AND STATUS OF WORK

Responsible Party	Purpose	Text/Topic	Code/Reference	Para(s)
CCEXEC90 CAC49 Relevant committees	Adoption / Revocation / Amendments / Information	Methods of analysis / performance criteria / sampling plans for provisions in Codex standards	CXS 234- 1999 / pertinent standards	47(i); 58(i); 65(ii)(a); 71(i);101 (i)
CCCF	Information	Endorsed NPC for individual aflatoxins in certain spices and certain food matrices	CXS 234- 1999	21
		Endorsed NPC for OTA in certain spices		
		Included example methods for the NPC		
	Request	Amendment of the Information document on criteria approaches for methods that use the sum of components	-	22(i)
		<u>Discussion on the development of methods of analysis for microplastics in food-grade salt</u>	-	183
CCASIA	Information	Endorsed the sampling plans	Relevant CCASIA regional standards	34(i)
		Note comments and concerns in relation to sampling plans in CCASIA regional standards		34(ii)
	Request	Review sampling plans in light of guidance provided in CXG 50- 2004		34(iii)
CCNE	Information	Endorsed methods of analysis	Regional standard for maamoul	36
		Retyping of method of ISO 1871 as Type IV for protein in teheana	CXS 234- 1999	65(ii)
		Endorsed methods of analysis for provisions in selected spices and culinary herb standards	CXS 234- 1999	40 and 42(i)
		Provision names		42(ii)

Responsible Party	Purpose	Text/Topic	Code/Reference	Para(s)
	Request	Clarification whether methods were fit-for-purpose	CXS 234-1999	42(iii)
CCFO	Information	Endorsed methods of analysis	CXS 234-1999	44(i – ii); 58(ii)
	Consideration	Options to determine moisture and volatile matter in omega-3 oils	-	44(iii)
		Methods for moisture in microbial omega-3 oils measure water and not moisture	-	44(iv)
CCFFP	Information	Endorsed methods of analysis / NPC	CXS 234-1999	46 and 58(ii)
CCCPL	Information	Endorsed methods of analysis	CXS 234-1999	58(ii)
	Request	Consider whether the provision “insect bored kernels” should be renamed to “grains attacked by pest” and whether the limits in CXS 199-1995 would still be applicable	CXS 199-1995	58(iii)
CCFL	Reply	Methods of analysis for precautionary allergen labelling	CXS 1-1985	117
PWG on endorsement (USA, Japan and Hungary) CCMAS46	Consideration	Endorsement of methods of analysis and sampling	CXS 234-1999	47(iii)
EWG (Germany) PWG on endorsement CCMAS46	Review / Update	Fruit juices workable package	CXS 234-1999 CXS 247-2005	71(ii)
EWG (USA, Serbia) PWG on endorsement CCMAS46	Review / Update	Cocoa products and chocolate workable package	CXS 234-1999	74(i)
EWG (Uruguay, Brazil and China) PWG on endorsement CCMAS46	Review / Update	Sugars and honey workable package	CXS 234-1999	101(ii)
EWG (USA) PWG on endorsement	Review / Update	Natural mineral waters workable package	CXS 234-1999	103

Responsible Party	Purpose	Text/Topic	Code/Reference	Para(s)
CCMAS46				
EWG (New Zealand, Germany) CCMAS46	Discussion paper	Review of sampling plans in CXS 234	CXS 234-1999	136(i-ii)
Relevant committees	Information	Confirmation that CXS 234-1999 is the single reference for methods of analysis and sampling plans		
EWG (New Zealand, Germany) CCMAS46	Discussion paper	Draft guidance on sampling plans for bulk materials / heterogeneous lots including practical examples applicable to mycotoxins	-	149(i)
CCCF	Information / reply			149(ii)
EWG (Chile, Brazil) CCMAS46	Review / Update	Harmonisation of provision names	CXS 234-1999	169
Codex Secretariat	Action	Issue CL on recommendations in cocoa products and chocolate workable package (Appendix IV, Part 2)	CXS 234-1999	74(ii)
		Update Information document on criteria approaches for methods that use a "sum of components"	-	19
	Publishing / information	Information document: Harmonization of names and format for principles in CXS 234-1999 Include list of acronyms and abbreviations of principles of methods of analysis and the list of acronyms for standard method references in CXS 234-1999	CXS 234-1999	168(i-iii)
Commodity committees and RCCs	Information	Information document: Harmonization of names and format for principles in CXS 234-1999	-	168(iii)

LIST OF ABBREVIATIONS

AACC	AACC International
AFT	Total aflatoxins
AOAC	AOAC International (formerly known as Association of Official Agricultural Chemists)
AQL	Acceptance quality limit
CCASIA	FAO/WHO Coordinating Committee for Asia
CAC	Codex Alimentarius Commission
CCCF	Codex Committee on Contaminants in Foods
CCCPL	Codex Committee on Cereals, Pulses and Legumes
CCEXEC	Executive Committee of the Codex Alimentarius Commission
CCFFP	Codex Committee on Fish and Fishery Products
CCFL	Codex Committee on Food Labelling
CCFO	Codex Committee on Fats and Oils
CCMAS	Codex Committee on Methods of Analysis and Sampling
CCNE	FAO/WHO Coordinating Committee for the Near East
CCSCH	Codex Committee on Spices and Culinary Herbs
CL(s)	Circular letter(s)
CR	Consumers' risk
CRD	Conference room document
CQL	Critical quality level
CXG	Codex guideline
CXS	Codex standard
ELISA	Enzyme Linked Immunosorbent Assay
EU	European Union
EWG	Electronic working group
FAO	Food and Agriculture Organization of the United Nations
IAM	Inter-Agency Meeting
ICUMSA	International Commission for Uniform Methods of Sugar Analysis
IDF	International Dairy Federation
IFU	International Fruit and Vegetable Juice Association
IOC	International Olive Council
ISO	International Organization for Standardization
LOD	Limit of determination
LOQ	Limit of quantification
ML(s)	Maximum level(s)
NFC SO	National Food Chain Safety Office

NPC	Numeric performance criteria
Nx	Nitrogen to protein conversion factors
OTA	Ochratoxin A
PAL	Precautionary allergen labelling
PR	Producers' risk
PWG	Physical working group
SDO(s)	Standard development organization(s)
USA	United States of America
VWG	Virtual working group

LIST OF CONFERENCE ROOM DOCUMENTS (CRDs)

CRD No.	Agenda Item	Submitted by
1	Division of Competence	European Union
2	3	Report of the virtual working group on endorsement of methods of analysis and sampling plans for provisions in Codex standards
3	3	Report of the physical working group on endorsement of methods of analysis and sampling plans for provisions in Codex standards
4	9	Report of the IAM
5	1, 10	Republic of Korea
6	4.2, 6	European Union
7	4.2, 5.3, 7.2, 8	El Salvador
8	1, 2, 3.1, 4.1, 5.3, 6, 7.1, 7.2, 8, 10	Rwanda
9	3	Norway
10	6	European Federation of Allergy and Airways Diseases Patients' Associations
11	3.1, 4.1, 6, 7.1, 7.2	Thailand
12	1, 2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.3, 6, 7.1, 7.2, 8	Uganda
13	1, 2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.3, 6, 7.1, 7.2, 8	Burundi
14	2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.3, 6, 7.1, 7.2, 8	Kenya
15	3.1, 4.1, 4.2, 5.3, 6, 7.1, 7.2	India
16	3.1, 3.2, 4.1, 4.2, 5.1, 5.2, 6, 8	Australia
17	4.1, 5.3, 6, 7.1, 7.2, 8	Ghana
18	4.1, 6	Cabo Verde
19	4	International Association for Cereal Science and Technology
20	2	Oman and Qatar
21	5.3	New Zealand
22	3.1, 4.1, 5.3, 7.1	Senegal
23	2, 3.1, 4.1, 5.3, 6, 7.1, 7.2	Nigeria
24	1, 2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.3, 6, 7.1, 7.2, 8, 10	United Republic of Tanzania
25	2, 3.1, 4.1, 4.2, 5.1, 5.2, 5.3, 6, 7.1, 7.2, 8	Panama
26	4.1	International Olive Council
27	4.1, 5.2, 5.3, 7.2	Azerbaijan
28	2, 4.1, 6, 7.1	Uruguay
29	3.1, 4.1, 5.1, 5.3, 6, 7.1, 7.2	International Union of Food Science and Technology
30	2, 3.1, 4.1, 5.1, 5.3, 6, 7.1, 7.2, 8	Bahrain, Egypt, Iraq, Libya, Oman, Qatar, Tunisia and Yemen

CRD No.	Agenda Item	Submitted by
31	1, 3.1, 4.1, 5.1, 5.3, 6, 7.1, 7.2, 8	Chile
32	10	United Kingdom
33	3	Japan as FAO/WHO Coordinator for Asia

INTRODUCTION

1. The Codex Committee on Methods of Analysis and Sampling (CCMAS) held its 45th session in Budapest, Hungary, from 9 to 13 March 2026, at the kind invitation of the Government of Hungary. The Session was chaired by Dr Attila Nagy, Director, National Food Chain Safety Office (NFCSO) and Dr Zsuzsa Farkas, Head of Department, Department of Digital Food Science, University of Veterinary Medicine, Budapest acted as the Vice-Chairperson. The Session was attended by 64 Member countries, one Member organization and 20 Observer organizations. The list of participants is contained in Appendix I.

OPENING OF THE SESSION

2. Dr Imre Nemes, President, NFCSO, opened the session and extended his warmest welcome to all participants. Dr Nemes highlighted the importance of ensuring scientific soundness, transparency and international cooperation in Codex, noting that Codex standards were critical for global trade, helped to promote consumer confidence in food safety and quality and served as the basis for legislation on food safety and quality in many countries. Dr Nemes also noted that the interest among Members in CCMAS's work remained strong and that CCMAS' work was instrumental for the modernisation of food safety and laboratory systems.
3. Ms Mary Kenny, Food Safety and Consumer Protection Officer, the Food and Agriculture Organization of the United Nations (FAO) Regional Office for Europe and Central Asia, and Dr Jing Tian, Vice-Chairperson of the Codex Alimentarius Commission (CAC), also addressed the Committee.

Division of Competence

4. CCMAS45 noted the division of competence between the European Union and its Member States, according to paragraph 5, Rule II of the Procedure of the CAC.

ADOPTION OF THE AGENDA (Agenda item 1)¹

5. CCMAS45 adopted the provisional agenda as the agenda for the session and agreed to consider the following items under Agenda Item 10 (Other Business and Future Work), subject to the availability of time:
 - Work of the Joint FAO/IAEA Centre; and
 - Discussion paper on the development of methods of analysis for microplastics in food-grade salt (CRD05).

MATTERS REFERRED TO THE COMMITTEE BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER SUBSIDIARY BODIES (Agenda item 2)²

6. The Codex Secretariat introduced the item and recalled that some matters from CAC48, the 88th and 89th Sessions of the Executive Committee of the Codex Alimentarius Commission (CCEXEC88 and CCEXEC89), the 18th Session of the Codex Committee on Contaminants in Food (CCCF18), the 23rd Session of the FAO/WHO Coordinating Committee for Asia (CCASIA23), the 12th Session of the FAO/WHO Coordinating Committee for Near East (CCNE12) and 8th Session of the Codex Committee on Spices and Culinary Herbs (CCSCH8) were for information purposes; and the following matters for action were considered by the virtual working group (VWG) meeting that met on 2 March 2026 and the physical working group (PWG) that met on 8-9 March 2026:
 - Reconsideration of the recommendation to revoke the method for salt saturation in salted fish and dried salted fish of the Gadidae family of fishes together with Appendix VIII (Part 1) of the *Recommended methods of analysis and sampling* (CXS 234-1999).
 - Review of example methods in certain numeric performance criteria (NPC) for salt and chloride.
 - Replies from CCSCH8 to questions from CCMAS43; and
 - Endorsement of methods of analysis for provisions in spices and culinary herbs standards.
7. CCMAS45 noted that CCEXEC89 had recommended that any additional resources be used for the development and update of all databases, including that for methods of analysis and sampling. The Codex Secretariat clarified that development and update of all databases were a priority for the Secretariat and that further technical information would be provided during a side event organised on the margins of this session with respect to the development of the database for methods of analysis.
8. Noting that CAC had acknowledged inconsistencies in nitrogen to protein conversion factors (Nx) that existed for soy products and that this could be addressed in the future, a Member sought clarification on how this could

¹ CX/MAS 26/45/1

² CX/MAS 26/45/2

be addressed as it had implications on consumer perceptions of food safety and quality. The Codex Secretariat recalled that the review of Nx values was the responsibility of commodity committees, but in cases where committees were adjourned *sine die*, a mechanism was still being developed to progress this work.

9. CCMAS45 noted that the Codex Committee on Milk and Milk Products (CCMMP) might consult with CCMAS in its process of elaborating a commodity standard for pasteurised liquid camel milk, to ensure that the methods submitted for CCMAS' endorsement were validated.

Conclusion

10. CCMAS45:
 - i. noted the matters for information referred by CAC, CCEXEC and other subsidiary bodies; and
 - ii. noted that matters for action arising from CAC and other subsidiary bodies would be considered under Agenda Item 3 (Endorsement of methods of analysis and sampling).

ENDORSEMENT OF METHODS OF ANALYSIS, NUMERIC PERFORMANCE CRITERIA, SAMPLING PLANS, AND OTHER RELATED MATTERS IN CODEX STANDARDS (Agenda item 3)³

11. CCMAS45 considered the recommendations on methods of analysis, numeric performance criteria (NPC), and sampling plans proposed for endorsement by Codex subsidiary bodies, as well as related matters arising from CAC, as presented in CRD02 and CRD03.

Codex Committee on Contaminants in Foods (CCCF)

Sampling plans for total aflatoxins and ochratoxin A in certain spices

12. CCMAS45 endorsed the sampling plans for total aflatoxins (AFT) and ochratoxin A (OTA) in certain spices (i.e. nutmeg, dried chili, and paprika) proposed by CCCF18 (2025) (Appendix II, Part 3.1).
13. CCMAS45 also considered the decision criteria for lots of large size (Table 1) and, in cases where a lot was subdivided into sublots, whether a test result from an analytical sample of a subplot exceeding the Codex maximum limit (ML) would result in the rejection of the entire lot or only the subplot.
14. CCMAS45 agreed to ask CCCF to clarify, for lots ≥ 25 tons (tables 1, 3, and 5), whether a test result exceeding the ML in any subplot should result in the rejection of the entire lot or only the affected subplot. The clarification should include a clear decision tree or decision point, such as a footnote to these tables, similar to the footnotes in tables 2, 4, and 6, which states that if the test result exceeds the ML, the lot should be rejected.

Numeric performance criteria for total aflatoxins and ochratoxin A in certain spices and in certain food matrices

15. CCMAS45 was informed that the VWG reviewed the NPC and recommended example methods that could meet them.
16. The PWG further discussed challenges in interpreting and applying the NPC tables when a ML was established as a "sum of components," such as for AFT. PWG proposed to revise the relevant section of the *Information document on criteria approaches for methods that use a "sum of components"* to ensure consistency between paragraph 13 and the data and calculations presented in the NPC tables.
17. The PWG also discussed whether to retain the NPC for AFT or present it only for each individual component, since the methods measured the individual components separately and were then summed to determine whether AFT exceeded or fell below the ML. To ensure that the minimum applicable range continued to cover the ML for each component, the upper limit was adjusted to correspond to the sum of the components (i.e. AFT).
18. CCMAS45 reviewed the recommendations of the VWG and PWG, noted comments from members, and made the following decisions:

Revision to the Information document on criteria approaches for methods that use a "sum of components"

19. CCMAS45 agreed to amend paragraph 13 of the information document to read:

"If the components included in the ML definition are not present in constant ratios and where the inclusion of weighting factors of the individual components results in LOD/LOQ values or minimum applicable range that cannot be validated, ML/n should be used to determine the criterion for LOD (e.g. $1/5 \cdot ML/n$) and for LOQ (e.g. $2/5 \cdot ML/n$) or for the minimum applicable range (e.g. $ML/n \pm 2S_R$) (e.g. $[ML/n - 2S_R, ML + 2S_R]$ for $ML < 0.1 \text{ mg/kg}$, and $[ML/n - 3S_R, ML + 3S_R]$ for $ML \geq 0.1 \text{ mg/kg}$), with n being the number of components included in the ML definition."

³ CX/MAS 26/45/3; CX/MAS 26/45/3-Add.1

Numeric performance criteria for total aflatoxins in certain spices and certain food matrices

20. CCMAS45 noted divergent comments in favour of or against retaining the NPC for AFT as follows:
- The NPC for AFT was similar to other procedures, where a calculation followed the analysis, with AFT being the sum of the individual components. The principle was comparable to an analytical method followed by calculation, since the reported value was the total of the components, not the results of the individual measurements.
 - The recovery range for AFT for certain spices, which was not directly measured, was listed as 60-115%, whereas the range for individual aflatoxins is 40-120%. Since the methods measured individual aflatoxins and the total was calculated from those values, this might support the removal of the NPC for AFT. However, the ML should be retained, while the remaining criteria could be omitted.
 - The NPC for AFT only applied to methods that directly measured AFT. Since all current methods measured each aflatoxin separately, this information did not apply to such methods and might even create confusion about which criteria a method must meet. Therefore, either the NPC for AFT, excluding the ML, should be removed, or a clear statement should be provided indicating that compliance must be based on the sum of individually measured aflatoxins.

Conclusion

21. CCMAS45 agreed to:
- i. remove the NPC for AFT, but keep the ML;
 - ii. endorse the revised NPC for the individual aflatoxins in certain spices (chili pepper, nutmeg) and certain food matrices (peanuts intended for further processing; tree nuts destined for further processing (almonds, hazelnuts, pistachios, and shelled Brazil nuts); ready-to-eat tree nuts (almonds, hazelnuts, pistachios, and shelled Brazil nuts); and dried figs);
 - iii. endorse the NPC for ochratoxin A in certain spices (chili pepper, paprika, nutmeg); and
 - iv. include examples of methods for the NPC for individual aflatoxins for certain spices and certain food matrices, and for OTA in certain spices (Appendix II, Part 1.2).
22. CCMAS45 also agreed to:
- i. inform CCCF about the amendment to the *Information document on criteria approaches for methods that use a "sum of components"*;
 - ii. recommend that CCCF review the NPC for "sum of components" in remaining sampling plans contained in the *General standard for contaminants and toxins in food and feed* (CXS 193-1995) to ensure consistency; and
 - iii. request CCCF to clarify for lots in excess of 25 tonnes, whether the test results exceeding the ML in any subplot should result in the rejection of the entire lot or only the affected subplot.

FAO/WHO Coordinating Committee for Asia (CCASIA)

Sampling plans for regional standards

23. CCMAS45 was informed that the VWG reviewed the sampling plans for inspection by attributes (Table 2) and inspection by variables (Table 3) in CX/MAS 26/45/3 Appendix III. However, the VWG could not reach a consensus on whether to endorse them. It was noted that the sampling plans were designed around producers' risk (PR) rather than consumers' risk (CR), making them potentially unsuitable for their intended purpose. It was also highlighted that the sampling plans were based on ISO 2859-1, even though a revised version of the sampling plans were now available. Given these concerns, the VWG did not make a recommendation on endorsing the sampling plans and requested CCMAS to consider the sampling plans further.
24. Japan, speaking as the FAO/WHO Coordinator for Asia, emphasized that the commodities in question were specific to Asia and were well-understood by experts in the region. The Member noted that the sampling plans focused solely on quality and did not address consumer health; therefore, CCASIA23 agreed that an AQL of 6.5% was appropriate. While developing the sampling plans, CCASIA23 considered the statistical principles outlined in the *General guidelines on sampling* (CXG 50-2004) as well as the commodities' characteristics, including their prices and production volumes. Although larger sample sizes would improve statistical reliability, they would also significantly increase testing costs relative to the products' value, potentially raising prices for consumers and hindering fair trade. To avoid unnecessarily large sample sizes and ensure consistency with international standards, CCASIA23 supported a practical balance between statistical rigour and economic feasibility. Based on this, CCASIA23 agreed to adopt the sampling plans outlined in ISO 2859-1 and ISO 3951-

- 1, both referenced in CXG 50-2004. These plans offered a high probability of accepting satisfactory-quality lots while effectively rejecting inferior ones, and CCASIA23 found them suitable for the commodities involved. In addition, the Member noted that the tables had been further reviewed, and no inconsistencies were found with CXG 50-2004.
25. New Zealand expressed concerns that the proposed sampling plans, based on ISO 2859-1, were primarily designed to protect producers from rejecting good-quality products and therefore did not adequately address CR. The Member questioned why testing would be required if product quality were not a concern. The Member also noted that Appendix 2 of CXG 50-2004 clearly outlined the limitations of ISO 2859-1 for use in Codex, including its limited control of CR, its inability to account for measurement uncertainty, and the shortcomings of ISO 2859-1 AQL 6.5% plans, particularly when applied to small sample sizes, which might lead to unfair practices in trade.
26. New Zealand highlighted that CXG 50-2004 provided guidance on developing sampling plans that appropriately balanced PR and CR, which the current proposal from CCASIA23 did not achieve. To address these issues, the Member proposed establishing an EWG with experts from CCMAS and CCASIA to refine the plans, using CXG 50-2004 as the basis for determining suitable risk levels, and to consider additional issues raised by Japan, such as potential testing requirements.
27. CCMAS45 noted the importance of identifying which Codex committee was responsible for accepting PR and CR. While statistical components were significant, they were only one aspect of the decision-making process and Codex committees were responsible for assessing the risks and determining acceptable levels within a given sampling plan, e.g. CCCF evaluates CR and adjusts the stringency of the sampling plan based on the level of risk posed by the contaminant.
28. Based on the discussion above, Japan submitted CRD33, which contained a rationale for the development of the sampling plans, including relevant data and information, to support their endorsement. Japan further confirmed that the figures in the sampling plan tables were consistent with the guidance provided in CXG 50-2004.
29. While several delegations expressed support for CRD33 and the endorsement of the sampling plans, New Zealand reiterated its concerns about the validity of the proposed sampling plans, which, in their view, remained unresolved and therefore could not support their endorsement. The Member further emphasized that, although CR had been calculated, there was no indication that the acceptability of those risk levels had been evaluated, which was an essential element to ensure consumers receive products of acceptable quality. The Member also recalled the absence of justification for excluding measurement uncertainty or for deeming the switching rules inherent to ISO 2859-1 AQL 6.5% plans impractical for international trade.
30. The Member therefore indicated that if the sampling plans were to be endorsed, a conditional mechanism should apply, otherwise it might set a precedent for similarly unsuitable sampling plans to be submitted in the future. This would jeopardize CCMAS' efforts in revising CXG 50-2004, undermine scientific integrity, and potentially damage the credibility of CCMAS in endorsing sampling plans under the guidance of CXG 50-2004.
31. The Chairperson noted that decisions on PR and CR were made by the relevant Codex committee, while CCMAS was responsible for verifying the accuracy of sampling plans and ensuring their alignment with guidance documents such as CXG 50-2004. The Chairperson further noted that Japan had reviewed the sampling plan tables and confirmed their consistency with CXG 50-2004, and that no additional comments had been received on this matter. The information contained in CRD33 was also deemed sufficient to allow CCMAS45 to make an informed, risk-based decision that reflected the shared responsibility between CCMAS and other Codex committees in developing and endorsing sampling plans that appropriately considered both PR and CR and ensured compliance with Codex standards.
32. Given these points and the unanimous support expressed by CCASIA Members present at the session, the Chairperson observed that returning the sampling plans to CCASIA was unlikely to produce a different response or outcome. While also acknowledging the concerns raised, the Chairperson advised that CCMAS could proceed with endorsing the sampling plans proposed by CCASIA23 and at the same time forward the concerns expressed at CCMAS45 to CCASIA.
33. The Chairperson further recalled the decision of CCMAS42 (2023), which requested Codex committees to review their sampling plans in light of the revised CXG 50-2004, and noted that related issues could be taken up on a broader level under Agenda item 7.1.

Conclusion

34. CCMAS45:
- i. endorsed the sampling plans proposed by CCASIA (Appendix II, Part 3.2);

- ii. noted the comments and concerns raised during the consideration of the sampling plans (paragraphs 26, 29 and 30) and agreed to inform CCASIA of these comments and concerns; and
- iii. advised CCASIA to consider reviewing its sampling plans in light of the guidance provided in the revised CXG 50-2004, in accordance with the recommendation of CCMAS42⁴.

FAO/WHO Coordinating Committee for the Near East (CCNE)

Methods of analysis for the Regional standard for maamoul (Near East)

35. CCMAS45 was informed that the VWG reviewed the analytical methods proposed by CCNE12 in the Regional standard for maamoul (Near East) and made revisions as explained in CRD02. Further to these revisions, CCMAS45 agreed on the following clarifications and adjustments to CRD02 Appendix II:
- AOAC 972.32 has been validated for only flour, whereas AOAC 970.70 was validated for baked foods.
 - For extraneous matter, the principle was amended to refer to “microscopy” for better accuracy.
 - For pH determination, AOAC 981.12 was replaced by AACC 02-52.01, which was identical to AOAC 943.02. Since validation data supported their use for flours, bread, cookies, and crackers, these methods were reclassified as Type II. Additionally, NMKL 179, proposed as an additional method by the VWG, was removed because there was no validation data supporting its use for baked foods, and to prevent listing multiple methods as Type IV, since ISO 1842, originally proposed by CCNE12, was already available as a Type IV method.
 - For moisture determination, the principle was amended to specify the drying temperature range.

Conclusion

36. CCMAS45 endorsed the methods of analysis in the Regional standard for maamoul (Near East) (Appendix II, Part 1.5).

Codex Committee on Spices and Culinary Herbs (CCSCH)

Methods of analysis for spices and culinary herbs based on replies from CCSCH8:

Small cardamom (*Standard for spices derived from dried or dehydrated fruits and berries* (CXS 357-2024)); turmeric (*Standard for dried and dehydrated roots, rhizomes, and bulbs* (CXS 359-2024)); dried or dehydrated chili pepper and paprika (*Standard for dried or dehydrated chili pepper and paprika* (CXS 353-2022)); and cloves (*Standard for dried floral parts* (CXS 344-2021))

37. CCMAS45 was informed that the VWG reviewed the analytical methods submitted by CCSCH7 (2024), which were updated based on replies from CCSCH8 (2025), following the questions put forward by CCMAS43 (2024)⁵, as explained in CRD02.
38. Further to these revisions, CCMAS45 agreed that for cloves, the qualifier “whole” applies to the commodity rather than the provision.
39. CCMAS45 also agreed to retain the note attached to ISO 927 regarding the 100 g test portion, even though it might seem redundant, since ISO 927 did not specify the type of cardamom, whereas the commodity standard already covered this requirement. However, CCSCH had confirmed a minimum test portion of 100 g for light seeds and small cardamom, and the footnote reflected that clarification. It was further noted that CCSCH recommended fixing the test portion for cardamom—whether small or large—at 100 g, in line with ISO 927, and that the terms used in CXS 234-1999 (small cardamom) and ISO 927 (light seeds/cardamom seeds) also appeared to be consistent.

Conclusion

40. CCMAS45 endorsed the methods of analysis for small cardamom (*Standard for spices derived from dried or dehydrated fruits and berries* (CXS 357-2024)); turmeric (*Standard for dried and dehydrated roots, rhizomes, and bulbs* (CXS 359-2024)); dried or dehydrated chili pepper and paprika (*Standard for dried or dehydrated chili pepper and paprika* (CXS 353-2022)); and cloves (*Standard for dried floral parts* (CXS 344-2021)). (Appendix II, Part 1.4).

Methods of analysis for spices and culinary herbs:

Standards for spices in the form of dried fruits and berries, provisions for vanilla; spices in the form of dried fruits and berries, provisions for large cardamom; spices in the form of dried seeds, provisions for dry and/or

⁴ REP23/MAS, para 81 (iii)

⁵ REP24/MAS, para 10 (iii, iv, v)

dehydrated coriander

41. CCMAS45 was informed that the PWG had reviewed the analytical methods submitted by CCSCH8. The PWG made revisions as outlined in CRD03 and identified provisions requiring clarification by CCSCH. Following these revisions, CCMAS45 further agreed that ISO 939 and ISO 928 should explicitly state that the analytical principles were gravimetry for ash (with incineration at 550°C as part of the procedure) and distillation for moisture. Accordingly, calculations should be based on moisture and ash results, with “incineration at 550°C” indicated in parentheses.

Conclusion

42. CCMAS45 agreed to:
- i. endorse the methods of analysis for vanilla (spices in the form of dried fruits and berries); large cardamom (spices in the form of dried fruits and berries); and dried and/or dehydrated coriander (spices in the form of dried seeds) (Appendix II, Part 1.4);
 - ii. inform CCSCH that qualifiers such as “whole”, “powdered/pieces” were product styles and as such should be attached to the commodity name rather than in the provision; and
 - iii. request CCSCH to clarify whether the following methods were fit-for-purpose:
 - a. AOAC 993.27, as a Type III method, for determining “mammalian and/or other excreta” in large cardamom and in dried dehydrated coriander; and
 - b. ISO 927, , for the determination of “mammalian and/or other excreta” in dried and dehydrated coriander.

Codex Committee on Fats and Oils (CCFO)

43. CCMAS45 was informed that the PWG had reviewed the analytical methods submitted by CCFO29. The PWG made revisions as outlined in CRD03 and identified provisions requiring clarification by CCFO. Following these revisions, CCMAS45 also made additional editorial corrections to improve clarity and accuracy and noted that the standard for microbial omega-3 oils had been submitted to CAC49 for adoption at Step 5 and would be further reviewed by CCFO.

Conclusion

44. CCMAS45 agreed to:
- i. endorse the method of analysis for the determination of gamma oryzanol in crude rice bran oil as Type IV (Appendix II, Part 1.3);
 - ii. endorse the methods of analysis in the draft standard for microbial omega-3 oils (except for moisture and volatile matter), noting the draft standard will be sent for adoption by CAC49 at Step 5 and the methods will not be included in CXS 234-1999 until final adoption of the standard (Appendix III); and
 - iii. return a question to CCFO about their preference for the two options to determine moisture and volatile matter in microbial omega-3 oils, specifically:
 - Option 1: Split the provision in the standard into two separate provisions that include the temperature. In this case, two numeric values in accordance with each method should be elaborated.
 - Moisture and volatile matter at 103°C
 - Moisture and volatile matter at 130°C
 - Option 2: Choose one method for this provision, which CCMAS would then consider for endorsement. Since the commodity is vulnerable to oxidation, the method with lower temperature, ISO 662, would be a more conservative approach.
 - iv. inform CCFO that the methods for moisture in microbial omega-3 oils actually measured water, and whether a provision name of “water” might be more accurate and clearer than the current provision name “moisture”.

Other matters

45. CCMAS45 recalled the issues raised at CAC48 (2025) regarding the revocation of the method for salt saturation in salted and dried salted fish of the *Gadidae* family, as well as the lack of necessary validation data for some example methods provided for certain NPC related to salt and chloride. Taking into account CRD09, the PWG reviewed these matters and summarized its outcomes in CRD03.

Conclusion

46. CCMAS45 agreed to:
- i. endorse the PWG's recommendation to retain the method of analysis and preparation of fish samples for salted fish and dried salted fish of the Gadidae family of fishes in CXS 234-1999 with amendments (Appendix II, Part 1.7); and
 - ii. endorse the revised NPC for salt determined as chloride expressed as sodium chloride (Appendix II, Part 1.7).

General conclusion

47. CCMAS45 agreed to:
- i. forward to CAC49:
 - a. the methods of analysis and numeric performance criteria for adoption and inclusion in CXS 234-1999 and/or revocation from CXS 234-1999 (Appendix II, Part 1);
 - b. the methods of analysis for revocation from the respective commodity standards (Appendix II, Part 2);
 - c. the sampling plans for adoption and inclusion in the relevant standards (Appendix II, Part 3);
 - ii. inform CCSCCH, CCFO, CCCF and CCFFP of the respective decisions (paragraphs 40, 42i, ii, 12, 21, 22i, 44i, ii, 22, 46) and refer relevant requests to CCFO, CCSCCH and CCCF (paragraphs 42iii, 44iii, iv, 14m 22ii, iii,); and
 - iii. re-establish the PWG on endorsement of methods of analysis and sampling, chaired by the United States of America (USA) and co-chaired by Hungary and Japan, working in English, French and Spanish, to meet immediately prior to CCMAS46, to consider:
 - a. all methods of analysis and sampling plans submitted by Codex committees for endorsement;
 - b. the outcomes of the work of the EWGs on the four workable packages: (i) cocoa products and chocolates, (ii) sugars and honey, (iii) fruit juices, and (iv) natural mineral waters (see Agenda item 5); and
 - c. any other matters referred by Codex committees or submitted by Members and Observers.

MATTERS PENDING FROM CCMAS44 (Agenda item 4)

REVIEW OF METHODS OF ANALYSIS IN COMMODITY STANDARDS (FISH AND FISHERY PRODUCTS, FATS AND OILS, CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS) (Agenda item 4.1)⁶

48. Canada, as Chair of the EWG, introduced the item and recalled that the recommendations of the EWG were considered by the PWG on endorsement of methods of analysis and sampling and the outcomes of the PWG were reflected in CRD03.
49. The EWG Chair explained that the summary table contained in CRD03, Appendix VI, Part 1 reflected the PWG recommendations, including endorsement decisions for methods related to provisions in standards for fish and fishery products, fats and oils and cereals, pulses and legumes and derived products, as well as a referral to Codex Committee on Cereals, Pulses and Legumes (CCCPL) on whether the provision "insect bored kernels" should be renamed "grains attacked by pest" in relation to the method for insect bored kernels in wheat and durum wheat and if so, whether the limits in the *Standard for wheat and durum wheat* (CXS 199-1995) would still be applicable.
50. CRD03 Appendix VI, Part 2 reflected the consequential changes required to relevant commodity standards.

Discussion

51. CCMAS45 considered all provisions in CRD03 Appendix VI, aligned methods' principles with decisions taken under agenda item 8, and made the following additional comments and decisions.

Fish and fishery products

⁶ CL 2026/1-MAS; CX/MAS 26/45/4; CX/MAS 26/45/4-Add.1 (Comments of Chile, Egypt, Guatemala, Indonesia, Philippines, Senegal, the United States of America and the International Commission for Uniform Methods of Sugar Analysis (ICUMSA))

Quick frozen fish sticks (fish fingers), fish portions and fish fillets – breaded or in batter

52. CCMAS45 amended the provision to clarify that the determination concerned the percentage (%) fish content and to include a reference to Appendix VI of CXS 234 in the methods column, as a calculation contained in that appendix was required. A consequential correction was made to Appendix VI of CXS 234 (“Other methods”), as Method 2 related to the determination of percentage (%) fish content.

Cereals, pulses, legumes and derived products*Broken kernels – maize (corn)*

53. CCMAS45 agreed to replace ISO 5223 with ISO 19942, noting that ISO 5223 applied only to test sieves and was not appropriate for the specification for broken maize (corn) kernels. ISO 19942 was identified as more appropriate as it focused on the product specification (broken kernels) through visual examination and gravimetry.

Wheat and durum wheat – shrunken and broken kernels

54. CCMAS45 agreed to delete ISO 5223 and to replace it with ISO 7970 for shrunken (shriveled) and broken kernels in wheat and to include a more appropriate method, ISO 11051, for the provision for shrunken (shriveled) and broken kernels in durum wheat.

Provisions for which no methods identified

55. CCMAS45 noted that no methods had been identified for certain provisions for oats and peanuts (CRD03, Appendix III), and that consideration could be given to the identification of these methods in the future. Members and Observers were welcome to submit methods through the CCMAS procedure (Appendix II, Part 5).

Other matters*Olive oils and pomace olive oils – peroxide value*

56. The PWG Chair recalled that the IOC has requested the endorsement of COI/T.20/Doc. No 38 as a Type I method for peroxide value in olive oils and olive pomace oils, which would be published in March 2026. However, questions were raised about whether the method was identical to ISO 3960 / AOCS Cd 8b-90 / NMKL 158 which had already been endorsed as Type I for this provision.
57. CCMAS45 noted that the data provided by IOC in CRD26 Rev.1 were consistent with data from ISO supporting the acceptability of the method as identical to the ISO method. The IOC method was therefore endorsed for the determination of peroxide value in olive oils and olive pomace oils for inclusion in CXS 234-1999.

Conclusion

58. CCMAS45 agreed to:
- i. submit the methods of analysis for adoption / revocation by CAC49 (Appendix II, Parts 1.1, 1.6, 1.7 and 2), with the adopted methods to be incorporated into CXS 234-1999 and amendments to relevant commodity standards;
 - ii. inform CCFFP, CCCPL and CCFO of the respective decisions taken at the session (paragraphs 52, 53-55 and 57); and
 - iii. request CCCPL to consider whether the provision, “insect bored kernels” should be renamed “grains attacked by pest” in relation to the method for insect bored kernels in wheat and durum wheat and whether the limits in the *Standard for wheat and durum wheat* (CXS 199-1995) would still be applicable.
59. CCMAS45 thanked Canada and the members of the EWG for the work done, noting that the EWG had completed its work according to its terms of reference (ToRs).

RETYPING OF ISO 1871 FOR DETERMINING PROTEIN IN QUINOA (Agenda item 4.2)⁷

60. CCMAS45 recalled that CCMAS44 had agreed to retain ISO 1871 for the determination of protein in quinoa in CXS 234-1999 as a Type IV method and had requested the PWG on endorsement to reconsider the typing of the method in light of the information contained in MAS44/CRD19.
61. The PWG considered the information from CRD19 and reproduced in CX/MAS 26/45/5.
62. The USA, as Chair of the PWG, drawing attention to CRD03, reported that divergent views had been expressed

⁷ CX/MAS 26/45/5

within the PWG regarding the retyping of ISO 1871. While some Members supported retyping ISO 1871 as a Type I method based on the data provided, which demonstrated the robustness of the method, others were of the view that ISO 1871 should be retained as a Type IV method, as it is a guideline and did not meet the criteria for a Type I method. It was also noted that ISO had agreed to expand the scope of ISO 20483 for cereals to include quinoa, subject to sponsorship by a member country. Consequently, retyping ISO 1871 as a Type I method could create difficulties in replacing the method once the validation study on ISO 20483 was completed. On this basis, the PWG recommended retaining the current Type IV classification.

63. The PWG Chair informed CCMAS45 that Hungary had offered to organize studies to support the extension of the scope of ISO 20483. The Chairperson confirmed that the validation trials would include quinoa, teheña, buckwheat and possibly other matrices and would be evaluated with the assistance of ISO, AOAC and AACC.
64. In addition, the PWG noted that ISO 1871 had previously been endorsed as a Type I method for protein determination in teheña. In view of the recommendation to retain ISO 1871 as a Type IV method for protein determination in quinoa, the PWG recommended retyping ISO 1871 as a Type IV method for protein determination in teheña.

Conclusion

65. CCMAS45 agreed to:
 - i. retain ISO 1871 as Type IV for protein in quinoa, noting the reservation of Peru to this decision;
 - ii. retype ISO 1871 as Type IV for protein in teheña and to:
 - a. forward this amendment to CAC49 for adoption (Appendix II, Part 1.8); and
 - b. inform CCNE accordingly.

REVIEW OF METHODS OF ANALYSIS IN CXS 234 (Agenda item 5)

66. CCMAS45 recalled that the PWG on endorsement of methods of analysis and sampling plans (hereinafter referred to as PWG) had considered the recommendations from the EWGs on two workable packages: cocoa products and chocolate, and sugars and honey, and from the expert group on the fruit juices workable package. CCMAS45 considered the recommendations presented in CRD03.

FRUIT JUICES WORKABLE PACKAGE (Agenda item 5.1)⁸

67. The United States of America (USA), as Chair of the PWG, speaking also on behalf Hungary and Japan as co-chairs, informed CCMAS45 that the PWG had considered the report and recommendations of the expert group convened by IFU, which proposed a number of changes to methods of analysis and had identified several methods that were no longer supported or validated, and recommended their revocation. These recommendations for revocation were supported by the PWG.
68. The PWG Chair further noted that, given the complexity, scope, and volume of the proposed changes, as well as the fact that the work had been undertaken by a limited group of experts rather than a full EWG, the PWG recommended that the proposed changes undergo further review by an EWG.

Discussion

69. CCMAS45 agreed with the proposed revocation of methods, as recommended, and further agreed that an EWG should continue the review of the recommended changes to methods of analysis proposed by the expert group.
70. CCMAS45 also recalled that several enzymatic and ISO methods had not been reviewed by the IFU expert group and noted IFU's offer to support the EWG by undertaking an initial review of these methods for its consideration.

Conclusion

71. CCMAS45 agreed to:
 - i. forward the methods for revocation to CAC49 (Appendix II, Part 2); and
 - ii. establish an EWG chaired by Germany, working in English to:
 - a. review the methods, recommended by the expert group, as presented in Appendix IV, Part 5;
 - b. review the remaining enzymatic and ISO methods (Appendix IV, Part 5) taking into account the initial review by IFU; and

⁸ CX/MAS 26/45/6

- c. prepare and submit the report of the EWG to the Codex Secretariat at least three months prior to CCMAS46.

COCOA PRODUCTS AND CHOCOLATE WORKABLE PACKAGE (Agenda item 5.2)⁹

- 72. CCMAS45 noted that while the PWG had considered the recommendations of the EWG on the cocoa products and chocolate workable package, concerns were raised regarding the late availability of the EWG report. This limited the opportunity for adequate consultation.
- 73. CCMAS45 therefore agreed that the EWG should be re-established to continue the review of the cocoa products and chocolate workable package and that the recommendations of the PWG as contained in CRD03 could serve as a basis for discussion.

Conclusion

- 74. CCMAS45 agreed to:
 - i. re-establish the EWG on cocoa products and chocolate workable package, chaired by USA and co-chaired by Serbia, working in English to:
 - a. continue with the review of methods in this workable package and to use the recommendations of the PWG (Appendix IV, Part 2) as a basis for discussion;
 - b. use the EWG online platform for discussions and publication of consultation documents; and
 - c. prepare and submit the report of the EWG to the Codex Secretariat at least three months prior to CCMAS46.
 - ii. request the Codex Secretariat to issue a circular letter (CL) requesting comments on the recommendations in Appendix IV Part 2 for consideration by the EWG.

SUGARS AND HONEY WORKABLE PACKAGE (Agenda item 5.3)¹⁰

- 75. The USA, as Chair of the PWG, speaking also on behalf of the co-Chairs Hungary and Japan, reported that the review of the workable package on sugars and honey had been led by Uruguay as Chair of the EWG. The PWG Chair noted that this was a complex workable package, drawing on historical commodity standards that were less clearly defined than those typically considered by CCMAS. Several of the methods addressed issues such as authenticity and food additives, resulting in a diverse range of methods for review and an extensive body of work.
- 76. The PWG Chair explained that the summary table contained in CRD03, Appendix V, reflected the recommendations of the PWG, including endorsement decisions, the proposed conversion of certain methods (e.g. the testing methods for sulfites in sugars and hydroxymethylfurfural content in honey) to numeric performance criteria (marked as “NPC-EWG”), or methods identified for further consideration by the EWG.
- 77. The PWG Chair further noted that, based on an intervention, AOAC 998.12, a method for the detection of added sugars from corn and cane sugar products, could pose a risk of false positive results for Mānuka honey, a regional product. In order to include this method in CXS 234-1999 while avoiding unintended impacts on products outside its scope, a footnote was proposed by the PWG to clarify its application.

Discussion

- 78. CCMAS45 considered all methods in CRD03 Appendix V and made the following additional comments and decisions.

Honey: Diastase activity

- 79. A Member noted that the methods AOAC 958.09 and IHC 6.1 for the determination of diastase activity in honey were not identical and therefore might not be appropriately considered together as a single Type I method.
- 80. CCMAS45 agreed to refer this method to the re-established EWG (hereinafter referred to as EWG) for further consideration.
- 81. Consequently, to avoid the absence of an endorsed method, CCMAS45 agreed to retain the current testing method (IHC method for the determination of diastase activity using Phadebas, 2009, with the exception that the incubation time should be increased from 15 to 30 minutes) in CXS 234-1999.

⁹ CX/MAS 26/45/7

¹⁰ CL 2026/4-MAS; CX/MAS 26/45/8; CX/MAS 26/45/8-Add.1 (Comments of Australia, Canada, Chile, Colombia, Ecuador, Egypt, European Union, Indonesia, Iraq, Peru, Philippines, Rwanda, the United States of America (USA), and the International Commission for Uniform Methods of Sugar Analysis (ICUMSA))

Honey: Sugars added (authenticity)

82. A Member expressed the view that the authenticity method (i.e. EN 17958), accompanied by a footnote, had not been endorsed, noting that the range used to assess authenticity was problematic and that reference was being made to values for which there was insufficient clarity or expertise. It was further noted that additional discussion would be required on this matter, and concern was expressed regarding the inclusion of such a footnote in the document.
83. The PWG Chair supported this view and proposed that the method be referred to the EWG for further consideration. It was noted that authenticity methods might require a level of specialized expertise beyond that generally available within CCMAS, and that additional expert input would therefore be beneficial. It was further noted that, during the EWG discussions, a suggestion had been made to involve experts from Members with specific experience in authenticity methods to assist the EWG in addressing issues related to method typing and applicability.
84. CCMAS45 agreed to the proposal of the PWG Chair to refer this method to the EWG for further consideration.

Honey: Sugars profile (glucose, fructose, sucrose)

85. In order to evaluate the validation of the testing method for this provision (i.e. AOAC 977.20), CCMAS45 agreed to refer this method to the EWG for further consideration.

Honey: Sugars added: detection of C4 sugar

86. CCMAS45 discussed whether to address the applicability of AOAC 998.12 to Mānuka honey through the immediate inclusion of a footnote in CXS 234-1999 or to defer this matter pending further review. Members expressed support for the inclusion of a footnote to clarify the applicability of the method to Mānuka honey, noting that published scientific evidence was available and that such clarification would help avoid unintended impacts on trade.
87. Taking into account the views expressed above, as well as concerns regarding the validation data and the need for further review of AOAC 998.12, CCMAS45 agreed to:
- insert a footnote excluding Mānukahoney; and
 - refer this method to the EWG for further consideration.

Sugars (dextrose anhydrous and dextrose monohydrate): D-Glucose

88. Noting that the method for this provision (ISO 5377) was a Type I method and therefore could not be converted to numeric performance criteria (NPC), CCMAS45 agreed to refer this method to the EWG for further consideration.

Sugars (fructose, lactose): pH

89. CCMAS45 agreed to revise the typing of the testing method for this provision (ICUMSA GS 1-23) from Type I to Type II, to ensure consistency with other methods.

Sugars (fructose, powdered sugar, white sugar, plantation or mill white sugar): Conductivity ash; Sugars (plantation or mill white sugar, soft white sugar and soft brown sugar): Conductivity ash

90. A Member drew attention to the methods for conductivity ash, noting that the title for Method ICUMSA GS 2-17 was "The Determination of Conductivity Ash in Refined Sugar Products and in Plantation White Sugar" and the title for ICUMSA GS 1-13 was "The Determination of Conductivity Ash in Raw Sugar, Brown Sugar, Juice, Syrup and Molasses".
91. Another Member further noted a potential inconsistency in the table for plantation and mill white sugar, where two different method types appeared to be indicated for the same provision.
92. CCMAS45 agreed to refer the ICUMSA GS 2-17 and ICUMSA GS 1-13 methods to the EWG for further consideration (Appendix IV, Part 6).

Sugars (soft white sugar and soft brown sugar): Invert sugar (as reducing sugars): ICUMSA GS 4-3 (applicable at levels >10% m/m); Sugars (soft white sugar and soft brown sugar): Invert sugar (as reducing sugars): ICUMSA GS 1-3 (applicable at levels <10% m/m)

93. CCMAS45 agreed to refer the ICUMSA GS 4-3 and ICUMSA GS 1-3 methods to the EWG for further consideration (Appendix IV, Part 6).

Sugars (plantation and mill white sugar, soft white sugar, powdered sugar): Colour (ICUMSA Unit)

94. CCMAS45 agreed to correct the principle for the testing method ICUMSA GS 9-8 to visible spectrophotometry.

Sugars (powdered sugar): Colour

95. CCMAS45 agreed to revoke ICUMSA GS 2-9, as another Type I method already existed for this provision.

Sugars (plantation or mill white sugar): Polarization

96. CCMAS45 agreed to revoke the ICUMSA GS 1-1, as it was already covered by another method.

Pending issues identified by the EWG Chair

97. Uruguay, speaking as the EWG Chair, indicated that several pending issues had not been addressed by the EWG. It was noted that testing methods for certain provisions in the *Standard for honey* (CXS 12-1981) (e.g. determination of sugars content and determination of electrical conductivity) had not been developed and that the standard did not include parameters for authenticity. It was further noted that some methods contained in the *Standard for sugars* (CXS 212-1999) were not covered by CXS 234-1999 and therefore lacked corresponding analytical methods (i.e. starch content), and that methods would need to be identified for these provisions. In addition, it was noted that a number of food additives, other than sulfites, were allowed for use in products conforming to CXS 212-1999 but were not listed in CXS 234-1999, and that consideration would be needed as to whether analytical methods should be identified for these additives.
98. The EWG Chair indicated that these issues represented a summary of matters that would need to be addressed by the EWG in its future work.

Other matters

99. A Member reiterated an intervention made in the PWG concerning raw sugar that, while a definition for raw sugar existed in CXS 212-1999, no quality factors had been established for this product, despite the significant level of international trade in raw sugar. Concern was expressed that, in the absence of established quality factors, the continued inclusion of raw sugar might not be appropriate, and it was suggested that it be deleted. It was further noted that care should be taken to clearly distinguish raw sugar from refined (white) sugar, which was already covered by quality factors. In addition, it was noted that the provision on invert sugar might also require revision.
100. In response, the Codex Secretariat clarified that any revision of a commodity standard under a Codex committee that was adjourned *sine die* would require a formal proposal from a Member and a request to CAC, which would decide when and how to undertake the work. It was noted that, at this stage, CCMAS could only record that a potential gap had been identified and that a future revision of the standard might be necessary, without prejudice to any Member submitting a proposal through the Codex Secretariat.

Conclusion

101. CCMAS45 agreed to:
- i. submit the methods for adoption / revocation by CAC49 (Appendix II, Part 1.9);
 - ii. re-establish the EWG chaired by Uruguay and co-chaired by Brazil and China, working in English and Spanish, to:
 - a. continue reviewing the relevant methods in the sugars and honey workable package (Appendix IV, Part 6), including the establishment of NPCs for some provisions;
 - b. consider, as appropriate, other issues identified by the EWG Chair (see paragraph 97); and
 - c. prepare and submit the report of the EWG to the Codex Secretariat at least three months prior to CCMAS46.
102. CCMAS45 encouraged the active participation of Codex Members and Observers in the EWG discussions, as well as the involvement of relevant experts to assist the EWG in its discussions and decision-making.

Other matters

103. CCMAS45 considered review of additional workable packages and agreed to establish an EWG chaired by the USA, working in English, to:
- i. review the natural mineral waters workable package; and
 - ii. prepare and submit the report of the EWG to the Codex Secretariat at least three months prior to CCMAS46.
104. An Observer informed the committee that they were willing to support the review of the methods of analysis in the foods for special dietary uses (FSDU) workable package whenever the committee decided to initiate such work in the future

METHODS OF ANALYSIS FOR PRECAUTIONARY ALLERGEN LABELLING (Agenda item 6)¹¹

105. The USA, as Chair of the EWG, speaking also on behalf of the co-chair, the United Kingdom (UK), introduced the item. The EWG Chair recalled that, in response to CCFL's request for advice on the availability of suitable analytical methods for determining allergenic protein in food, CCMAS had established, and subsequently re-established, the EWG to evaluate the relevant methods and to compile and format the information submitted by Members into a draft response to CCFL.
106. The draft document for submission to CCFL comprised three parts: (i) a draft response from CCMAS to the request from CCFL47; (ii) Table 1, listing methods of analysis in support of precautionary allergen labelling with published multi-laboratory validation studies or performance-tested methods; and (iii) Table 2, listing methods of analysis currently available in support of precautionary allergen labelling but lacking multi-laboratory validation studies.
107. The EWG Chair informed CCMAS45 that, based on comments received, the draft document had been revised to further emphasize that: (i) the methods listed in Tables 1 and 2 were provided solely to support CCFL's deliberations on reference doses and should neither be forwarded to CCMAS for endorsement nor cited in CCFL texts; (ii) analytical methods were available to detect and quantify unintended allergen presence resulting from cross-contact, with limits of detection and quantification suitable for determining whether such presence exceeded or fell below the action levels established by the FAO/WHO Expert Consultation for priority allergens; and (iii) some corrections had been made to Tables 1 and 2.

Discussion

108. CCMAS45 considered the revised document.
109. The FAO representative recalled that, during the joint FAO/WHO Expert Consultation on Food Allergens, experts had reached consensus that the reference doses recommended by FAO/WHO and currently under discussion by CCFL could be implemented and monitored using existing analytical capabilities. It was further noted that the current recommendations of the EWG were inclusive and aligned with the conclusions of the Expert Consultation, which confirmed that analytical methods were available to detect and quantify unintended allergen presence (UAP) in foods.
110. An Observer noted that, although the development of Codex method performance criteria had been considered potentially duplicative in light of existing AOAC and European frameworks, these frameworks were not fully aligned in practice. It was observed that fixed numerical criteria established in certain standards differed structurally from AOAC standard performance requirements, such that compliance with one framework would not necessarily ensure compliance with another. The Observer further noted that numerical performance criteria were generally not applicable to immunoassay- or PCR-based methods and indicated that clarification was needed as to whether harmonized fitness-for-purpose or performance expectations could be described for such methods. It was suggested that describing broader performance expectations, rather than fully harmonizing validation frameworks, could support more consistent fitness-for-purpose assessments and facilitate international trade.
111. In response, the EWG Chair clarified that differences existed between numerical performance guidelines and AOAC standard performance requirements. While it was acknowledged that Codex could potentially develop general performance criteria to address such differences, it was emphasized that this would constitute new work and was outside the scope of the current activity.
112. In response to comments that a gap remained in clearly identifying methods suitable for quantifying UAP across food intakes of 10–1000 g for CCFL use, CCMAS45 noted that existing methods were capable of detecting and quantifying UAP for priority allergens within this intake range and that this was captured in the draft response to CCFL.
113. Noting that no single analytical method performed optimally across all food matrices and processing conditions, and that PCR methods for gluten, while potentially supporting a risk-based approach, were indirect methods, CCMAS45 agreed to remove PCR for gluten from Table 2.
114. With regard to clarification on casein and total milk protein, CCMAS45 noted some ELISA kits report results in units different from those in the [Risk Assessment of Food Allergens Part 2: Review and Establish Threshold Levels in Foods for the Priority Allergens](#), and in these cases a conversion factor is provided by the manufacturer to convert to 'mg total protein from the allergenic food / kg food.' For example, some kits detect both casein and whey proteins and report total milk protein, while others quantify only one protein fraction and the result is then converted to total milk protein. Accordingly, result reporting units in tables 1 and 2 were

¹¹ CX/MAS 26/45/9

corrected where possible.

115. Regarding the three entries for walnut in Table 1, the EWG Chair explained that the methods had been submitted as multi-laboratory validated by a Member; however, no supporting citations had been provided. CCMAS45 agreed to move these three entries from Table 1 to Table 2.
116. CCMAS45 agreed to insert and delete certain entries in Tables 1 and 2 and made corresponding editorial revisions (e.g. corrections of the reporting unit).

Conclusion

117. CCMAS45 agreed to forward the reply together with the two tables, as presented in Appendix V, to CCFL.

SAMPLING PLANS: DISCUSSION PAPERS (Agenda item 7)

REVIEW OF SAMPLING PLANS IN CXS 234-1999 (Agenda item 7.1)¹²

118. New Zealand, as Chair of the EWG, speaking also on behalf of the co-Chair, Germany, introduced the item and explained the background to the work, previous discussions in CCMAS and the EWG, its conclusions and recommendations.
119. The EWG Chair explained that four options were identified for the inclusion of sampling plan information in the Codex system and there was strong support for option 1 (Include information on sampling plans in CXS 234-1999), with sampling plan information maintained alongside methods of analysis in CXS 234-1999, preferably within a database. This was in line with previous decisions of CCMAS36(2015)¹³ and CAC39(2016)¹⁴ for CXS 234-1999 to be a single reference for methods of analysis and sampling.
120. In addition, there was also support for option 4, to have a standard for each commodity group. This was seen as a practical approach to advance sampling plans. Unless there was a specific need for a more stringent plan for a particular application, the same sampling plan could be applied across provisions, taking into account any other relevant considerations.
121. A review of sampling information in Part B of CXS 234-1999 showed that entries largely described physical sampling procedures only, with limited reference to inspection sampling plans. Only the milk and milk products group referred to inspection standards, and none identified specific sampling plans (e.g. Acceptance Quality Limit (AQL), Critical Quality Level (CQL), or Producers' risk (PR)) for individual provisions. Overall, the information in CXS 234-1999 was found to be insufficient to ensure fully harmonized and enforceable standards.
122. A broader review of Codex standards confirmed a general lack of sampling plan information across the Codex system. As a result, Codex standards cannot be considered fully harmonized. While the *Codex Procedural Manual* indicated that CCMAS might have a role in developing sampling plans, concerns were noted regarding the suitability of CCMAS setting plans for diverse commodity groups, particularly given limited product-specific expertise and challenges in engaging committees that had been adjourned *sine die*.
123. The EWG Chair proposed that CCMAS45 consider the recommendations in paragraph 13 of CX/MAS 26/45/10 including the re-establishment of an EWG to further explore the type and format of information in CXS 234-1999 and the features of the database.

Discussion

Inclusion of sampling plans information in CXS 234-1999 / database

124. There was general support for option 1, i.e. to house all sampling plans in CXS 234-1999 and in the form of a searchable database, as this was the most user-friendly approach, which would facilitate the identification of the appropriate combination of sampling and analytical methods required for testing. This approach was in line with the decision of CCMAS36 (2015) and CAC39 (2016) that CXS 234-1999 should serve as the single reference for methods of analysis and sampling.
125. There was also support to avoid duplicating the number of sampling plans to the extent possible by forming commodity groups for certain provisions.
126. CCMAS45 noted that sampling plans should not co-exist in commodity or other relevant standards to avoid any inconsistencies between CXS 234-1999 and the associated Codex standards.

¹² CL 2026/5-MAS; CX/MAS 26/45/10; CX/MAS 26/45/10-Add.1 (Comments of Australia, Brazil, Ecuador, Egypt, European Union, Indonesia, Iraq, Japan, Peru, Rwanda, United States of America (USA) and the International Commission for Uniform Methods of Sugar Analysis (ICUMSA))

¹³ REP15/MAS paragraph 110

¹⁴ REP16/CAC Appendix II

127. With respect to the database, CCMAS45 welcomed the work currently underway by the Codex Secretariat and noted that further discussions through an EWG on the features and design for the database would help to support the ongoing work.
128. While it was noted that the construction of the database was underway, CCMAS noted that a paper version of CXS 234-1999 in its current format was still required and, in this respect, further work was needed on the format and type of information to be integrated into CXS 234-1999.

Review of sampling plans for inclusion in CXS 234-1999

129. CCMAS45 considered questions with regard to the review of the sampling plans for integration into CXS 234-1999 and noted that there were a number of standards that lacked sampling plans. It was also noted that the responsibility was with respective commodity committees or other relevant committees to assess parameters that determined the selection of appropriate sampling plans for a given commodity provision combination.
130. The Codex Secretariat reiterated that the development of sampling plans lay with the respective commodity or other relevant committees and that while CCMAS could assist with advising on and/or the development of sampling plans, the identification of values for provisions such as consumer risk (CR) or producer risk (PR) was with the commodity committee or other relevant committee. The Codex Secretariat further explained that while it was preferable for Codex standards to have sampling plans for completeness, committees were under no obligation to develop such plans. If CCMAS were to consider developing sampling plans, it should consider whether it had sufficient resources to undertake such work.
131. The Codex Secretariat therefore suggested a pragmatic, stepwise approach for integrating sampling plans into CXS 234-1999 and/or the database. The Codex Secretariat recommended that CCMAS focuses on reviewing existing sampling plans rather than developing new ones. The review should primarily target updating existing sampling plans in commodity standards where there is an active committee to facilitate coordination. Meanwhile, the review of sampling plans in commodity standards developed by committees that have been adjourned *sine die* could be addressed in a second phase.
132. This approach received general support as it took into consideration the resources available in both CCMAS and other relevant Codex committees.
133. To a question on whether measurement uncertainty data were considered necessary to support the development and application of sampling plans, the EWG Chair explained that such data were required to determine whether the measurement uncertainty was non-negligible. However, this assessment depended on the relationship between measurement uncertainty and process variability, which could vary by producer, country, or product. As a result, a single, blanket approach might not be appropriate.

Communication with relevant committees

134. CCMAS45 agreed that, at this stage, relevant Codex committees should be informed and encouraged to review their existing sampling plans. Any subsequent requests for support from CCMAS could be considered as they arise.
135. CCMAS45 also agreed that existing sampling plans would be retained in and/or transferred to CXS 234-1999 in their current form. The EWG would review these sampling plans with a view that they could be included in a database in the future. All comments received from relevant Codex committees would be taken into account in future work.

Conclusion

136. CCMAS45 agreed to:
 - i. re-establish the EWG, chaired by New Zealand and co-chaired by Germany, working in English to:
 - a. review sampling plans and sampling procedures in commodity standards and in CXS 234-1999 for alignment with the *General guidelines on sampling* (CXG 50-2004) and against statistical principles in general;
 - b. consider how sampling plans and sampling procedures could be included in CXS 234-1999, noting the current use of CXS 234-1999 in a paper format and future use of CXS 234-1999 in the form of a database; and
 - c. prepare a report for submission to the Codex Secretariat at least three months prior to CCMAS46.
 - ii. inform all relevant Codex committees of the decision that CXS 234-1999 should be the single reference for methods of analysis and sampling plans and of the ongoing CCMAS work in this regard; and

- iii. reiterate its previous recommendation to Codex committees that sampling plans should be developed as necessary, and if a committee considered it appropriate to develop sampling plans, they should do so in compliance with CXG 50-2004 and not by reference to CXG 50-2004.

SAMPLING PLANS FOR BULK MATERIALS / HETEROGENOUS LOTS INCLUDING MYCOTOXINS (Agenda item 7.2)¹⁵

137. Germany, as co-chair of the EWG, speaking also on behalf of the Chair, New Zealand, introduced the item and explained the background to the work, the discussions in the EWG, its conclusions and recommendations. The EWG co-Chair further explained that the discussions of CCMAS44 had been communicated to CCCF in line with the decision of CCMAS that any work on sampling plans for bulk materials / heterogenous lots including mycotoxins should be in consultation with CCCF who had the responsibility to develop sampling plans for relevant provisions for contaminants in foods.
138. The EWG co-Chair explained that the current sampling plans for mycotoxins in bulk commodities in CXS 193-1995 were based on statistical parameters derived from non-randomly selected, contaminated lots. As a result, these parameters might not be appropriate for partially contaminated or inhomogeneous lots, and information on CR and PR were limited. Available tools might underestimate these risks.
139. The EWG co-Chair emphasized that the discussion paper did not challenge the validity of existing sampling plans and did not propose new ones. Instead, it reviewed the theoretical foundations of the current plans, particularly those developed by Whittaker, and examined their relationship to the broader scientific literature, statistical parameters, and the FAO mycotoxins sampling tool. It also outlined possible methods for evaluating existing plans, including utility-based approaches that consider both risks and costs.
140. The EWG had completed its work and developed the discussion paper which concluded that new work was needed to develop guidance, potentially as an annex to CXG 50-2004.
141. CCMAS45 was invited to consider initiating new work to develop general guidance on sampling plans for inhomogeneous bulk materials, with a particular focus on mycotoxins, taking into account the discussion paper.

Discussion

142. CCMAS45 noted that there was general support for the development of general guidance on sampling plans for bulk materials / heterogenous lots, that this guidance might include practical example(s) addressing mycotoxins, and that the guidance might possibly be included as an annex to CXG 50-2004. However, CCMAS45 agreed that it was premature to initiate new work through the formal Codex process at this stage.
143. The Vice-Chairperson explained that it was not necessary to decide whether to initiate new work on the inclusion of the guidance as an annex to CXG 50-2004 at this stage, as this would not delay the continued development of the discussion paper. A decision could be taken at the next session on the new work and placement of the guidance.
144. A Member emphasized that mycotoxins represented a significant food safety concern, particularly for commodities such as maize, peanuts, and sorghum. In this context, clear, practical, and scientifically sound Codex guidance would strengthen national food control systems and facilitate fair trade. Furthermore, noting that current approaches referred to in CXS 193-1995 had limitations in addressing inhomogeneous contamination, The Member expressed its preference that such guidance, if developed, could be included as an annex to CXG 50-2004.
145. CCMAS45 also agreed to continue liaising with CCCF and noted that an option for such communication could be through a side event at CCCF19. It was clarified that the work of CCMAS would remain limited to statistical and theoretical guidance and would not affect the remit of CCCF in developing the actual sampling plans.
146. Members noted that further work was needed to explore the available data in order to better characterize the inhomogeneity of bulk lots, evaluate existing sampling plans in CXS 193-1995 with respect to CR and PR, and identify aspects that might require amendments / revisions to achieve an appropriate balance of these risks. It was noted that the data presented in the discussion paper might not be suitable for this purpose.
147. A Member further indicated that it did not support the use of a utility-based approach for enforcement sampling, as illustrated in the example provided in the discussion paper. Such an approach required prior information on the proportion of contaminated incremental units within a lot and on the variability of aflatoxin concentrations among those units, and this information was typically not available in the context of regulatory enforcement actions.

¹⁵ CL 2026/6-MAS; CX/MAS 26/45/11; CX/MAS 26/45/11-Add.1 (Comments of Australia, Brazil, Chile, Ecuador, Egypt, European Union, Indonesia, Iraq, Japan, Peru, Türkiye, United Arab Emirates and the International Commission for Uniform Methods of Sugar Analysis (ICUMSA))

148. CCMAS45 noted that the EWG would work on gathering more data to inform the further development of the model.

Conclusion

149. CCMAS45 agreed to:
- i. re-establish the EWG, chaired by New Zealand and co-chaired by Germany, working in English to:
 - a. continue work on a draft guidance on sampling plans for bulk materials / heterogeneous lots including practical examples applicable to mycotoxins, taking into account the discussions in CCMAS45 and any feedback from CCCF; and
 - b. prepare a discussion paper, and if appropriate a project document, for submission to the Codex Secretariat at least three months prior to CCMAS46.
 - ii. inform CCCF of the ongoing discussions in CCMAS and to request feedback on the need for such guidance and the scope of the work.

HARMONIZATION OF NAMES AND FORMAT FOR PRINCIPLES IDENTIFIED IN CXS 234 (Agenda item 8)¹⁶

150. Brazil, as Chair of the EWG, and speaking also on behalf of the co-Chair, Chile, introduced the item. The EWG Chair recalled that CCMAS44 had considered a discussion paper on the harmonization of names and formats for principles and provisions in CXS 234-1999 and had agreed to re-establish an EWG to continue the work. Given the complexity of the subject, CCMAS44 also agreed to address the harmonization of provisions separately.
151. The EWG reviewed and proposed revisions to the harmonization of names for principles of methods of analysis in CXS 234-1999, focusing on clarifying definitions, aligning terminology with internationally recognized references, and improving the consistency and clarity of analytical principles, acronyms and standard method references. In addition, the EWG examined possible approaches for the harmonization of provisions and identified discrepancies between CXS 234-1999 and relevant commodity standards.
152. The EWG Chair proposed that CCMAS45 review the proposed consolidated structure and text contained in Appendix I and Annexes A, B and C of CX/MAS 26/45/12, with particular attention to the proposed wording and definitions, and consider the retention, inclusion or removal of method principles not currently reflected in CXS 234-1999. The EWG Chair further proposed that Appendix I and its Annexes (Annexes A, B and C) be published as an information document to support the work of CCMAS and other Codex committees submitting methods of analysis, noting that the information document would be a living document subject to update as needed.
153. With respect to the harmonization of provisions, the EWG Chair proposed to consider the approach set out in Annex D of Appendix I as a basis for guiding the continuation of the work.

Discussion

154. Members expressed appreciation for the work undertaken by the EWG. CCMAS45 made the following comments and decisions.

Appendix I: Discussion paper on harmonization of names and format for principles in CXS 234-1999

Section 2 Definitions

155. In response to a question regarding the origin of the definitions included in the document, the EWG Chair explained that definitions accompanied by references had been derived from existing literature or standards, while other definitions had been developed by the EWG where no suitable references could be identified.
156. Noting the existence of a publicly available ISO database containing definitions of analytical terms which were identified in section 2 definitions, CCMAS45 agreed to make a general reference to the relevant ISO definitions by including a link to the ISO Online Browsing Platform (OBP) (<https://www.iso.org/obp/ui/en/>) and in addition, agreed to retain definitions that were not included in the OBP and had been developed by other standards-setting organizations or by the EWG, as follows:
- Biological assay and titrimetry;
 - Chromatography: the definition quoted from IUPAC;
 - Volumetry: the newly proposed definition, "A technique that determines the volume that a testitem

¹⁶ CX/MAS 26/45/12

occupies”.

Section 3.1. Assays whose results are method dependent: bullet point A

157. CCMAS45 agreed with the proposed new text, as follows:

Description in the principle of the predominant method parameters (but not all the method parameters) that makes the result(s) method dependent, if necessary, for example: temperature, conversion factor.

Annex A: Principles of methods of analysis

158. CCMAS45 discussed whether the list of method principles should be limited to those currently included in CXS 234-1999 or expanded to cover a broader range of analytical techniques that could be relevant in the future. Some Members expressed the view that the list should be limited to principles already included in CXS 234-1999, with additions introduced only when new principles were proposed for endorsement, in order to maintain a concise and manageable scope. Other Members considered that a broader list could facilitate harmonization by providing guidance to commodity committees when proposing new methods. CCMAS45 noted that methods already included in CXS 234-1999 should be prioritized and agreed to discuss the principles line by line.
159. CCMAS45 made editorial corrections and amendments aimed at ensuring accuracy, including the inclusion of relevant principles following the term “Detector” and the separation of “Flotation” as an individual principle. CCMAS45 also considered the insertion or deletion of certain principles based on those currently included in CXS 234-1999 and their applicability at the laboratory level, including the insertion of Cavity Ring-Down Spectroscopy (CRDS) under Spectroscopy, the deletion of Colorimetry, and the insertion of Argentometry and Alkalimetry under Titrimetry.
160. With regard to the terminology used for thermal decomposition procedures, CCMAS45 noted differing views on the use of the terms “ashing,” “incineration,” and “mineralization,” as well as the temperature ranges associated with these procedures. It was observed that analytical methods specify particular temperatures, which may vary and partially overlap, and that higher temperatures were often referred to as incineration, while lower temperatures were commonly associated with ashing. Members questioned the need to distinguish between multiple terms or to create separate lists, noting that the end-product of these procedures was generally ash and that the processes were conceptually similar. It was further noted that, while terms such as “mineralization” could be broader in scope, the need for clarity, simplicity, and consistency in terminology was emphasized, taking into account established usage by international bodies and the practical application of methods. CCMAS45 therefore agreed to use the terminology “incineration” instead of “ashing” or “mineralization”.
161. Regarding whether centrifugation should be considered a method principle or a sample preparation technique, CCMAS45 noted that, while centrifugation had been included in CXS 234-1999, it was primarily used for sample preparation or separation and did not in itself constitute a determination technique for quantifying a component. It was further noted that, although some techniques classified as principles may involve elements of sample preparation, centrifugation was generally applied in combination with other analytical techniques. CCMAS45 agreed that centrifugation should be deleted from the document and that the matter should be further reviewed, with a view to making corresponding corrections to CXS 234-1999.

Annex B: acronyms and abbreviations of principles of methods of analysis

162. CCMAS45 agreed to make corresponding revisions in light of the outcomes of Annex A.

Annex D: Proposed approach for harmonizing provisions in CXS 234-1999

163. Members discussed the harmonization of provisions in the context of the development of a database. It was noted that the existing provisions had been developed by subject matter experts in the committees for valid technical reasons, and that renaming or revising provisions could constitute a CCMAS overreach and create implementation difficulties.
164. Members expressed support for the establishment of a database and noted that it would be necessary to facilitate the identification and management of similar or related provisions. It was further noted that the development of such a database could be complex, given the large number of existing and new provisions, including provisions expressed using different terminology.
165. The Chairperson noted that the draft text prepared by the EWG addressed the harmonization of pH-related provisions, and that related provisions were considered to refer to the same analytical concept, unless expert advice indicated otherwise. It was further noted that, given the large number of provisions in CXS 234-1999, additional harmonization work would be required, supported by illustrative examples.
166. The Codex Secretariat clarified that issues related to consistency and harmonization of provisions could be addressed at different levels, noting that some matters were of a straightforward editorial nature and could be addressed without amending commodity standards, while other issues would require consultation and, where

appropriate, amendments to relevant texts.

167. CCMAS45 noted that the work should continue through an EWG, under clear terms of reference.

Conclusion

168. CCMAS45 agreed to:

- i. publish, as an information document, the document entitled *Harmonization of names and format for principles in CXS 234-1999, with Principles of methods of analysis, Acronyms and abbreviations of principles of methods of analysis*, and *List of acronyms for standard method references* included as three appendices to the information document (Appendix VI);
- ii. include the documents *Acronyms and abbreviations of principles of methods of analysis* and *List of acronyms for standard method references* in CXS 234-1999; and
- iii. inform the commodity committees and the Regional Coordinating Committees (RCCs) of the availability of the information document and to request that it be used when submitting methods for endorsement.

169. CCMAS45 further agreed to establish an EWG chaired by Chile, co-chaired by Brazil, working in English, to:

- i. propose a harmonization of the provisions along CXS 234-1999 following the steps:
 - a. identify the provisions where amendments are not necessary or just require editorial modification.
 - b. identify information that is placed in the name of the provision but is not necessary or is related with the name of the commodity or additional information related to the method, and suggest where to place the information, if it is necessary.
 - c. compare the names of the provisions in CXS 234-1999 with the names in the commodities standards and in case of inconsistency, suggest how to address it, considering if it is an active or an inactive committee.
 - d. group the provisions according to their characteristics and assess if it is possible harmonize them; and
 - e. identify the Committees that should be consulted and inform them of the inconsistency and request for their opinions, if necessary.
- ii. revise CXS 234-1999 using the harmonised names and formats of the principles and present a revised version to CCMAS46 for consideration; and
- iii. to submit its report to the Codex Secretariat at least three months prior to CCMAS46.

REPORT OF AN INTER-AGENCY MEETING ON METHODS OF ANALYSIS (Agenda item 9)

170. The Observer from the MoniQA Association (MoniQA), speaking as Chair of the inter-agency meeting (IAM), introduced the report of IAM-36 described in CRD04. The Observer highlighted several topics from CRD04 of relevance to the work of CCMAS that were discussed in the IAM:

- Review of methods submitted by CCSCH and CCFO;
- Retyping of the ISO 1871 method for protein determination in quinoa;
- Methods of analysis for precautionary allergen labelling; and
- Harmonization of names and format for principles identified in CXS 234-1999.

171. The Observer also stressed that the IAM had requested that SDOs should notify Codex when methods are changed/updated in accordance with the Information Document: Guidance on Process for Submission, Consideration and Endorsement of Methods, noting that due to differing cycles between SDOs in updating methods, methods that were initially technically identical may become out of sync over time. The Observer noted that SDOs could be contacted during the preparation of standards for both methodological and statistical advice.

172. CCMAS45 noted that several of the issues raised in CRD04 were considered under relevant agenda items.

Conclusion

173. CCMAS45 thanked the members of IAM for their valuable contribution to the work of CCMAS and Codex.

OTHER BUSINESS AND FUTURE WORK (Agenda item 10)

Activities of the Joint FAO/IAEA Centre relevant to the work of CCMAS

174. The Representative of the Joint Centre informed CCMAS that the Food Safety and Control Section (FSCS) of the Joint FAO/IAEA Centre contributes to strengthening global food safety and authenticity by promoting the use of nuclear and related analytical techniques. Its activities support Member States in improving food control systems, facilitating fair trade, and enhancing laboratory capacities through targeted capacity building and technology transfer. The FSCS applies a complementary analytical approach that integrates rapid screening methods with high-precision confirmatory techniques. These are used to detect contaminants and residues, verify geographical origin, and identify food fraud. The approaches include spectroscopic techniques, chromatography coupled with mass spectrometry, isotope ratio analysis, gas chromatography–ion mobility spectrometry, and immunosensor-based methods. Recent research and method development focus on areas such as the authentication of fish and olive oil, the detection of adulteration in honey and fruit juices, the analysis of mycotoxins, and studies on veterinary drug depletion using radiolabelled compounds. The FSCS also ensures that research outputs are translated into practical applications through coordinated research projects, technical cooperation activities, training initiatives, and scientific publications.
175. The Representative noted that these efforts directly supported CCMAS priorities by advancing analytical method development, promoting harmonization and standardization, strengthening interlaboratory comparisons, and providing scientific input relevant to the food safety risk assessment and Codex standard-setting processes.

Conclusion

176. CCMAS45 noted the information provided and expressed its appreciation to the Joint FAO/IAEA Centre for their interest in and support of the work of CCMAS.

Development of methods of analysis for microplastics in food-grade salt

177. The Republic of Korea, referring to CRD05, informed CCMAS that microplastics have emerged as contaminants of global concern, particularly in sea salt, which was produced directly from marine environments. Several studies had reported the presence of microplastics in commercial food-grade salts; however, analytical approaches varied considerably, limiting the comparability of results. Key analytical challenges included differences in sample preparation procedures, particle size thresholds, and analytical techniques. It was also noted that analytical methods for microplastics in drinking water were currently under discussion within ISO.
178. The Member recalled that reliable and comparable analytical data would therefore be important for any future consideration of microplastics in food, and harmonization of analytical approaches might be beneficial. CCMAS45 was invited to note this emerging analytical issue and to recognize the potential value of collaborative work on analytical method development in this area.
179. There was general agreement that microplastics (and nanoplastics) in foods, including drinking water, represented an emerging issue of concern and posed significant analytical challenges.
180. Attention was drawn to:
 - the recent guidance published by the UK National Measurement Laboratory (CRD32);
 - ISO standards for microplastics in drinking water and the environment, and that possible ISO standards for microplastics in food were under discussion; and
 - the offer from AOAC to assist with standardization efforts in this area.

181. CCMAS45 noted that no Codex standards currently existed and that CCMAS was therefore not able to consider methods of analysis at this time. CCMAS further noted the ongoing work of SDOs and other bodies and agreed that developments could be followed through the IAM. CCMAS45 agreed that once relevant Codex standards are developed, CCMAS would be ready to assist in the identification of appropriate methods of analysis.

Conclusion

182. CCMAS45 thanked the Republic of Korea for bringing this emerging issue to the attention of CCMAS and noted the ongoing work by SDOs in this area.
183. CCMAS45 agreed that this topic could be brought to the attention of CCCF.

DATE AND PLACE OF THE NEXT SESSION (Agenda item 11)

184. CCMAS45 was informed that its 46th Session was tentatively scheduled to take place from 10-14 May 2027 in Budapest, Hungary, with the final arrangements subject to confirmation by the Host Country in consultation with the Codex Secretariat.

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APPENDIX II**Part 1. METHODS OF ANALYSIS FOR ADOPTION AND REVOCATION BY CAC49****(For inclusion in CXS 234 and revocation from CXS 234)**

- 1.1 CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS
- 1.2 CODEX COMMITTEE ON CONTAMINANTS IN FOOD
- 1.3 CODEX COMMITTEE ON FATS AND OILS
- 1.4 CODEX COMMITTEE ON SPICES AND CULINARY HERBS
- 1.5 FAO/WHO COORDINATING COMMITTEE FOR NEAR EAST
- 1.6 FATS AND OILS
- 1.7 FISH AND FISHERY PRODUCTS
- 1.8 MISCELLANEOUS PRODUCTS
- 1.9 SUGARS AND HONEY

Part 2. METHODS OF ANALYSIS FOR REVOCATION BY CAC49**(For revocation from the respective standards as indicated)****Part 3. SAMPLING PLANS FOR ADOPTION BY CAC49****(For inclusion in the respective standards as indicated)**

- 3.1 CODEX COMMITTEE ON CONTAMINANTS IN FOOD
- 3.2 FAO/WHO COORDINATING COMMITTEE FOR ASIA

Part 4. METHODS OF ANALYSIS WHICH REMAIN UNCHANGED IN CXS 234 AS A RESULT OF DECISIONS BY CCMAS45**(For information)**

- 4.1 CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS
- 4.2 FISH AND FISHERY PRODUCTS
- 4.3 SUGARS AND HONEY

Part 5. METHODS OF ANALYSIS WHICH REMAIN UNCHANGED IN STANDARDS OTHER THAN CXS 234 AS A RESULT OF DECISIONS BY CCMAS45**(For information)**

Part 1

METHODS OF ANALYSIS FOR ADOPTION AND REVOCATION BY CAC49 (For inclusion in CXS 234 and revocation from CXS 234)

Notes:

1. Methods and performance criteria for inclusion and/or amendment in CXS 234-1999: changes indicated in ~~strike through~~, or **bold** and underlined font.
2. Methods for revocation in CXS 234-1999: ~~strike throughs~~ are indicated in **red**.
3. The reference to Appendices VI and VIII in this document relates to the relevant appendices in CXS 234-1999.

1.1 CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS

Cereals, pulses and legumes and derived products				
Commodity	Provision	Method	Principle	Type
<u>Maize (corn)</u>	<u>Broken kernels</u>	<u>ISO 19942</u>	<u>Sieving, visual examination, gravimetry</u>	!
<u>Sorghum grains</u>	<u>Fibre, crude</u>	<u>ICC 113 / ISO 6541</u>	<u>Gravimetry (incineration at 550°C)</u>	!
<u>Rice</u>	<u>Head rice</u>	<u>ISO 7301</u>	<u>Visual examination, micrometry, gravimetry</u>	!
<u>Rice</u>	<u>Large broken kernel</u>	<u>ISO 7301</u>	<u>Visual examination, micrometry, gravimetry</u>	!
<u>Rice</u>	<u>Medium broken kernel</u>	<u>ISO 7301</u>	<u>Visual examination, micrometry, gravimetry</u>	!
<u>Rice</u>	<u>Small broken kernel</u>	<u>ISO 7301</u>	<u>Visual examination, micrometry, sieving, gravimetry</u>	!
<u>Rice</u>	<u>Chips</u>	<u>ISO 7301</u>	<u>Sieving, gravimetry</u>	!
<u>Rice</u>	<u>Heat-damaged kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Damaged kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Immature kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Chalky kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Red kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Red-streaked kernels</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!

Cereals, pulses and legumes and derived products				
Commodity	Provision	Method	Principle	Type
<u>Rice</u>	<u>Pecks</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Rice</u>	<u>Maximum recommended levels of other types of rice</u>	<u>ISO 7301</u>	<u>Visual examination, gravimetry</u>	!
<u>Wheat and durum wheat</u>	<u>Minimum test weight</u>	<u>ISO 7971-1</u>	<u>Gravimetry</u>	!
<u>Wheat</u>	<u>Shrunken (shrivelled) and broken kernels</u>	<u>ISO 7970</u>	<u>Sieving, visual examination and gravimetry</u>	!
<u>Durum wheat</u>	<u>Shrunken (shrivelled) and broken kernels</u>	<u>ISO 11051</u>	<u>Sieving, visual examination and gravimetry</u>	!
<u>Wheat</u>	<u>Edible grains other than wheat and durum wheat</u>	<u>ISO 7970</u>	<u>Sieving and gravimetry</u>	!
<u>Wheat</u>	<u>Damaged kernels</u>	<u>ISO 7970</u>	<u>Sieving and gravimetry</u>	!
<u>Durum wheat</u>	<u>Edible grains other than wheat and durum wheat</u>	<u>ISO 11051</u>	<u>Sieving and gravimetry</u>	!
<u>Durum wheat</u>	<u>Damaged kernels</u>	<u>ISO 11051</u>	<u>Sieving and gravimetry</u>	!
<u>Durum wheat</u>	<u>Insect bored kernels</u>	<u>ISO 11051</u>	<u>Visual examination and gravimetry</u>	!
<u>Oats</u>	<u>Minimum test weight</u>	<u>ISO 7971-1</u>	<u>Gravimetry</u>	!
Degermed maize (corn) meal and maize (corn) grits	<u>Fat, crude</u> <u>Crude fat</u>	AOAC 945.38F and 920.39C and ICC 110/1	Calculation from moisture and Gravimetry (ether extraction)	!
<u>Peanuts</u>	<u>Kernel defects: Damaged kernels</u>	<u>FDA Method MPM: V.10 (v89)</u>	<u>Visual examination-gravimetry</u>	!

1.2 CODEX COMMITTEE ON CONTAMINANTS IN FOOD

Method performance criteria for total aflatoxins and ochratoxin A in certain spices

<u>Commodity</u>	<u>Provision</u>	<u>ML</u> <u>(ug/kg)</u>	<u>Method performance criteria</u>					<u>Example of methods that meet the criteria</u>	<u>Principle</u>
			<u>Minimal applicable range</u> <u>(ug/kg)</u>	<u>Limit of detection (LOD)</u> <u>(ug/kg)</u>	<u>Limit of quantification (LOQ) (ug/kg)</u>	<u>Precision (RSD_R) (%) no more than</u>	<u>Recovery (%)</u>		
<u>Chilli pepper, nutmeg</u>	<u>AFT B1+B2+G1+G2</u>	<u>20</u>						<u>EN 17424</u> <u>EN 17641</u>	<u>HPLC-FLD</u> <u>HPLC-MS/MS</u>
	<u>AFB1</u>	<u>-</u>	<u>2.8 – 28.8</u>	<u>≤ 1</u>	<u>≤ 2</u>	<u>≤ 44</u>	<u>40 – 120</u>		
	<u>AFB2</u>	<u>-</u>	<u>2.8 – 28.8</u>	<u>≤ 1</u>	<u>≤ 2</u>	<u>≤ 44</u>	<u>40 – 120</u>		
	<u>AFG1</u>	<u>-</u>	<u>2.8 – 28.8</u>	<u>≤ 1</u>	<u>≤ 2</u>	<u>≤ 44</u>	<u>40 – 120</u>		
	<u>AFG2</u>	<u>-</u>	<u>2.8 – 28.8</u>	<u>≤ 1</u>	<u>≤ 2</u>	<u>≤ 44</u>	<u>40 – 120</u>		
<u>Chilli pepper, paprika, nutmeg</u>	<u>OTA</u>	<u>20</u>	<u>11.2 – 28.8</u>	<u>≤ 4</u>	<u>≤ 8</u>	<u>≤ 44</u>	<u>60 – 115</u>	<u>EN 17250</u> <u>EN 17641</u>	<u>HPLC-FLD</u> <u>HPLC-MS/MS</u>

Method performance criteria for total aflatoxins in certain food matrices

<u>Commodity</u>	<u>Provision</u>	<u>ML</u> <u>(ug/kg)</u>	<u>Method performance criteria</u>					<u>Example of methods that meet the criteria</u>	<u>Principle</u>
			<u>Minimal applicable range</u> <u>(ug/kg)</u>	<u>Limit of detection (LOD)</u> <u>(ug/kg)</u>	<u>Limit of quantification (LOQ) (ug/kg)</u>	<u>Precision (RSD_R) (%) no more than</u>	<u>Recovery (%)</u>		
<u>Peanuts intended for further processing</u>	<u>AFT B1+B2+G1+G2</u>	<u>15</u>						<u>EN 14123</u> <u>EN 17641</u>	<u>HPLC-FLD</u> <u>HPLC-MS/MS</u>
	<u>AFB1</u>	<u>-</u>	<u>2.1 – 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFB2</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG1</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG2</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		

<u>Commodity</u>	<u>Provision</u>	<u>ML</u> <u>(µg/kg)</u>	<u>Method performance criteria</u>					<u>Example of methods that meet the criteria</u>	<u>Principle</u>
			<u>Minimal applicable range</u> <u>(µg/kg)</u>	<u>Limit of detection (LOD)</u> <u>(µg/kg)</u>	<u>Limit of quantification (LOQ)</u> <u>(µg/kg)</u>	<u>Precision (RSD_R) (%)</u> <u>no more than</u>	<u>Recovery (%)</u>		
<u>Tree nuts destined for further processing: almonds, hazelnuts, pistachios, and shelled Brazil nuts</u>	<u>AFT</u> <u>B1+B2+G1+G2</u>	<u>15</u>						<u>EN 14123</u> <u>EN 17641</u>	<u>HPLC-FLD</u> <u>HPLC-MS/MS</u>
	<u>AFB1</u>	<u>-</u>	<u>2.1 – 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFB2</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG1</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG2</u>	<u>-</u>	<u>2.1 - 21.6</u>	<u>≤ 0.75</u>	<u>≤ 1.5</u>	<u>≤ 44</u>	<u>40 - 120</u>		
<u>Ready-to-eat tree nuts: almonds, hazelnuts, pistachios and shelled Brazil nuts</u>	<u>AFT</u> <u>B1+B2+G1+G2</u>	<u>10</u>						<u>EN 17641</u>	<u>HPLC-MS/MS</u>
	<u>AFB1</u>	<u>-</u>	<u>1.4 – 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFB2</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG1</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG2</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
<u>Dried figs</u>	<u>AFT</u> <u>B1+B2+G1+G2</u>	<u>10</u>						<u>EN 17641</u>	<u>HPLC-MS/MS</u>
	<u>AFB1</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFB2</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG1</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		
	<u>AFG2</u>	<u>-</u>	<u>1.4 - 14.4</u>	<u>≤ 0.5</u>	<u>≤ 1.0</u>	<u>≤ 44</u>	<u>40 - 120</u>		

1.3 CODEX COMMITTEE ON FATS AND OILS

Fats and oils				
Commodity	Provision	Method	Principle	Type
<u>Crude rice bran oil</u>	<u>Gamma oryzanol</u>	<u>See Appendix **</u>	<u>Spectrophotometry-UV</u>	<u>IV</u>

Appendix ** of CXS 234-1999

DETERMINATION OF GAMMA ORYZANOL CONTENT IN CRUDE RICE BRAN OIL**Definition**

This method is used to determine gamma oryzanol content (percentage) in oils from spectrophotometer absorption measurements at the wavelength of maximum absorption near 315 nm.

Scope

Applicable to crude rice bran oil.

Apparatus

- Spectrophotometer – for measuring extinction in the ultraviolet between 310 nm and 320 nm
- Rectangular quartz cuvettes – having an optical light path of 1 cm
- Volumetric flask – 25 ml
- Filter paper – Whatman No. 2, or equivalent

Reagents

- n-Heptane – spectrophotometrically pure.

Procedure

- (i) Before using, the spectrophotometer should be properly adjusted to a zero-reading filling both the sample cuvette and the reference cuvette with n-Heptane.
- (ii) Filter the oil sample through filter paper at ambient temperature.
- (iii) Weigh accurately approximately 0.02 g of the sample so prepared into a 25 ml volumetric flask, make up to the mark with n-Heptane.
- (iv) Fill a cuvette with the solution obtained and measure the extinction at the wavelength of maximum absorption near 315 nm, using the same solvent as a reference.
- (v) The extinction values recorded must lie within the range 0.3–0.6. If not, the measurements must be repeated using more concentrated or more diluted solutions as appropriate.

Calculation

Calculate gamma oryzanol content as follows:

$$\text{Gamma oryzanol content, \%} = 25 \times (1 / W) \times A \times (1 / E)$$

Where: W = mass of sample, g

A = extinction (absorbance) of the solution

E = specific extinction $E^{1\%}_{1\text{ cm}}$ = 359

1.4 CODEX COMMITTEE ON SPICES AND CULINARY HERBS

Spices and culinary herbs ¹				
Commodity	Provision	Method	Principle	Type
<u>Small cardamom</u>	<u>Light seeds</u>	<u>ISO 927*</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Turmeric</u>	<u>Colouring power expressed as curcuminoids</u>	<u>ISO 5566</u>	<u>Spectrophotometry-UV-Vis</u>	!
<u>Dried or dehydrated chilli pepper and paprika</u>	<u>Pungency, Scoville Heat Units</u>	<u>ASTA 21.3 / AOAC 995.03</u>	<u>HPLC FLD/UV-Vis and calculation</u>	!
Dried or dehydrated chilli pepper and paprika	Pungency, Scoville Heat Units	ISO 3513	Sensory evaluation	!
<u>Cloves (as whole)</u>	<u>Mould visible</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
Cloves	Mould visible (for whole)	Method V-8 Spices, Condiments, Flavors and Crude Drugs (Macroanalytical Procedure Manual, FDA Technical Bulletin Number 5) https://www.fda.gov/food/laboratory-methods-food/mpm-v-8-spices-condiments-flavors-and-crude-drugs#v32	Visual examination followed by gravimetry	IV
<u>Vanilla</u>	<u>Moisture</u>	<u>ISO 5565-2</u>	<u>Distillation</u>	!
<u>Vanilla</u>	<u>Extraneous matter</u>	<u>ISO 927*</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Vanilla</u>	<u>Live Insect</u>	<u>ISO 927*</u>	<u>Visual examination (by count)</u>	!
<u>Vanilla</u>	<u>Vanillin content on wet basis</u>	<u>ISO 5565-2</u>	<u>HPLC-UV</u>	II
<u>Large cardamom</u>	<u>Moisture</u>	<u>ISO 939</u>	<u>Distillation</u>	!

¹ Methods of analysis for vanilla (spices in the form of dried fruits and berries), large cardamom (spices in the form of dried fruits and berries), and dried and/or dehydrated coriander (spices in the form of dried seeds) can only be included in CXS 234 after the respective standards have been adopted.

Spices and culinary herbs ¹				
Commodity	Provision	Method	Principle	Type
<u>Large cardamom</u>	<u>Volatile oil (on dry basis)</u>	<u>ISO 939 and ISO 6571</u>	<u>Calculation (from moisture and volatile Oils), distillation and distillation</u>	!
<u>Large cardamom</u>	<u>Total ash (On dry basis)</u>	<u>ISO 939 and ISO 928</u>	<u>Calculation (from moisture and ash) (incineration at 550°C), distillation and gravimetry</u>	!
<u>Large cardamom</u>	<u>Acid insoluble ash (on dry basis)</u>	<u>ISO 939 and ISO 930</u>	<u>Calculation (from moisture and ash) (incineration at 550°C), distillation and gravimetry</u>	!
<u>Large cardamom</u>	<u>Extraneous matter</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Large cardamom</u>	<u>Foreign matter</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Large cardamom (for whole)</u>	<u>Whole insect live/dead</u>	<u>ISO 927</u>	<u>Visual examination (counting)</u>	!
<u>Large cardamom (for powdered/pieces)</u>	<u>Whole insect live/dead</u>	<u>AOAC 975.49</u>	<u>Flotation</u>	!
<u>Large cardamom</u>	<u>Mammalian and/or other excreta</u>	<u>Method V-8 Spices, Condiments, Flavors and Crude Drugs (Macro analytical Procedure Manual) MPM: V-8, Spices</u> https://www.fda.gov/food/laboratory-methods-food/mpm-v-8-spices-condiments-flavors-and-crude-drugs#v32	<u>Visual examination followed by gravimetry</u>	IV
<u>Large cardamom</u>	<u>Visible mould / Mouldy Material</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Large cardamom</u>	<u>Insect defiled</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Large cardamom</u>	<u>Empty, malformed and split capsules</u>	<u>ISO 10622</u>	<u>Visual examination (counting)</u>	!

Spices and culinary herbs ¹				
Commodity	Provision	Method	Principle	Type
<u>Large cardamom</u>	<u>Immature and shrivelled capsules / seed</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Large cardamom</u>	<u>Light seeds</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Moisture</u>	<u>ISO 939</u>	<u>Distillation</u>	!
<u>Dried or dehydrated coriander</u>	<u>Total ash on dry basis</u>	<u>ISO 939 and ISO 928</u>	<u>Calculation from moisture and ash (incineration at 550°C), distillation and gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Acid insoluble ash (dry basis)</u>	<u>ISO 939 and ISO 930</u>	<u>Calculation from moisture and ash (incineration at 550°C), distillation and gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Volatile oils (dry basis)</u>	<u>ISO 939 and ISO 6571</u>	<u>Calculation from moisture and volatile oils, distillation and distillation</u>	!
<u>Dried or dehydrated coriander</u>	<u>Extraneous matter</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Foreign matter</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Split fruits, damaged or discoloured fruits</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Mouldy material / mould visible</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Insect defiled</u>	<u>ISO 927</u>	<u>Visual examination followed by gravimetry</u>	!
<u>Dried or dehydrated coriander</u>	<u>Live insect</u>	<u>ISO 927</u>	<u>Visual examination (counting)</u>	!
<u>Dried or dehydrated coriander</u>	<u>Dead insect</u>	<u>ISO 927</u>	<u>Visual examination (counting)</u>	!

Spices and culinary herbs ¹				
Commodity	Provision	Method	Principle	Type
<u>Dried or dehydrated coriander</u>	<u>Mammalian or/and other excreta</u>	<u>Method V-8 Spices, Condiments, Flavors and Crude Drugs (Macroanalytical Procedure Manual) MPM: V-8, Spices</u> https://www.fda.gov/food/laboratory-methods-food/mpm-v-8-spices-condiments-flavors-and-crude-drugs#v32	<u>Visual examination followed by gravimetry</u>	<u>IV</u>

* 100 g test portion size

1.5 FAO/WHO COORDINATING COMMITTEE FOR NEAR EAST

Miscellaneous products				
Commodity	Provision	Method	Principle	Type
<u>Maamoul</u>	<u>Extraneous matter</u>	<u>AOAC 970.70</u>	<u>Microscopy</u>	I
<u>Maamoul</u>	<u>pH</u>	<u>ISO 1842</u>	<u>Potentiometry</u>	IV
<u>Maamoul</u>	<u>pH</u>	<u>AACC 02-52.01 / AOAC 943.02</u>	<u>Potentiometry</u>	II
<u>Maamoul</u>	<u>Water activity</u>	<u>ISO 18787</u>	<u>Electrometry</u>	II
<u>Maamoul</u>	<u>Moisture</u>	<u>NMKL 206</u>	<u>Gravimetry (drying at 102 to 105 °C)</u>	I

1.6 FATS AND OILS

Fats and oils				
Commodity	Provision	Method	Principle	Type
<u>Edible fats</u> Fats and oils not covered by individual standards	Acidity: acid value	ISO 660 / AOCS Cd 3d-63	Titrimetry	I
<u>Edible fats</u> Fats and oils not covered by individual standards	Copper and iron	AOAC 990.05 / ISO 8294 / AOCS Ca 18b-91	Atomic absorption spectrophotometry (direct graphite furnace)	II
<u>Edible fats</u> Fats and oils not covered by individual standards	Peroxide value	AOCS Cd 8b-90 / ISO 3960 / NMKL 158	<u>Titrimetry</u> (colorimetric)	I
Olive oils and olive pomace oils	Peroxide value	ISO 3960 / AOCS Cd 8b-90 / NMKL 158 / <u>COI/T.20/Doc.No.38</u>	<u>Titrimetry</u>	I
<u>Named animal fats</u>	<u>Fatty acid composition</u>	<u>AOCS Ce 2-66 and AOCS Ce 1i-07</u>	<u>Preparation of methyl esters and GC-FID</u>	II
Named animal fats	Fatty acid composition	ISO 12966-2 and ISO 12966-4	Preparation of methyl esters and gas <u>chromatography GC-FID</u>	III

Fats and oils				
Commodity	Provision	Method	Principle	Type
<u>Fat spreads and blended spreads</u>	<u>Milk fat content</u> ²	<u>AOAC 2012.13 / ISO 16958 IDF 231</u>	<u>GC-FID and calculation*</u>	I
<u>Fat spreads and blended spreads</u>	<u>Salt content</u>	<u>ISO 15648 IDF 179</u>	<u>Titrimetry (Potentiometry)</u>	II
<u>Fat spreads and blended spreads</u>	<u>Salt content</u>	<u>AOAC 2016.03 / ISO 21422 IDF 242</u>	<u>Titrimetry (Potentiometry)</u>	III
<u>Fat spreads and blended spreads</u>	<u>Vitamin A</u>	<u>EN 12823</u>	<u>HPLC-UV</u>	II
<u>Fat spreads and blended spreads</u>	<u>Vitamin D</u>	<u>EN 12821 / NMKL 167</u>	<u>HPLC-UV</u>	II
<u>Fat spreads and blended spreads</u>	<u>Vitamin E</u>	<u>ISO 9936</u>	<u>HPLC-UV</u>	III
<u>Fat spreads and blended spreads</u>	<u>Vitamin E</u>	<u>EN 12822</u>	<u>HPLC-UV</u>	II
Named vegetable oils	Fatty acid composition	ISO 12966-2 and ISO 12966-4 / AOCS Ce 2-66 and AOCS Ce 1h-05	Gas chromatography of methyl esters	II
<u>Named vegetable oils</u>	<u>Fatty acid composition</u>	<u>AOCS Ce 2-66 and AOCS Ce 1h-05</u>	<u>Preparation of methyl esters and GC-FID</u>	II
<u>Named vegetable oils</u>	<u>Fatty acid composition</u>	<u>ISO 12966-2 and ISO 12966-4</u>	<u>Preparation of methyl esters and GC-FID</u>	III
Fats and oils (all)	Soap content	ISO 10539 / AOCS Cc 17-95	Titrimetry (colorimetric <u>alkalimetry</u>)	I

² milk fat is measured as butyric acid with a conversion factor

1.7 FISH AND FISHERY PRODUCTS

Fish and fishery products				
Commodity	Provision	Method	Principle	Type
Crackers from marine and freshwater fish, crustacean and molluscan shellfish	Crude protein	Described in the standard		
Crackers from marine and freshwater fish, crustacean and molluscan shellfish	Moisture	Described in the standard		
<u>Crackers from marine and freshwater fish, crustacean and molluscan shellfish</u>	<u>Moisture</u>	<u>AOAC 950.46B (air drying)</u>	<u>Gravimetry</u>	<u>!</u>
Raw bivalve molluscs (shucked)	Drained weight	Described in the standard		
<u>Raw bivalve molluscs (shucked)</u>	<u>Drained weight</u>	<u>AOAC 953.11</u>	<u>Gravimetry</u>	<u>!</u>
<u>Quick frozen fish sticks (fish fingers), fish portions and fish fillets – breaded or in batter</u>	<u>Determination of fish content (declaration) – Nitrogen Moisture Total fat Ash</u>	<u>ISO 937 and ISO 1442 and ISO 1443 and ISO 936 and see Appendix VI</u>	<u>Calculation from Titrimetry (Kjeldahl digestion) and gravimetry</u>	<u>!</u>
Quick frozen fish sticks (fish fingers), fish portions and fish fillets – breaded or in batter	Determination of fish content (declaration) – nitrogen	ISO 937 and see Appendix VI	Titrimetry (Kjeldahl digestion) and calculation	!!
Quick frozen fish sticks (fish fingers), fish portions and fish fillets – breaded or in batter	Determination of fish content (declaration) – moisture	ISO 1442 and see Appendix VI	Gravimetry and calculation	!

Fish and fishery products				
Commodity	Provision	Method	Principle	Type
Quick frozen fish sticks (fish fingers), fish portions and fish fillets—breaded or in batter	Determination of fish content (declaration)—total fat	ISO 1443 and see Appendix VI	Gravimetry and calculation	I
Quick frozen fish sticks (fish fingers), fish portions and fish fillets—breaded or in batter	Determination of fish content (declaration)—ash	ISO 1443 and see Appendix VI	Gravimetry and calculation	I
Salted fish and dried salted fish of the Gadidae family of fishes	Salt saturation	<u>See Appendix VIII</u> <u>See equation in footnote^{xii}</u>	Calculation	I

^{xii} ~~The % salt saturation is calculated as follows:~~

~~1. % salt in water = (% salt content / (% salt content + % moisture)) × 100%~~

~~2. % salt saturation = (% salt in water / 26.4 %*) × 100%~~

~~* The solubility of sodium chloride in water is 36 g per 100 g water, and the constant is calculated as follows: 36 g sodium chloride / (100 g water + 36 g sodium chloride) × 100% = 26.4%~~

APPENDIX VI

Other methods

(1) Chemical analysis method (nitrogen factor end-product method)

Appropriate in cases where there is reason to doubt the composition of the fish core (i.e. appears to contain non-fish ingredients). Except for fully cooked products, this method requires confirmation with the AOAC Method 996.15, or with Method #2 (Determination of percentage fish content) in conjunction with investigation at the processing plant when determining product compliance with the labelling provisions in CXS 166-1989. This method should trigger in-factory investigation (e.g. raw ingredient recipe checks) when suspect products are identified.

The percentage fish content, corrected for the non-fish flesh nitrogen contributed by the carbohydrate coating, is calculated as follows.

$$\% \text{ Fish content} = \frac{(\% \text{ total nitrogen} - \% \text{ nonfish flesh nitrogen})}{\text{N factor}^*} \times 100$$

*appropriate N (nitrogen) factor

The non-fish flesh nitrogen is calculated as follows:

$$\% \text{ non-fish flesh nitrogen} = \% \text{ carbohydrate} \times 0.02$$

Where the carbohydrate is calculated by difference:

$$\% \text{ carbohydrate} = 100 - (\% \text{ water} + \% \text{ fat} + \% \text{ protein} + \% \text{ ash})$$

APPENDIX VIII

PREPARATION OF FISH SAMPLES AND DETERMINATION OF SALT SATURATION, BASED ON SALT AND MOISTURE CONTENT, AND WATER CONTENT IN FISH AND FISHERY PRODUCTS IN SALTED FISH AND DRIED SALTED FISH OF THE GADIDAE FAMILY OF FISHES

PART 1: PREPARATION OF FISH SAMPLES

~~Salted fish and dried salted fish of the Gadidae family of fishes~~

1. Before preparing of a sub-sample adhering salt crystals should be removed by brushing from the surface of the sample without using water.
2. The preparation of fish samples for the determination of salt content, and water content moisture in order to calculate the % salt saturation of the fish should be carried out according to AOAC 937.07. The analysis should be on the edible portion of the fish.
3. Determination should be performed at least in duplicate.

PART 2: DETERMINATION OF SALT CONTENT

For determination of salt content, see Table 5. "Method performance criteria for salt determined as chloride expressed as sodium chloride".

PART 2-3: DETERMINATION OF MOISTURE AND WATER CONTENT

~~Salted fish and dried salted fish of the Gadidae family of fishes~~

- i. Determination of % salt saturation as required by the standard, should be in accordance to AOAC 950.46.B (Airdrying (a))
- ii. Determination of water content in the whole fish, when needed in the commercial trade of klippfish and wet salted fish, the method of sampling the fish should be carried out according to the "Determination of Water Content in Whole Fish by Cross Section Method" defined in the Annex to this Appendix.

~~Salted Atlantic herring and salted sprat~~

~~Determination of water content is performed according to AOAC 950.46B (air drying).~~

PART 4: DETERMINATION OF SALT SATURATION

Salt saturation is determined by calculation, using the mean values of the replicates, according to the following formula:

1. % salt in water = (% salt content / (% salt content + % moisture)) x 100%

2. % salt saturation = (% salt in water / 26.4 %*) x 100%

***The solubility of sodium chloride in water is 36 g per 100 g water, and the constant is calculated as follows: 36 g sodium chloride / (100 g water + 36 g sodium chloride) x 100% = 26.4%**

Table 5. Method performance criteria for salt determined as chloride expressed as sodium chloride

Commodity	Provision	ML (%)	Method performance criteria					Examples of methods that meet the criteria	Principle
			Minimal applicable range (%)	Limit of detection (LOD) (%)	Limit of quantification (LOQ) (%)	Precision (RSD _R) (%) no more than	Recovery (%)		
Boiled dried salted anchovies	Sodium chloride and salt determined as chloride expressed as sodium chloride	15 (NaCl)	13.8-16.2 <u>13-17</u>	1.5	3.0	5.3 ≤ 5	98-102	NMKL 178	Titrimetry (potentiometry)
		9.1 (Cl ⁻)	8.3-9.9 <u>8-10</u>	0.91	1.8	5.7 ≤ 6	98-102	AOAC 971.27 <u>AOAC 937.09</u> <u>AOAC 976.18</u>	Titrimetry (potentiometry) Titrimetry <u>Titrimetry (potentiometry)</u>
Fish sauce	Sodium chloride and salt determined as chloride expressed as sodium chloride	From 20 (NaCl)	18-22	2.0	4.0	5.1 ≤ 5	98-102	NMKL 178 AOAC 971.27 AOAC 976.18	Titrimetry (potentiometry)
		From 12 (Cl ⁻)	11-13	1.2	2.4	5.5 ≤ 6	98-102	<u>AOAC 937.19</u>	Titrimetry (potentiometry) Titrimetry (potentiometry) Titrimetry
Salted Atlantic herring and salted sprat	Sodium chloride and salt determined as chloride expressed as sodium chloride	From 1 to 20 (NaCl)	0.9-22 <u>1-22</u>	0.1	0.2	≤ 8.0	97-103	NMKL 178 AOAC 971.27 AOAC 976.18	Titrimetry (potentiometry)
		From 0.6 to 12 (Cl ⁻)	0.5-13 <u>1-13</u>	0.06	0.12	8.6 ≤ 9		<u>AOAC 937.09</u>	Titrimetry (potentiometry) Titrimetry (potentiometry) Titrimetry

Commodity	Provision	ML (%)	Method performance criteria					Examples of methods that meet the criteria	Principle
			Minimal applicable range (%)	Limit of detection (LOD) (%)	Limit of quantification (LOQ) (%)	Precision (RSD _R) (%) no more than	Recovery (%)		
Salted fish and dried salted fish of Gadidae family of fishes	Sodium chloride and salt determined as chloride expressed as sodium chloride	From 12 (NaCl)	11–13	1.2	2.4	5.5 ≤ 6	98–102	NMKL 178 AOAC 971.27 AOAC 976.18 <hr/> AOAC 937.09	Titrimetry (potentiometry)
		From 7.3 (Cl ⁻)	6.8–8.1 <u>7–8</u>	0.8	1.5	5.9 ≤ 6			Titrimetry (potentiometry) Titrimetry (potentiometry) Titrimetry
Sturgeon caviar	Sodium chloride and salt determined as chloride expressed as sodium chloride	From 3 to 5 (NaCl)	2.7–5.5 <u>3–6</u>	0.3	0.6	6.8 ≤ 7	97–103	NMKL 178 AOAC 971.27 AOAC 976.18	Titrimetry (potentiometry)
		From 1.8 to 3.0 (Cl ⁻)	1.7–3.4 <u>2–3</u>	0.2	0.4	7.3 ≤ 7			Titrimetry (potentiometry) Titrimetry (potentiometry) AOAC 937.09 Titrimetry

1.8 MISCELLANEOUS PRODUCTS

Miscellaneous products				
Commodity	Provision	Method	Principle	Type
Tehena	Protein content	ISO 1871	Titrimetry, Kjeldahl	I IV

1.9 SUGARS AND HONEY

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Honey	Free a Acidity	MAFF Validated Method V19 J. Assoc. Public Analysts (1992) 28 (4) 171-175	Titrimetry	I
Honey	Moisture	AOAC 969.38B / or MAFF Validated Method V21	Refractometry	I
Honey	Sample preparation	AOAC 920.180		
Honey	Solids, water-insoluble	MAFF Validated Method V22 / IHC 8 J. Assoc. Public Analysts (1992) 28(4) 189-193	Gravimetry <u>drying at 135°C</u>	I
Honey	Sugars added (for sugar profile)	AOAC 998.18	Carbon isotope ratio mass spectrometry	I
Honey	Sugars added: detection of corn and cane sugar products	AOAC 978.17	Carbon isotope ratio mass spectrometry	I
<u>Honey excluding manuka honey</u>	<u>Sugars added: detection of corn and cane sugar products</u>	<u>AOAC 998.12</u>	<u>IRMS</u>	<u>II</u>
Sugars (dextrose anhydrous and dextrose monohydrate)	Solids, total	ISO 1741	Gravimetry (<u>drying at 100°C</u> , vacuum oven)	I
Sugars (glucose syrup and dried glucose syrup)	Solids, total	ISO 1742	Gravimetry (<u>drying at 70°C</u> , vacuum oven)	I
Sugars (dextrose anhydrous and dextrose monohydrate, dried glucose syrup, glucose syrup, powdered dextrose, lactose)	Sulphated ash	ISO 5809	Single sulphonation <u>Gravimetry (incineration at 525°C)</u>	I
Sugars (soft brown sugar)	Sulphated ash	ICUMSA GS 1/3/4/7/8-11 3-11	Gravimetry (<u>incineration at 650°C</u>)	I
Sugars (fructose, <u>lactose</u>)	pH	ICUMSA GS 1/2/3/4/7/8-23 1-23	Potentiometry	I <u>II</u>

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Sugars (lactose)	pH	ICUMSA GS 1/2/3/4/7/8-23	Potentiometry	I
Sugars (fructose)	Loss on drying	ISO 1742	Gravimetry (<u>vacuum drying at 70°C</u>)	I
Sugars (plantation or mill white sugar, <u>powdered sugar, soft white sugar and soft brown sugar, white sugar</u>)	Loss on drying	ICUMSA GS 2/1/3-15 <u>2-15</u>	Gravimetry (<u>drying at 105°C</u>)	I
Sugars (powdered sugar)	Loss on drying	ICUMSA GS 2/1/3-15	Gravimetry	I
Sugars (soft white sugar and soft brown sugar)	Loss on drying	ICUMSA GS 2/1/3-15	Gravimetry	I
Sugars (white sugar)	Loss on drying	ICUMSA GS 2/1/3-15	Gravimetry	I
Sugars (glucose syrup and dried glucose syrup)	Reducing sugar	ISO 5377	Titrimetry (<u>Lane & Eynon</u>)	I
Sugars (lactose)	Lactose, anhydrous (<u>as reducing sugars</u>)	<u>USP General Chapter 731 and ICUMSA GS 1/2/3/4/7/8-23 4-3</u>	<u>Titrimetry Calculation from loss on drying (80°C) and Titrimetry - Lane & Eynon</u>	II <u>IV</u>
Sugars (plantation or mill white sugar)	Sulphur dioxide	ICUMSA GS 2/3-35 NMKL 135 EN 1988-2	Enzymatic method	II
Sugars (powdered sugar and powdered dextrose)	Sulphur dioxide	ICUMSA GS 2/3-35 NMKL 135 EN 1988-2	Enzymatic method	II
Sugars (raw cane sugar)	Sulphur dioxide	ICUMSA GS 2/3-35 NMKL 135 EN 1988-2	Enzymatic method	II
Sugars (soft white sugar and soft brown sugar)	Sulphur dioxide	ICUMSA GS 2/3-35 NMKL 135 EN 1988-2	Enzymatic method	II

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Sugars (white sugar)	Sulphur dioxide	ICUMSA GS 2/3-35 NMKL-135 EN-1988-2	Enzymatic method	II
Sugars (soft white sugar and soft brown sugar)	Sucrose plus invert sugar <u>(as reducing sugars)</u>	ICUMSA GS 4/3-7 <u>4-7</u>	Titrimetry	I <u>IV</u>
Sugars (plantation and mill white sugar, <u>soft white sugar, powdered sugar</u>)	Colour <u>(ICUMSA Unit)</u>	ICUMSA GS 9/1/2/3-8 <u>9-8</u>	<u>Visible spectrophotometry</u> <u>Photometry</u>	I
Sugars (powdered sugar)	Colour	ICUMSA GS 2/3-9	Photometry	I
Sugars (soft white sugar)	Colour	ICUMSA GS 2/3-9	Photometry	I
Sugars (white sugar, <u>powdered sugar</u>)	Polarization	ICUMSA GS 2/3-4 <u>2-1</u>	Polarimetry	II <u>III</u>
Sugars (powdered sugar)	Polarization	ICUMSA GS 2/3-4 after filtration if necessary to remove any anticaking agents	Polarimetry	II
<u>Sugars (powdered sugar)</u>	<u>Polarization</u>	<u>ICUMSA GS 3-1</u>	<u>Polarimetry</u>	<u>III</u>
<u>Sugars (white sugar, powdered sugar, plantation or mill white sugar)</u>	<u>Polarization</u>	<u>ICUMSA GS 4/2/3-1-1-1 (powdered sugars, if filtration to remove any anticaking agents is unnecessary)</u>	<u>Polarimetry</u>	<u>II</u>
Sugars (plantation or mill white sugar)	Polarization	ICUMSA GS 1/2/3-1	Polarimetry	II
<u>Sugars (white sugar, powdered sugar, plantation or mill white sugar)</u>	<u>Polarization</u>	<u>ICUMSA GS 1-2</u>	<u>Polarimetry</u>	<u>III</u>

Part 2

METHODS OF ANALYSIS FOR REVOCATION BY CAC49 (for revocation from the respective standard as indicated)

Note: Revocations from the commodity standards are indicated in **red** and ~~strike through~~.

STANDARD FOR NAMED VEGETABLE OILS (CXS 210-1999)**8. METHODS OF ANALYSIS AND SAMPLING**

For checking the compliance with this standard, the methods of analysis and sampling contained in the Recommended methods of analysis and sampling (CXS 234-1999) relevant to the provisions in this standard, shall be used.

~~8.1 Determination of GLC ranges of fatty acid composition~~

~~According to ISO 5509:2000.~~

GENERAL STANDARD FOR FRUIT JUICES AND NECTARS (CXS 247-2005)**9. METHODS OF ANALYSIS AND SAMPLING**

Table 2: Methods of analysis and sampling

PROVISION	METHOD	PRINCIPLE	TYPE
Vitamin C (Sections 3.2 Quality criteria and 3.3 Authenticity)^a	EN 14130 (2004)	High performance liquid chromatography (HPLC)	II
Pectin (Section 4 Additives)	IFU Method No. 26 (1964/1996)	Precipitation/photometry	I
Stable hydrogen isotope ratio of water from fruit juices (Sections 3.2 Quality criteria and 3.3 Authenticity)^a	ENV 12142 (1997)	Stable isotope mass spectrometry	II
Carbon dioxide (Sections 4 Additives and 5 Processing aids)	IFU Method No. 42 (1976)	Titrimetry (back-titration after precipitation)	IV

Part 3

SAMPLING PLANS FOR ADOPTION BY CAC49 (For inclusion in the respective standard(s) as indicated)**3.1 CODEX COMMITTEE ON CONTAMINANTS IN FOOD****SAMPLING PLANS FOR TOTAL AFLATOXINS AND OCHRATOXIN A IN CERTAIN SPICES (i.e. NUTMEG, DRIED CHILLI AND PAPRIKA)**

(for inclusion in the *General standard for contaminants and toxins in food and feed* (CXS 193-1995))

A) Spices with large particle size (Whole nutmeg, whole dried chilli and whole paprika)

In case of large lots and on condition that the subplot can be separated physically, each lot shall be subdivided into sublots following Table 1. Taking into account that the weight of the lot is not always an exact multiple of the weight of the sublots, the weight of the subplot may exceed the mentioned weight in Table 1 by a maximum of 20%.

**Table 1: Subdivision of Spices sublots according to lot weight
– Whole nutmeg, whole dried chilli and whole paprika –**

Lot weight (tonne)	Weight or number of sublots	No incremental samples	Aggregate sample weight (kg)
≥ 500	100 tonnes	100	10
> 125 and < 500	5 sublots	100	10
≥ 25 and ≤ 125	25 tonnes	100	10
< 25	—	10 – 100 (*)	1 - 10
(*) Depending on the lot weight — see Table 2			

Each sub-lot shall be sampled separately. The number of incremental samples of 100 g to be taken depends on the weight of the lot, with a minimum of 10 and a maximum of 100. The figures in the following Table 2 shall be used to determine the number of incremental samples to be taken and the subsequent division of the aggregate sample.

**Table 2: Number of incremental samples to be taken according to lot weight
– Whole nutmeg, whole dried chilli and whole paprika –
(for lots < 25 tonnes)**

Lot weight (tonnes)	No of incremental samples	Aggregate sample weight (kg)
≤ 0.1	10	1
> 0.1 – ≤ 0.2	15	1.5
> 0.2 – ≤ 0.5	20	2
> 0.5 – ≤ 1.0	30	3
> 1.0 – ≤ 2.0	40	4
> 2.0 – ≤ 5.0	60	6
> 5.0 – ≤ 10.0	80	8
> 10.0 – <25.0	100	10

If the test result is ≤ Codex ML, then accept the lot; otherwise, reject the lot.

B) Spices with small particle size (crushed/cracked/broken/flakes of nutmeg, dried chilli and paprika)

In the case of large lots and on condition that the subplot can be separated physically, each lot shall be subdivided into sublots following Table 3. Taking into account that the weight of the lot is not always an exact multiple of the weight of the sublots, the weight of the subplot may exceed the mentioned weight in Table 3 by a maximum of 20%.

**Table 3: Subdivision of spices sublots according to lot weight
- crushed/cracked/broken/flakes of nutmeg, dried chilli and paprika -**

Lot weight (tonnes)	Weight or number of sublots	Number of incremental samples	Aggregate sample weight (kg)
≥ 25	25 tonnes	100	10
< 25	—	5 – 100 (*)	0.5 – 10
(*) Depending on the lot weight — see Table 4			

Each subplot shall be sampled separately. The number of incremental samples of 100 g to be taken depends on the lot weight, with a minimum of 5 and a maximum of 100, resulting in an aggregate sample of 0.5 to 10 kg. Table 4 can be used to determine the number of incremental samples to be taken from lots of various sizes.

**Table 4: Number of incremental samples to be taken according to lot weight
- crushed/cracked/broken/flakes of nutmeg, dried chilli and paprika –
(for lots < 25 tonnes)**

Lot weight (tonnes)	Number of incremental samples	Aggregate sample weight (kg)
≤ 0.01	5	0.5
> 0.01 – ≤ 0.1	10	1
> 0.1 – ≤ 0.2	15	1.5
> 0.2 – ≤ 0.5	20	2
> 0.5 – ≤ 1.0	30	3
> 1.0 – ≤ 2.0	40	4
> 2.0 – ≤ 5.0	60	6
> 5.0 – ≤ 10.0	80	8
> 10.0 – < 25.0	100	10

If the test result is ≤ Codex ML, then accept the lot; otherwise, reject the lot.

C) Powdered spices (obtained by grinding nutmeg, dried chilli and paprika)

In the case of large lots and on condition that the subplot can be separated physically, each lot shall be subdivided into sublots following Table 5. Taking into account that the weight of the lot is not always an exact multiple of the weight of the sublots, the weight of the subplot may exceed the mentioned weight in Table 5 by a maximum of 20%.

**Table 5: Subdivision of spices sublots according to lot weight
- Powdered spices (nutmeg, dried chilli and paprika) -**

Lot weight (tonnes)	Weight or number of sublots	Number of incremental samples	Aggregate sample weight (kg)
≥ 25	25 tonnes	50	4
< 25	—	3 – 50 (*)	0.24 – 4.0
(*) Depending on the lot weight — see Table 6			

Each subplot shall be sampled separately. The number of incremental samples of 80 g to be taken depends on the lot weight, with a minimum of 3 and a maximum of 50 incremental samples. Table 6 can be used to determine the number of incremental samples to be taken from lots of various sizes.

Table 6: Number of incremental samples of powdered spices to be taken depending on the weight of the lot - (for lots < 25 tonnes) -

Lot weight (tonnes)	Minimum number of incremental samples	Minimum aggregate sample weight (kg)
≤ 0.1	3	0.24
$> 0.1 - \leq 0.5$	10	0.8
$> 0.5 - \leq 5.0$	25	2
$> 5.0 - \leq 10.0$	35	2.8
$> 10.0 - < 25.0$	50	4

If the test result is \leq Codex ML, then accept the lot; otherwise, reject the lot.

3.2 FAO/WHO COORDINATING COMMITTEE FOR ASIA

SAMPLING PLANS FOR VARIOUS COMMODITIES IN REGIONAL STANDARDS DEVELOPED BY CCASIA

(for inclusion in following regional standards: CXS 322R-2015; CXS 298R-2009; CXS 301R-2011; CXS 323R-2013; CXS 323-2017; CXS 354R-2023; CXS 355R-2023; and the Regional standard for quick frozen dumpling (Asia) pending adoption)

Inspection by attributes plans in accordance with ISO 2859-1 (AQL=6.5%)

Lot size Number of packages, each containing 1 or more units)	Inspection level					
	Reduced		Normal		Tightened	
	Sample size (n)	Acceptance number (c)	Sample size (n)	Acceptance number (c)	Sample size (n)	Acceptance number (c)
2-15	2	0	2	0	3	0
16-50	5	1	8	1	13	1
51-90	5	1	13	2	13	1
91-150	8	2	20	3	20	2
151-280	13	3	32	5	32	3
281-500	20	5	50	7	50	5
501-1200	32	6	80	10	80	8
1201-3200	50	8	125	14	125	12
3201 and over	80	10	200	21	200	18

Note

- If sample size n equals to or exceeds lot size, carry out 100% inspection.
- The number of samples to be analyzed is n. If the number of samples that do not meet criterion is less than or equal to c, the lot should be accepted. Otherwise, the lot should be rejected.

Inspection by variable plans in accordance with ISO 3951-1 (AQL=6.5%)

Lot size (number of packages, each containing 1 or more units)	Inspection level					
	Reduced		Normal		Tightened	
	n	k	n	k	n	k
2-15	4	0.586	4	0.735	3	0.950
16-25	4	0.586	6	0.939	6	1.061
26-50	4	0.586	6	0.887	9	1.218
51-90	5	0.550	9	0.869	9	1.190
91-150	7	0.507	14	0.935	14	1.147
151-280	9	0.628	21	0.945	21	1.227
281-500	14	0.601	33	1.036	32	1.225
501-1200	21	0.830	52	1.120	50	1.245
1201-3200	33	0.954	79	1.195	78	1.281
3201 and over	52	1.120	124	1.239	122	1.325

Note

- If sample size n equals to or exceeds lot size, carry out 100 percent inspection.
- In case of minimum limit, if the sample mean is higher than the minimum limit plus k times standard deviation, the lot should be accepted. Otherwise, reject the lot.

- In case of maximum limit, if the sample mean is lower than the maximum limit minus k times standard deviation, the lot should be accepted. Otherwise, reject the lot.

Part 4

METHODS OF ANALYSIS WHICH REMAIN UNCHANGED IN CXS 234 AS A RESULT OF DECISIONS BY CCMAS45 (For information)**4.1 CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS**

Cereals, pulses and legumes and derived products				
Commodity	Provision	Method	Principle	Type
Quinoa	Protein	ISO 1871	Titrimetry (Kjeldahl digestion)	IV
Degermed maize (corn) meal and maize (corn) grits	Protein	ICC 105/2 and ICC 110/1	Calculation from moisture and Titrimetry (Kjeldahl digestion)	I

4.2 FISH AND FISHERY PRODUCTS

Fish and fishery products				
Commodity	Provision	Method	Principle	Type
Crackers from marine and freshwater fish, crustacean and molluscan shellfish	Crude protein	AOAC 2001.11	Titrimetry (Kjeldahl digestion)	IV

4.3 SUGARS AND HONEY

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Honey	Diastase activity	IHC Method for determination of diastase activity with Phadebas, 2009 except that the incubation time should be increased from 15 to 30 minutes		IV

Part 5

METHODS OF ANALYSIS WHICH REMAIN UNCHANGED IN STANDARDS OTHER THAN CXS 234 AS A RESULT OF DECISIONS BY CCMAS45
(For information)

STANDARD FOR PEANUTS (CXs 200-1995)

ANNEX

Factor/Description	Limit	Method of analysis
1. In-Pod Defects		
1.1 Empty Pods: pods containing no kernels.	3% m/m	To be determined
1.2 Damaged Pods: include: shrivelled pods (pods which are imperfectly developed and shrunken); or pods having cracks or broken areas which cause conspicuous openings or which seriously weaken a large portion of the pod, especially if the kernel inside the pod is easily visible without any pressure forced upon the edges of the crack.	10% m/m	To be determined
1.3 Discoloured Pods: pods having dark discolouration caused by mildew, staining, or other means affecting 50% or more of the pod surface.	2% m/m	To be determined
2. Kernel Defects		
2.2 scoured Kernels: kernels are not damaged but are affected by one or more of the following: flesh (cotyledon) discolouration which is darker than a light yellow colour or consists of more than a slight yellow pitting of the flesh; and/or skin discolouration which is dark brown, dark grey, dark blue, or black, and covers more than 25% of the kernel.	3% m/m	To be determined

2.3	Broken and Split Kernels: broken kernels are those from which more than a quarter has been broken off. Split kernels have been split into halves.	3% m/m	To be determined
3.	Peanuts other than the designated type.	5% m/m	To be determined

STANDARD FOR OATS (CXS 201-1995)**ANNEX**

Factor/Description		Limit	Method of analysis
2	Hull-less and broken kernels (kernels with no hulls and broken of any size).	5% m/m max	To be developed
3	Edible grains other than oats (whole or identifiably broken).	3% m/m max	To be developed
4	Damaged kernels (including pieces of kernels that show visible deterioration due to moisture, weather, disease, insects, mould, heating, fermentation, sprouting or other causes).	3% m/m max	To be developed
5	Wild oats: <i>Avena fatua</i> or <i>Avena sterilis</i> .	0.2% m/m max	To be developed
6	Insect bored kernels: kernels which have been visibly bored or tunnelled by insects.	0.5% m/m max	To be developed
7	Blemished grains , i.e. grains with stained hulls due to the action of climatic factors.	To be decided	To be developed

APPENDIX III

**METHODS OF ANALYSIS FOR INFORMATION FOR CCFO AND FUTURE ADOPTION AND INCLUSION
IN CXS 234-1999 UPON FINALISATION OF THE STANDARD FOR MICROBIAL OMEGA-3 OILS BY
CCFO**

Note: changes indicated in **bold** and underlined font.

Fats and oils				
Commodity	Provision	Method	Principle	Type
<u>Microbial omega-3 oils</u>	<u>Fatty acid composition</u>	<u>ISO 12966-2 and ISO 12966-4</u>	<u>Preparation of FAME* and determination by GC-FID</u>	III
<u>Microbial omega-3 oils</u>	<u>Fatty acid composition</u>	<u>AOCS Ce 2-66 and AOCS Ce 1i-07</u>	<u>Preparation of FAME* and determination by GC-FID</u>	II
<u>Microbial omega-3 oils</u>	<u>EPA and DHA</u>	<u>Ph. Eur. 2.4.29 / USP 401</u>	<u>GC-FID</u>	II
<u>Microbial omega-3 oils</u>	<u>EPA and DHA</u>	<u>AOCS Ce 1i-07</u>	<u>GC-FID</u>	III
<u>Microbial omega-3 oils</u>	<u>Peroxide Value</u>	<u>AOCS Cd 8b-90 / ISO 3960 / NMKL 158 / Ph. Eur. 2.5.5</u>	<u>Titrimetry</u>	I
<u>Microbial omega-3 oils</u>	<u>Anisidine Value</u>	<u>Ph. Eur. 2.5.36 / AOCS Cd 18-90 / ISO 6885</u>	<u>Spectrophotometry-UV</u>	I
<u>Microbial omega-3 oils</u>	<u>Acid Value</u>	<u>AOCS Ca 5a-40 / AOCS Cd 3d-63 / ISO 660 / NMKL 38 / USP 401. Method 1</u>	<u>Titrimetry</u>	I
<u>Microbial omega-3 oils</u>	<u>Unsaponifiable matter</u>	<u>ISO 3596 / AOCS Ca 6b-53</u>	<u>Gravimetry and Titrimetry</u>	I
<u>Microbial omega-3 oils</u>	<u>Moisture</u>	<u>ISO 8534</u>	<u>Titrimetry (Karl Fischer)</u>	II
<u>Microbial omega-3 oils</u>	<u>Moisture</u>	<u>AOCS Ca 2e-84</u>	<u>Titrimetry (Karl Fischer)</u>	III

*FAME = Fatty Acid Methyl Esters

APPENDIX IV

METHODS OF ANALYSIS FOR FURTHER CONSIDERATION
(For referral)

Note: Text indicated in ~~strike through~~, or **bold** and underlined font indicate changes and/or additions discussed in relation to the method of analysis as it currently appears in CXS 234-1999.

Part 1. CEREALS, PULSES AND LEGUMES AND DERIVED PRODUCTS - for referral to CCCPL

Cereals, pulses and legumes and derived products				
Commodity	Provision	Method	Principle	Type
<u>Wheat</u>	<u>Insect bored kernels</u>	<u>ISO 7970</u>	<u>Visual examination and gravimetry</u>	!

Part 2. COCOA PRODUCTS AND CHOCOLATE – for review by the EWG on cocoa products and chocolate workable package

Cocoa products and chocolate				
Commodity	Provision	Method	Principle	Type
Chocolate and chocolate products	Cocoa butter_	AOAC 963.15 / IOCCC <u>ICA No. 14</u>	Gravimetry (Soxhlet extraction)	I
Chocolate and chocolate products	Fat, total <u>Cocoa butter</u> on dry basis_	ICA No. 26 / AOAC 977.10 and AOAC 963.15 <u>/ ICA No. 14</u>	Calculation from moisture (determined as water) <u>water</u> and gravimetry (Soxhlet extraction)	I
Chocolate and chocolate products	Milk_fat	IOCCC <u>ICA No. 5</u>	Titrimetry / Distillation	I IV
<u>Chocolate and chocolate products</u>	<u>Milk fat</u>	<u>AOCS Ce 11a-07 / ISO 11053</u>	<u>GC-FID and calculation</u>	!
<u>Chocolate and chocolate products</u>	<u>Milk fat</u>	<u>AOAC 990.27</u>	<u>GC-FID and calculation</u>	!
<u>Chocolate and chocolate products</u>	<u>Milkfat</u>	<u>AOAC 945.34; 925.41B; 920.80</u>	<u>Titrimetry / Distillation</u>	I

Cocoa products and chocolate				
Commodity	Provision	Method	Principle	Type
Chocolate and chocolate products	Moisture	IOCCC 26 or AOAC 977.10 (Karl Fischer method); or AOAC 931.04 or IOCCC 1	Gravimetry	I
Chocolate and chocolate products	Non-cocoa butter vegetable fat	AOCS Ce 10/-02 and described in the standard	Described in the standard GC-MS	I IV
<u>Chocolate and chocolate products</u>	<u>Cocoa butter equivalents in cocoa butter and plain chocolate</u>	<u>ISO 23275-1 and ISO 23275-2 / AOCS Ce 11-05</u>	<u>GC-FID</u>	I
<u>Chocolate and chocolate products</u>	<u>Cocoa butter equivalents in milk chocolate</u>	<u>ISO 11053 / AOCS Ce 11a-07</u>	<u>GC-FID</u>	I
<u>Chocolate and chocolate products</u>	<u>Determination of centre and coating of filled chocolate</u>	<u>See Appendix **</u>		
Cocoa (cacao) mass or cocoa/ chocolate liquor, and cocoa cake	<u>Cocoa butter Fat</u>	AOAC 963.15 / or ICA No. IOCCC 14	Gravimetry (Soxhlet extraction)	I
Cocoa butter	Free fatty acids	ISO 660 / or AOCS Cd 3d-63	Titrimetry	I
Cocoa butter	Unsaponifiable matter	ISO 3596 or ISO 18609 or / AOCS Ca 6b-53	Titrimetry Gravimetry after extraction with diethyl ether	I
<u>Cocoa butter</u>	<u>Unsaponifiable matter**</u>	<u>ISO 18609</u>	<u>Gravimetry after extraction with hexane</u>	IV
Cocoa powders (cocoa) and dry cocoa-sugar mixtures	Moisture <u>(determined as water)</u>	IOCCC ICA No. 26 or / AOAC 977.10 (Karl Fischer method)	Gravimetry Titrimetry - Karl Fischer	I II
<u>Cocoa powders (cocoas) and dry mixtures of cocoa and sugars</u>	<u>Determination of content of full-fat cocoa powder, fat-reduced cocoa powder and highly fat-reduced cocoa powder</u>	<u>EU CLEN Method ILIADe 112 and AOAC 963.15 / ICA No. 14</u>	<u>HPLC-UV, Gravimetry (Soxhlet extraction) and calculation</u>	I
<u>Cocoa powders (cocoas) and dry mixtures of cocoa and sugars</u>	<u>Cocoa butter</u>	<u>AOAC 963.15 / ICA No. 14</u>	<u>Gravimetry (Soxhlet extraction)</u>	I

* Applicable for products which do not contain milkfat or other added fats

**** Results obtained from ISO 18609 are systematically lower. In case of limitations due to climate or regulations that prohibit the use of diethyl ether, ISO 18609 can be used instead of the Type I method.**

Appendix ** of CXS 234-1999

DETERMINATION OF CENTRE AND COATING OF FILLED CHOCOLATE IN CHOCOLATE AND CHOCOLATE PRODUCTS

All methods approved for the chocolate type used for the coating and those approved for the type of centre concerned.

Part 3. CODEX COMMITTEE ON FATS AND OILS – for referral to CCFO

Fats and oils				
Commodity	Provision	Method	Principle	Type
<u>Microbial omega-3 oils</u>	<u>Moisture</u>	<u>ISO 8534</u>	<u>Titrimetry (Karl Fischer)</u>	II
<u>Microbial omega-3 oils</u>	<u>Moisture</u>	<u>AOCS Ca 2e-84</u>	<u>Titrimetry (Karl Fischer)</u>	III
<u>Microbial omega-3 oils</u>	<u>Moisture and volatile matter at 103 °C</u>	<u>ISO 662</u>	<u>Gravimetry</u>	I
<u>Microbial omega-3 oils</u>	<u>Moisture and volatile matter at 130 °C</u>	<u>AOCS Ca 2c-25</u>	<u>Gravimetry</u>	I

Part 4. CODEX COMMITTEE ON SPICES AND CULINARY HERBS – for referral to CCSCH

Spices and culinary herbs				
Commodity	Provision	Method	Principle	Type
<u>Large cardamom</u>	<u>Mammalian and/or other excreta</u>	<u>AOAC 993.27</u>	<u>Colorimetry</u>	III
<u>Dried or dehydrated coriander</u>	<u>Mammalian and/or other excreta</u>	<u>AOAC 993.27</u>	<u>Colorimetry</u>	
<u>Dried or dehydrated coriander</u>	<u>Mammalian and/or other excreta</u>	<u>ISO 927</u>	<u>Visual examination (gravimetry)</u>	

Part 5. FRUIT JUICES AND NECTARS – for review by the EWG on fruit juices and nectars workable package

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Pectin (additives)	IFUMA 26	Precipitation / photometry	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx}	Determination of stable hydrogen isotope ratio of water from fruit juices ENV 12142	Stable isotope mass spectrometry	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Vitamin C (dehydro-ascorbic acid and ascorbic acid) (Quality / Authenticity)</u>	Determination of vitamin C (dehydro-ascorbic acid and ascorbic acid) AOAC 967.22	Microfluorometry	III
Fruit juices and nectars	Ascorbic acid-L <u>(additives)</u>	IFU 17a	HPLC- <u>UV</u>	II
Fruit juices and nectars	Ascorbic acid-L <u>(additives)</u>	AOAC 967.21 / ISO 6557-2	<u>Titrimetry</u> (Indophenol method)	III
Fruit juices and nectars	Ascorbic acid-L <u>(additives)</u>	IFU 17b	<u>Potentiometric titrimetry</u> (iodine) method	III
<u>Fruit juices and nectars</u>	<u>Determination of glucose, fructose, sucrose and sorbitol</u> <u>(additive / authenticity)</u>	<u>IFU 67</u>	<u>HPLC-RI</u>	II

^{xx} **3.4 Verification of composition, quality and authenticity**

Fruit juices and nectars should be subject to testing for authenticity, composition and quality where applicable and where required. The analytical methods used should be those found in Section 9 (Methods of analysis and sampling).

The verification of a sample's authenticity/quality can be assessed by comparison of data for the sample, generated using appropriate methods included in the standard, with that produced for fruit of the same type and from the same region, allowing for natural variations, seasonal changes and for variations occurring due to processing.

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
<u>Fruit juices and nectars</u>	<u>Determination of glucose, fructose and sucrose (additive / authenticity)</u>	<u>NMKL 148</u>	<u>HPLC-RI</u>	<u>III</u>
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005 ^{xx}	Determination of glucose fructose and saccharose EN 12630 IFUMA 67 NMKL 148	HPLC	II
Fruit juices and nectars	Quinic, malic and citric acid in cranberry juice cocktail and apple juice (permitted ingredients and additives) <u>(Quality / Additive / Authenticity)</u>	Determination of quinic, malic and citric acid in cranberry juice cocktail and apple juice AOAC 986.13	HPLC- <u>UV</u>	III
Fruit juices and nectars	Sucrose (permitted ingredients) <u>(Additive / Authenticity)</u>	EN 12630 IFUMA 67 <u>NMKL 148</u>	HPLC- <u>RI</u>	II
<u>Fruit juices and nectars</u>	<u>Sucrose (Additive / Authenticity)</u>	<u>NMKL 148</u>	<u>HPLC-RI</u>	<u>III</u>
Fruit juices and nectars	Tartaric acid in grape juice (additives) <u>(Quality/Additive/Authenticity)</u>	EN 12137 IFUMA 65	HPLC- <u>UV</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005 ^{xx} <u>Fermentability (Quality/Authenticity)</u>	Determination of fermentability IFUMA 18	Microbiological method	I

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Anthocyanins (Quality/Authenticity)</u>	Detection of anthocyanins IFUMA 71	HPLC- <u>UV</u>	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Beet sugar in fruit juices (Authenticity)</u>	Detection of beet sugar in fruit juices AOAC 995.17	<u>Magnetic Resonance spectrometry (D-NMR)</u> Deuterium NMR	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>C¹³/C¹² ratio of ethanol derived from fruit juices (Authenticity)</u>	Determination of C¹³/C¹² ratio of ethanol derived from fruit juices JAOAC 79, No. 1, 1996, 62-72	<u>Stable isotope mass spectrometry</u> IRMS	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Carbon stable isotope ratio of apple juice (Authenticity)</u>	Determination of carbon stable isotope ratio of apple juice AOAC 981.09 - JAOAC 64, 85 (1981)	<u>Stable isotope mass spectrometry</u> IRMS	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Carbon stable isotope ratio of orange juice (Authenticity)</u>	Determination of carbon stable isotope ratio of orange juice AOAC 982.21	<u>Stable isotope mass spectrometry</u> IRMS	II

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Carotenoid, total/individual groups (Authenticity)</u>	Determination of carotenoid, total/individual groups EN 12136; IFUMA 59	Spectrophotometry	I
Fruit juices and nectars	<u>Cellobiose (Quality/Authenticity)</u>	IFUMA 4	Capillary gas chromatography <u>Cap-GC-FID</u>	IV
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Formol number (Quality/Authenticity)</u>	Determination of formol number EN 1133 IFUMA 30	Potentiometric titration	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Free amino acids (Quality/Authenticity)</u>	Determination of free amino acids EN 12742 IFUMA 57	Liquid Chromatography	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Hesperidin and naringin (Quality/Authenticity)</u>	Determination of hesperidin and naringin EN 12148 IFUMA 58	HPLC	II
Fruit juices and nectars	High Fructose Corn Syrup and Hydrolysed Inulin Syrup in apple juice (permitted ingredients) <u>(Additive / Authenticity)</u>	Determination of HFCS and HIS by Capillary GC method JAOAC 84, 486 (2001) / IFU recommendation No. 4	<u>CAP-GC-FID</u>	IV

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Naringin and neohesperidin in orange juice (Quality/Authenticity)</u>	Determination of naringin and neohesperidin in orange juice AOAC 999.05	HPLC-UV	III
Fruit juices and nectars	Phosphorus/phosphate <u>(Quality/Additive/Authenticity)</u>	EN 1136 / IFU 50	Photometric determination <u>Photometry</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Proline by photometry – non-specific determination (Quality/Authenticity)</u>	Determination of proline by photometry – non-specific determination EN 1141 IFUMA 49	Photometry	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Sodium, potassium, calcium, magnesium in fruit juices (Quality/Authenticity)</u>	Determination of sodium, potassium, calcium, magnesium in fruit juices EN 1134 IFUMA 33	Atomic absorption spectroscopy <u>AAS</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Stable carbon isotope ratio in the pulp of fruit juices (Authenticity)</u>	Determination of stable carbon isotope ratio in the pulp of fruit juices ENV 13070 Analytica Chimica Acta 340 (1997) / <u>IFU 88</u>	Stable isotope mass spectrometry <u>IRMS</u>	II

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Stable carbon isotope ratio of sugars from fruit juices (Authenticity)</u>	Determination of stable carbon isotope ratio of sugars from fruit juices ENV 12140 Analytica Chimica Acta 271 (1993) / <u>IFU 88</u>	Stable isotope mass spectrometry <u>IRMS</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx}	Determination of stable oxygen isotope ratio in fruit juice water ENV 12141	Stable isotope mass spectrometry	II
<u>Fruit juices and nectars</u>	<u>Stable oxygen isotope ratio in fruit juice water (Authenticity)</u>	<u>IFU 89</u>	<u>IRMS</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Sugar beet derived syrups in frozen concentrated orange juice $\delta^{18}\text{O}$ measurements in water (Authenticity)</u>	Determination of sugar beet derived syrups in frozen concentrated orange juice $\delta^{18}\text{O}$ Measurements in water AOAC 992.09	Oxygen isotope ratio analysis <u>IRMS</u>	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Benzoic acid as a marker in orange juice for pulpwash (Quality/Authenticity)</u>	Determination of benzoic acid as a marker in orange juice AOAC 994.11	HPLC	III

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Chloride (expressed as sodium chloride) (Authenticity)</u>	Determination of chloride (expressed as sodium chloride) EN 12133 IFUMA 37	Electrochemical titrimetry	III
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Fumaric acid (Quality/Authenticity)</u>	Determination of fumaric acid IFUMA 72	HPLC	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Essential oils (Scott titration) (Quality/Authenticity)</u>	Determination of essential oils (Scott titration) AOAC 968.20 / IFUMA45 ^{xxi}	(Scott) Distillation, / titration	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx}	Determination of pH value NMKL 179	Potentiometry	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>pH-value (Quality)</u>	Determination of pH value EN 1132 IFUMA 11 / <u>NMKL 174</u> / ISO 1842	Potentiometry	IV II
Fruit juices and nectars	Soluble solids <u>(Quality)</u>	AOAC 983.17 / EN 12143 / IFU 8 / ISO 2173	Indirect by refractometry	I

^{xxi} Because there is no numerical value in the standard, duplicate Type I methods have been included which may lead to different results.

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Starch (Quality)</u>	Detection of starch AOAC 925.38 / IFUMA 73	Colorimetric	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Titrateable acids, total (Quality/Authenticity)</u>	Determination of titrable acids, total EN 12147 IFUMA 03 ISO 750	Titrimetry	I
Fruit juices and nectars	Benzoic acid and its salts; sorbic acid and its salts <u>(Additive)</u>	IFUMA 63 / NMKL 124	HPLC- <u>UV</u>	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Ash in fruit products (Quality/Authenticity)</u>	Determination of ash in fruit products AOAC 940.26; / EN 1135 ; IFUMA 9	Gravimetry	I
Fruit juices and nectars	Sulphur dioxide (additives)	Optimized Monier Williams AOAC 990.28 / IFUMA 7A NMKL 132	Titrimetry (after distillation)	II
<u>Fruit juices and nectars</u>	<u>Sulphur dioxide (additives)</u>	<u>NMKL 132</u>	<u>Spectrophotometric (after distillation)</u>	III
Fruit juices and nectars	Ascorbic acid-L	ISO 6557-2	<u>Titrimetry</u> (Indophenol method)	III
Fruit juices and nectars	Ascorbic acid-L	ISO 6557-1	Fluorescence spectroscopy	IV
Fruit juices and nectars	Malic acid (additives)	AOAC 993.05	<u>HPLC and</u> Enzymatic determination and HPLC	III

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Malic acid-D	IFUMA 64	Enzymatic determination	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Isocitric acid-D (Quality criteria / Authenticity)</u>	Determination of isocitric acid-D IFUMA 54	Enzymatic determination	II
Fruit juices and nectars	Citric acid ^{xix} (additives / <u>authenticity</u>)	IFUMA 22	Enzymatic determination	III
Fruit juices and nectars	Glucose-D and fructose-D (permitted ingredients) <u>(Additive / Authenticity)</u>	IFUMA 55	Enzymatic determination	II
Fruit juices and nectars	Malic acid-L (<u>Additive / Authenticity</u>)	IFU 21	Enzymatic determination	II
Fruit juices and nectars	Sucrose (<u>Additive / Authenticity</u>)	IFU 56	Enzymatic determination	III
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>L-malic/total malic acid ratio in apple juice (Quality/Authenticity)</u>	Determination of L-malic/total malic acid ratio in apple juice AOAC 993.05	Enzymatic determination and HPLC	II

xx 3.4 Verification of composition, quality and authenticity

Fruit juices and nectars should be subject to testing for authenticity, composition and quality where applicable and where required. The analytical methods used should be those found in Section 9 (Methods of analysis and sampling).

The verification of a sample's authenticity/quality can be assessed by comparison of data for the sample, generated using appropriate methods included in the standard, with that produced for fruit of the same type and from the same region, allowing for natural variations, seasonal changes and for variations occurring due to processing.

xix All juices except citrus based juices.

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Sorbitol-D (Quality / Authenticity)</u>	Determination of sorbitol-D IFUMA 62	Enzymatic determination	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Acetic acid (Quality / Authenticity)</u>	Determination of acetic acid IFUMA 66	Enzymatic determination	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Alcohol (ethanol) (Quality)</u>	Determination of alcohol (ethanol) IFUMA 52	Enzymatic determination	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Gluconic acid (Quality)</u>	Determination of gluconic acid IFUMA 76	Enzymatic determination	II
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Glycerol (Quality)</u>	Determination of glycerol IFUMA 77	Enzymatic determination	II

Fruit juices and nectars				
Commodity	Provision	Method	Principle	Type
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Lactic acid- D and L (Quality)</u>	Determination of Lactic acid- D and L IFUMA 53	Enzymatic determination	II
Fruit juices and nectars	Sulphur dioxide (additives)	NMKL 135	Enzymatic determination	III
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>pH-value (Quality)</u>	Determination of pH value ISO 1842	Potentiometry	IV II
Fruit juices and nectars	Soluble solids <u>(Quality)</u>	ISO 2173	Indirect by refractometry	I
Fruit juices and nectars	Sections 3.2 Quality criteria and 3.3 Authenticity of CXS 247-2005^{xx} <u>Titrateable acids, total (Quality/Authenticity)</u>	Determination of titrateable acids, total ISO 750	Titrimetry	I

***ACA = anhydrous citric acid**

Part 6. SUGARS AND HONEY – for review by the EWG on sugars and honey workable package**Part 6.1 Methods for consideration for the development of method performance criteria**

Sugars and honey				
Commodity	Provision	Method	Principle	Type
<u>Honey</u>	<u>Hydroxymethylfurfural</u>	<u>AOAC 980.23</u>	<u>Spectrophotometry-UV</u>	<u>III</u>
<u>Honey</u>	<u>Hydroxymethylfurfural</u>	<u>IHC 5</u>	<u>HPLC-UV</u>	<u>II</u>
Sugars (fructose)	D-Fructose	ISO 10504	Liquid chromatography (refractive index detection) <u>HPLC-RI</u>	II
Sugars (fructose)	D-Glucose	ISO 10504	Liquid chromatography (refractive index detection) <u>HPLC-RI</u>	II
<u>Sugars (plantation or mill white sugar)</u>	<u>Sulfites (expressed as sulphur dioxide) > 50 mg/kg ML</u>	<u>AOAC 962.16 (for > 50 mg/kg ML)</u>	<u>Titrimetry Modified Monier – Williams</u>	<u>III</u>
<u>Sugars (plantation or mill white sugar)</u>	<u>Sulfites (expressed as sulphur dioxide)</u>	<u>AOAC 990.28</u>	<u>Titrimetry Modified Monier – Williams</u>	<u>III</u>
<u>Sugars (plantation or mill white sugar)</u>	<u>Sulfites (expressed as sulphur dioxide)</u>	<u>ICUMSA GS 2-33</u>	<u>Colorimetry</u>	<u>IV</u>
<u>Sugars (all)</u>	<u>Sulfites (expressed as sulphur dioxide)</u>	<u>US FDA Method C-004.04</u>	<u>LC-MS/MS</u>	<u>IV</u>
Sugars (plantation or mill white sugar, <u>powdered sugar and powdered dextrose, raw cane sugar, soft white sugar and soft brown sugar, white sugar</u>)	<u>Sulphur dioxide</u> <u>Sulfites (expressed as sulphur dioxide)</u>	ICUMSA GS 2/3-35 <u>2-35</u> NMKL 135 EN 1988-2	Enzymatic <u>spectrophotometry-UV</u>	II

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Sugars (dextrose anhydrous and dextrose monohydrate, fructose, glucose syrup and dried glucose syrup)	<u>Sulphur dioxide Sulfites (expressed as sulphur dioxide)</u>	ISO 5379	Acidimetry and nephelometry	IV
Sugars (fructose)	<u>Sulphur dioxide Sulfites (expressed as sulphur dioxide)</u>	ISO 5379	Acidimetry and nephelometry	IV
Sugars (glucose syrup and dried glucose syrup)	<u>Sulphur dioxide Sulfites (expressed as sulphur dioxide)</u>	ISO 5379	Acidimetry and nephelometry	IV

Method performance criteria for powdered sugar and powdered dextrose

<u>Commodity</u>	<u>Provision</u>	<u>ML (%)</u>	<u>Method performance criteria</u>					<u>Example of methods that meet the criteria</u>	<u>Principle</u>
			<u>Minimal applicable range (%)</u>	<u>Limit of detection (LOD) (%)</u>	<u>Limit of quantification (LOQ) (%)</u>	<u>Precision (RSD_R) (%) no more than</u>	<u>Recovery (%)</u>		
Powdered sugar and powdered dextrose	Dextrose anhydrous (as D-glucose)	99.5	93.5 - 105.5	9.95	19.9	4			
Powdered sugar and powdered dextrose	Dextrose monohydrate (as D-glucose)	99.5	93.5 - 105.5	9.95	19.9	4			
Powdered sugar and powdered dextrose	Glucose syrup	20	18.5 - 21.5	2	4	5			
Powdered sugar and powdered dextrose	Fructose (laevulose)	98	92.1 - 103.9	9.8	19.6	4			
Powdered sugar and powdered dextrose	Fructose (laevulose)	0.5	0.43 - 0.57	0.05	0.1	9			

Method performance criteria for honey

<u>Commodity</u>	<u>Provision</u>	<u>ML (mg/kg)</u>	<u>Method performance criteria</u>					<u>Example of methods that meet the criteria</u>	<u>Principle</u>
			<u>Minimal applicable range (mg/kg)</u>	<u>Limit of detection (LOD) (mg/kg)</u>	<u>Limit of quantification (LOQ) (mg/kg)</u>	<u>Precision (RSD_R) (%) no more than</u>	<u>Recovery (%)</u>		
Honey	Hydroxymethylfurfural content	40	29.0 – 51.0	4.0	8.0	18			
Honey (declared origin from countries or regions with tropical ambient temperatures, and blends of these honeys)	Hydroxymethylfurfural content	80	60.1 – 99.9	8.0	16.0	17			

Part 6.2 Other methods returned for further consideration

Sugars and honey				
<u>Commodity</u>	<u>Provision</u>	<u>Method</u>	<u>Principle</u>	<u>Type</u>
<u>Honey</u>	<u>Diastase activity</u>	<u>AOAC 958.09 / IHC 6.1</u>	<u>Enzymatic spectrophotometry-visible</u>	<u>I</u>
<u>Honey</u>	<u>Sugars added (authenticity)</u>	<u>EN 17958**</u> <u>** For authenticity ranges, refer to: Apidologie 2008, 39 (5), 574-587</u>	<u>HPLC-IRMS</u>	<u>III</u>
<u>Honey</u>	<u>Sugars profile (glucose, fructose, sucrose)</u>	<u>AOAC 977.20</u>	<u>HPLC-RI</u>	<u>IV</u>
Honey	Diastase activity	IHC Method for determination of diastase activity with Phadebas, 2009 except that the incubation time should be increased from 15 to 30 minutes		IV
<u>Honey excluding mānuka honey</u>	<u>Sugars added: detection of C₄ sugar</u>	<u>AOAC 998.12</u>	<u>IRMS</u>	<u>II</u>

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Sugars (dextrose anhydrous and dextrose monohydrate)	D-Glucose	ISO 5377	Titrimetry <u>(Lane & Eynon)</u>	I
Sugars (fructose, <u>powdered sugar</u> , <u>white sugar</u> , <u>plantation or mill white sugar</u>)	Conductivity ash	ICUMSA GS 2/3-17 2-17	Conductimetry	I
Sugars (powdered sugar)	Conductivity ash	ICUMSA GS 2/3-17	Conductimetry	I
Sugars (white sugar)	Conductivity ash	ICUMSA GS 2/3-17	Conductimetry	I
Sugars (plantation or mill white sugar, <u>soft white sugar and soft brown sugar</u>)	Conductivity ash	ICUMSA GS 4/3/4/7/8-13 1-13	Conductimetry	I
Sugars (soft white sugar and soft brown sugar)	Conductivity ash	ICUMSA GS 1/3/4/7/8-13	Conductimetry	I
Sugars (lactose)	Loss on drying	USP General Chapter 731	Gravimetry (drying at 120 °C for 16h)	I
Sugars (plantation or mill white sugar)	Invert sugar (<u>as reducing sugars</u>)	ICUMSA GS 1/3/7-3-1-3	Titrimetry (Lane & Eynon)	I IV
<u>Sugars (plantation or mill white sugar)</u>	<u>Invert sugar (as reducing sugars)</u>	<u>ICUMSA GS 1-5</u>	<u>Titrimetry – Luff Schoorl</u>	IV
<u>Sugars (plantation or mill white sugar)</u>	<u>Invert sugar</u>	<u>FCC 14th Ed Sucrose monograph. for Organic Impurities - Invert Sugar</u>	<u>HPLC - PAD</u>	II
Sugars (<u>white sugar</u> , powdered sugar)	Invert sugar (<u>as reducing sugars</u>)	ICUMSA GS 2/3-5 2-5 after filtration if necessary to remove any anticaking agents	Titrimetry - <u>Knight & Allen</u>	I

Sugars and honey				
Commodity	Provision	Method	Principle	Type
Sugars (white sugar)	Invert sugar	ICUMSA GS 2/3-5	Titrimetry	I
Sugars (powdered sugar)	Invert sugar	ICUMSA GS 2-4 after filtration if necessary to remove any anticaking agents	Enzymatic spectrophotometry-UV	IV
Sugars (soft white sugar and soft brown sugar)	Invert sugar (as reducing sugars)	ICUMSA GS 4/3-3 4-3 (applicable at levels >10% m/m)	Titrimetry (Lane & Eynon)	I
Sugars (soft white sugar and soft brown sugar)	Invert sugar (as reducing sugars)	ICUMSA GS 1/3/7-3 1-3 (applicable at levels <10% m/m)	Titrimetry (Lane & Eynon)	I IV

APPENDIX V

RESPONSE FROM CCMAS TO THE REQUEST FROM CCFL47

In response to the request from CCFL47 to CCMAS (see [REP23/FL](#)) regarding suitable methods of analysis to support precautionary allergen labelling (PAL), CCMAS compiled methods in use by Codex Members for each priority allergen listed in Table 11 of Risk Assessment of Food Allergens Part 2: Review and Establish Threshold Levels in Foods for the Priority Allergens. These allergens include wheat, cereals containing gluten (e.g. wheat) plus other gluten containing foods (*Triticum* species including rye and other *Secale* species, barley and other *Hordeum* species and their hybridized strains), crustacea, eggs, fish, milk, peanuts, sesame, and specific tree nuts (almond, cashew, hazelnut, pecan, pistachio, and walnut). No methods were submitted for pecan or pistachio, but these could be reviewed again should CCFL require it. In addition to wheat, CCMAS agreed to include cereals containing gluten (e.g. other *Triticum* species, rye and other *Secale* species, barley and other *Hordeum* species and their hybridized strains). CCMAS additionally collated and categorized the method title, analysis principle, target analyte, conversion factors to mass of total protein from the allergenic food, LOQ or analytical measurement range, validation status, validation quality assurance, and method performance data from the validation study. In all, CCMAS collected over 100 sets of method validation data for evaluation against the following method development, validation, and performance guidelines (noting, the most recent guideline version must be utilized in each case):

- AOAC Appendix M
- EN 17855 (ELISA)
- EN 17644 (LC-MS)
- EN 17254 (ELISA Gluten)
- EN 15634 (PCR)

It is important to note that these AOAC and EN guidelines are not officially endorsed by Codex but serve as important reference against which to evaluate method performance and validation statuses. CCMAS informs CCFL that Codex members may also use these guidelines if they wish to evaluate method performance when implementing CCFL's work on PAL. CCMAS reviewed and agreed to include in its response to CCFL the methods contained in Tables 1 and 2 of this reply. Table 1 includes methods that were either collaboratively studied or performance tested methods. These methods have shown acceptable performance on blinded food samples. Table 2 includes methods that were validated either at the manufacturer, in a single laboratory, or in-house.

The analytical methods in Tables 1 and 2 may be suitable for use in the process of conducting risk assessment for determining if UAP can be controlled below the specified action levels (ALs) for each allergenic food and supporting PAL. The AL will be dependent on the reference amount determined to be relevant in the risk assessment. However, food business operators must demonstrate that the selected method is fit for purpose for the specified AL and matrix in question. In addition, the following caveats apply:

- The tables reflect methods compiled by CCMAS that meet either the CEN performance requirements and/or the AOAC validation guidelines for at least one commodity—they are not exhaustive, and not all methods are able to measure across all foods at all specified ALs. Future methods will likely become available that can also meet the performance requirements.
- Currently, only a limited number of collaboratively studied and standardized test methods for allergen determination are available.
- The performance (accuracy, precision, recovery, etc.) of food allergen analytical methods is heavily dependent upon the food matrix and food production processing (e.g. exposure to high temperature, fermentation, etc.) and can lead to erroneous results. Consistent with the FAO/WHO Risk Assessment of Food Allergens Part 2' Section 8.2 paragraph 1 the CCMAS tables 1 and 2 list methods using Enzyme-Linked Immunosorbent Assay (ELISA) and LC MS/ MS, with a majority of ELISA methods because of their wider use and consequently the larger underlying evidence base, followed to a less extent LC-MS/MS. Although it is preferable for allergen test methods to target protein, in some instances where such test methodology is lacking, alternative methods, such as those based on DNA, may need to be used, nevertheless, conversion of DNA copies to total protein is a potential source of issues for these techniques and constitutes an indirect method for determining the presence of allergenic food.
- Food business operators must be aware that quantitative testing results produced by different test kits on the same test material may not necessarily agree. They are advised to select a test kit that has an appropriate sensitivity for the specified allergen in the selected food matrix and complies with the performance requirements in AOAC Appendix M and/or EN 17855 (ELISA).

- With regard to whether the methods are suitable for assessing the risk of UAP in foods, the ALs in Table 11 of the [Risk Assessment of Food Allergens Part 2: Review and Establish Threshold Levels in Foods for the Priority Allergens](#) vary by approximately two orders of magnitude. The suitability of a method at the relevant AL is dependent on the amount of food consumed, reference amount (RfA), and the reference dose (RfD). Some methods included in tables 1 and 2 are appropriate at certain RfAs but not others. The analytical range of a method (including dilutions as needed to quantify higher concentrations) must span the relevant AL before food business operators and/or trading partners begin testing. If there are instances where the level of UAP approaches the AL, then the precision and accuracy of the method at those concentrations should be understood.
- The LOQ of the method should be lower than the allergen AL because methods tend to not be as reliable at concentrations near the LOQ. A factor of 3 has been proposed to provide a safety margin (e.g. at an AL as low as 1 mg/kg, the method should have a LOQ of 0.33 or lower).
- The reporting units in many ELISA kits are not in the same units as the ALs. In many cases a conversion factor is required to convert the test reporting units into mg total protein from the allergenic food / kg food. CCMAS encountered inconsistent reporting of conversion factors. To avoid confusion and simplify interpretation against the ALs, analytical results should be reported in a standardized unit (mg total protein from the allergenic source / kg of food), but this is not always possible to include in a single table (e.g. for crustacean, tropomyosin conversion to total protein is heavily dependent on crustacean source and there is not a single conversion factor for all crustaceans). Food business operators and trading partners must ensure the test results are in the appropriate reporting units or use a valid conversion factor to calculate the correct reporting units.
- Methods for the determination of gluten in Table 1 lack explicit association to the specific food sources of gluten (e.g. wheat, barley, rye, etc.). Methods that quantify gluten are aligned with the outputs of the recent FAO/WHO expert consultation on reference doses for gluten: <https://openknowledge.fao.org/handle/20.500.14283/cd7703en>.
- Laboratory users must review kit validation data for cross reactivities (e.g. for allergen analytical methods targeting walnut and cashew, a high degree of cross-reactivity with pecan and pistachio, respectively, has been reported, and depending on the assay kit, LOQ for pecan or pistachio may differ by approximately one order of magnitude from those for the intended target analytes). Users must also choose ELISA kits that will not produce false positives on the food matrix being tested. To facilitate this process, sample submitters must provide comprehensive sample product composition. Laboratory users should also note there are other factors in the samples under analysis which can cause false positives which are not related to cross reactivity (e.g. non-specific binding due to polyphenols, colors, etc.). The manufacturer-provided selectivity study is a resource but does not guarantee against cross reactivity.
- Some ELISA kits have critical changes since the time when validation studies were performed. For example, some manufacturers have changed extraction buffers to less hazardous reagents, and the associated performance of these kits may have changed. Since testing kits are updated on a regular basis, often maintaining the same kit name, it is difficult to relate the literature to the current iteration of the kit. Few kit manuals reference or publish the data relating directly to the development of that kit. If required, kit users can approach kit manufacturers and request whether further details and validation data are available to receive.¹³ Users must ensure the method or ELISA kit chosen can meet the intended needs.
- Regarding validation, while collaborative studies estimate method performance in practice and independent laboratory studies (e.g. performance tested methods) can demonstrate how the method performs on an unknown in practice, these do not necessarily indicate that a method performs superiorly to methods that have only been validated by the manufacturer or validated in a single laboratory.
- Most proprietary methods are not distributed globally and the lack of availability and for certain regions to access these methods would be restrictive to trade. Nevertheless, the provision of the information in this reply may encourage broader supplier distribution.
- While the tables include methods that were submitted, multiple allergen testing kits with manufacturers' in-house validations are available from a range of suppliers and may also be appropriate, but this should be verified (see AOAC and EN guidelines reference above for guidance).
- Qualitative methods submitted to CCMAS were excluded from the tables of methods given the intended use.

¹ FSA-UK (2023) Review of allergen analytical testing methodologies: Allergen detection methods: Unbiased literature search , <https://www.food.gov.uk/research/review-of-allergen-analytical-testingmethodologies-allergen-detection-methods-unbiased-literature-search>

CCMAS therefore encourages CCFL to consider these limitations with respect to Tables 1 and 2 and to ensure that trading partners and users of the methods are aware of them. Users will need to review and if necessary, to verify method performance for their specific case and should consult the validation guidelines and performance requirements above. In addition to future methods likely becoming available, CCMAS emphasizes that there are many methods that were developed and validated before the AOAC guidelines and CEN performance requirements were published—the results of those methods are not invalidated, and users can obtain additional validation data where needed.

For CCFL's information, most of the methods submitted to the EWG rely on proprietary methods, typically in the form of ELISA kits. The Codex Procedural Manual specifies that "a proprietary method should not be endorsed if a suitable non-proprietary method of analysis is available" and that "preference should be given to adopting appropriate method criteria rather than endorsing a specific proprietary method of analysis."²

The submitted list of methods in tables 1 and 2 shall not be construed as a recommendation or an endorsement of food allergen methods. They are intended to facilitate CCFL's deliberations regarding reference doses and should not be forwarded by CCFL to CCMAS for endorsement nor included as a reference in CCFL's texts.

CCMAS can confirm that methods are available to detect and quantify unintended allergen presence (UAP) in foods from cross contact with detection and quantification limits (LOD and LOQ) suitable to determine if UAP is above or below the action levels established by the FAO/WHO Expert Consultation for priority allergens for intakes of foods from 10 g to 1000 g.

² *Codex Procedural Manual*. 30th edition. Section 2.13: Provisions on the use of proprietary methods in Codex standards. Pg. 70.

Table 1: Methods of analysis in support of precautionary allergen labeling with published, multi-laboratory validation studies or performance tested methods.

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Crustacea	Shimadzu FA test EIA-crustacea II	ELISA	08624	0.31 – 20 mg crustacean protein/kg	J AOAC Int., 101(3), 798-804 (2018); J AOAC Int., 91, 123-129 (2008)
Crustacea	Crustacean kit II "Maruha Nichiro"	ELISA	55362	LOQ: 0.66 mg crustacean protein/kg (Catalog range 0.8 – 20 mg crustacean protein/kg)	J AOAC Int., 101, 798-804 (2018)
Egg	FASTKIT ELISA Ver.III EGG	ELISA	NPH-999100430EX	0.31 – 20 mg egg protein/kg	Food Safety 9.4 (2021): 101-116
Egg	Allergeneye ELISA II Egg Prima	ELISA	077834	1 – 20 mg egg protein/kg	Food Safety 9.4 (2021): 101-116
Egg	Morinaga BioSciences Egg (Ovalbumin) ELISA Kit II	ELISA	M2111	0.31 – 20 mg egg protein /kg	J AOAC Int., 89(6), 1600-1608 (2019); https://doi.org/10.1093/jaoac/89.6.1600
Gluten	AOAC PTM 081202: ALLER-TEK® Gluten ELISA	ELISA	ELISA Technologies	LOQ: 5 mg gluten /kg	AOAC PTM 081202
Gluten	AOAC PTM 061201:Neogen Veratox® for Gliadin R5	ELISA	700002592	LOQ: 5 mg gluten /kg	AOAC PTM 061201
Gluten	AOAC PTM 052005: SENSISpec INgezim Gluten R5	ELISA	Gold Standard Diagnostics	LOQ: 3 – 4 mg gluten /kg	AOAC PTM 052005
Gluten	AOAC PTM 042301: GlutenTox ELISA Rapid G12	ELISA	Hygiena	LOQ: 1.2 mg gluten /kg	AOAC PTM 042301
Gluten	AOAC PTM 032301: TotalTarget Kit for Gluten	Immunochromatographic test	EnviroLogix	LOQ: 4 mg gluten /kg	AOAC PTM 032301
Gluten	AOAC PTM 011804: Wheat/Gluten ELISA Kit	ELISA	Morinaga BioSciences M2103	LOQ: 0.06 – 0.49 mg gluten /kg	AOAC PTM 011804

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Gluten	AOAC 2018.15: RIDASCREEN® Total Gluten	ELISA	R-Biopharm R7041	LOQ: 5 mg gluten /kg	https://doi.org/10.1093/jaoac/102.5.1535
Gluten	AOAC 2015.05: RIDASCREEN® Gliadin competitive	ELISA	R-Biopharm R7021	LOQ: 10 mg gluten /kg	https://doi.org/10.5740/jaoacint.CS2015.15
Gluten	AOAC 2014.03: AgraQuant Gluten G12 ELISA®	ELISA	Romer Labs	LOQ: 4 mg gluten /kg	https://doi.org/10.5740/jaoacint.14-197
Gluten	AOAC 2012.01: RIDASCREEN® Gliadin	ELISA	R-Biopharm R7001	LOQ: 5 mg gluten /kg (2.5 mg gliadin /kg)	https://doi.org/10.1093/jaoacint/qsab148
Gluten	FASTKIT ELISA Ver.III WHEAT	ELISA	999100135	0.31 – 20 mg gluten /kg	Food Safety 9.4 (2021): 101-116
Gluten	Morinaga BioSciences Wheat/Gluten (Gliadin) ELISA Kit II	ELISA	M2114	0.31 – 20 mg wheat protein/kg, 0.26 – 17 mg gluten/kg	Food Safety 9.4 (2021): 101-116; AOAC PTM No.011804
Gluten	Allergeneye ELISA II Wheat	ELISA	077847	1 – 20 mg wheat protein/kg	Food Safety 9.4 (2021): 101-116
Milk	AOAC PTM 101501: RIDASCREEN® FAST Milk	ELISA	R-Biopharm R4652	LOQ: 2.5 mg milk protein/kg	AOAC PTM 101501
Milk	FASTKIT ELISA Ver.III MILK	ELISA	999100424	0.31 – 20 mg milk protein/kg	Food Safety 9.4 (2021): 101-116
Milk	Allergeneye ELISA II Milk Prima	ELISA	077836	1 – 20 mg milk protein/kg	Food Safety 9.4 (2021): 101-116
Milk	Morinaga BioSciences Total Milk ELISA Kit II	ELISA	M2122	0.31 – 20 mg milk protein/kg	Casein Protein ELISA Kit: J AOAC INT.VOL. 89, NO. 6, (2006)
Peanut	AOAC PTM 030403 Neogen Veratox for Peanut Allergen Test	ELISA	700002569	2.5 – 25 mg peanut /kg	AOAC PTM 030403
Peanut	AOAC PTM 112102: RIDASCREEN® Peanut	ELISA	R6811	Range: 0.166 – 1.33 mg peanut protein /kg	AOAC PTM 112102
Peanut	FASTKIT ELISA Ver.III PEANUT	ELISA	999100141	0.31 – 20 mg peanut protein/kg	Food Safety 9.4 (2021): 101-116

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Peanut	Allergeneye ELISA II Peanut Prima	ELISA	077860	1 – 20 mg peanut protein /kg	Food Safety 9.4 (2021): 101-116
Peanut	Morinaga BioSciences Peanut ELISA Kit II	ELISA	M2116	0.31 – 20 mg peanut protein/kg	Food Safety 9.4 (2021): 101-116.

Table 2: Methods of analysis currently available in support of precautionary allergen labeling but lacking multi-laboratory validation studies.

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Almond	RIDASCREEN® FAST Mandel/Almond (R609)	ELISA	R609	0.575 – 4.6 mg almond protein /kg	Manufacturer validation report not available
Almond	Neogen Veratox for Almond	ELISA	700002574	2 – 25 mg almond /kg	In-house manufacturer validation report available upon request
Cashew	RIDASCREEN® FAST Cashew R6872	ELISA	R6872	2.5 – 20 mg cashew /kg	Member reported in-house validation only
Cashew	BioFront Technologies - MonoTrace Cashew ELISA kit	ELISA	CA2-EK-96	LOQ = 1 mg cashew (whole) /kg, range = 1 – 40 mg cashew (whole) /kg; LOQ = 0.17 mg cashew protein, range 0.17 – 7 mg cashew protein/kg	Manufacturer validation report includes cake, cookies, chocolate, ice cream, powdered infant soy formula, yogurt, milk & spices.
Cashew	Neogen Veratox VIP for Cashew	ELISA	700002605	0.2 – 0.5 mg cashew protein / kg	In-house manufacturer validation report available upon request
Cashew	SENSISpec ELISA Cashew	ELISA	HU0030004	2 mg Cashew (whole) /kg	Manufacturer validation report for cookies, cornflakes, ice cream and dark chocolate.
Crustacea	Neogen Veratox for Crustacea Allergen	ELISA	700002598	2.5 – 25 mg total crustacea (shrimp)/kg	In-house manufacturer validation report available upon request

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Crustacea	AgraQuant Crustacea ELISA test kit (10002076)	ELISA	10002076	LOQ is equivalent to 0.7 mg/kg of shrimp protein; 20 - 400 ppb tropomyosin, 0.1 - 2 mg crustacea protein / kg	Unpublished in-house validation only.
Crustacea	ELISA Systems Crustacean Tropomyosin Residue Assay	ELISA	ESCRURD-48	0.05 – 0.5 mg Crustacean Tropomyosin /kg food	ELISA Systems Validation Report Crustacean Tropomyosin Oct 2020
Egg	AOAC 2017.17: Detection and Quantitation of Selected Food Allergens: LC-MS/MS	LC-MS/MS		LOQ: 3 mg whole egg powder/kg (1.44 mg total egg protein/kg food)	https://doi.org/10.5740/jaoacint.19-0112
Egg	RIDASCREEN FAST Ei/Egg	ELISA	R6402	0.24 mg/kg – 6.48 mg egg protein/kg	Manufacturer validation report Sept. 2017 available online
Egg	Romer Labs AgraQuant Egg White ELISA	ELISA	10002026	0.4 - 10 mg egg white protein/kg	Manufacturer validation
Egg	ELISA Systems Processed Egg Residue Detection Kit	ELISA	ESEGGPR-48	0.48 – 4.8 mg egg protein /kg	ELISA Systems Validation Report Processed Egg May 2021
Egg	RIDASCREEN FAST Lysozym	ELISA	R6452	0.25 mg/kg – 2.0 mg Lysozyme / kg – food; 0.05 mg/kg – 0.4 mg Lysozyme / kg – wine	r-Biopharm, RIDASCREEN FAST Lysozym Product Information 02/2016
Egg	Neogen Veratox for Egg Allergen	ELISA	700002575	2.5 – 25 mg whole dried egg /kg food	In-house manufacturer validation report available upon request
Fish	GOLD STANDARD DIAGNOSTICS FISH ELISA	ELISA	FIS-E01/E04	LOQ: 4.0 mg cod/kg food	Manufacturer validation

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Fish	AgraQuant Fish ELISA test	ELISA	10002083	4 – 100 mg cod /kg food	Manufacturer validation
Gluten	RIDASCREEN EASY Gluten	ELISA	RAE7071	3 – 48 mg gluten/kg	Manufacturer validation
Hazelnut	AOAC 2017.17: Detection and Quantitation of Selected Food Allergens: LC-MS/MS	LC-MS/MS		LOQ: 10 mg hazelnut/kg (1.503 mg hazelnut protein/kg food)	https://doi.org/10.5740/jaoacint.19-0112
Hazelnut	RIDASCREEN FAST Hazelnut	ELISA	R-Biopharm R6802	0.375 – 3.0 mg hazelnut protein/kg	Manufacturer validation
Hazelnut	RIDASCREEN EAS Hazelnut	ELISA	R-Biopharm RAE6401	0.3 – 5.4 mg hazelnut protein /kg	Manufacturer validation
Hazelnut	ELISA Systems Hazelnut Residue Detection Kit	ELISA	ESHRD-48	0.5 – 5.0 mg hazelnut protein/kg	ELISA Systems Validation Report Hazelnut December 2020 v2
Hazelnut	Hazelnut ELISA Kit II MloBS	ELISA	Morinaga BioSciences M2119	0.16 – 10 mg hazelnut protein / kg	Manufacturer validation
Hazelnut	Neogen Veratox for Hazelnut Allergen	ELISA	700002564	2.5 – 25 mg/kg hazelnut	In-house manufacturer validation report available upon request
Milk	AOAC 2017.17: Detection and Quantitation of Selected Food Allergens: LC-MS/MS	LC-MS/MS		LOQ: 10 mg fluid milk/kg (2.564 mg total milk protein/kg food)	https://doi.org/10.5740/jaoacint.19-0112
Milk	Neogen Veratox for total milk allergen	ELISA	700002577	2.5 – 25 mg nonfat dried milk /kg food	Manufacturer validation
Milk	RIDASCREEN FAST β -lactoglobulin	ELISA	R-Biopharm R4912	Range: 0.167 – 4.5 mg β -lactoglobulin / kg (corresponding to 1.67-45 mg milk protein/kg)	Manufacturer validation

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Milk	AgraQuant R MILK ELISA	ELISA	RomerLabs 10002080	Range: 0.4 mg/kg – 10 mg milk protein/kg , 2.0 – 50.0 mg milk protein /kg meat products	Manufacturer validation
Milk	AgraQuant Beta-Lactoglobulin ELISA	ELISA	RomerLabs 10002034	Range: 0.01 – 0.4 mg β -lactoglobulin / kg	Manufacturer validation
Milk	ELISA Systems Casein Residue Detection Kit	ELISA	ESCASPRD-48	0.35 – 3.5 mg total milk protein/kg	ELISA Systems Validation Report Casein September 2024
Milk	RIDASCREEN FAST Casein	ELISA	R-Biopharm R4612	Unprocessed samples: 0.5 – 13.5 mg casein / kg (0.63 – 16.9 mg milk protein /kg) Processed samples: 2.5 – 67.5 mg casein / kg (3.13 – 84.4 mg milk protein /kg)	Manufacturer validation
Milk	ELISA Systems β -Lactoglobulin (BLG) Detection Kit	ELISA	ESMRDBLG-48	1.0 – 10 mg total milk protein /kg	ELISA Systems Validation Report BLG Nov 2022
Milk	SENSIspec ELISA total milk protein	ELISA	HU0030014	0.4 – 10 mg milk protein / kg	Manufacturer validation
Peanut	AOAC 2017.17: Detection and Quantitation of Selected Food Allergens: LC-MS/MS	LC-MS/MS		LOQ:10 mg peanut/kg (2.22 mg total peanut protein/kg food) in cookies, 3 mg/kg (0.666 mg total peanut protein/kg food) in breakfast cereals	https://doi.org/10.5740/jaoacint.19-0112

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Peanut	Morinaga BioSciences High Sensitive Peanut ELISA Kit II	ELISA	M2120	0.2 – 12.8 mg peanut protein/kg	Manufacturer validation
Peanut	Neogen Veratox VIP for Peanut	ELISA	700002570	0.25 – 5 mg peanut protein / kg	In-house manufacturer validation report available upon request
Sesame	Neogen Veratox for Sesame	ELISA	700002599	2.5 – 25 mg/kg sesame	In-house manufacturer validation report available upon request
Sesame	RIDASCREEN FAST SESAME	ELISA	R7202	0.53 – 4 mg sesame protein / kg	Manufacturer validation
Sesame	ELISA Systems Sesame Seed Protein Residue Assay	ELISA	ESSESE-48	0.25 – 2.5 mg sesame seed protein /kg	ELISA Systems Validation Report Sesame Dec 2022
Walnut	SENSISpec ELISA WALNUT	ELISA	HU0030024	LOQ 0.3 mg walnut protein/kg food; RANGE: 0.3 – 3.0 mg walnut protein/kg food	Gold Standard Diagnostic QP-19REP-99 Version 03EN
Walnut	BIOFRONT MONOTRACE WALNUT	ELISA	WJ4-EK-96	LOQ: 2 mg walnut / kg	Manufacturer validation
Walnut	AgraQuant R Walnut	ELISA	10002030	Range 2 – 60 mg walnut / kg	Manufacturer validation
Walnut	Neogen Veratox VIP for Walnut	ELISA	700002601	0.15 – 0.75 mg walnut protein /kg	In-house manufacturer validation report available upon request
Walnut	FASTKIT ELISA Ver.III WALNUT	ELISA	999500165	0.31 – 20 mg walnut protein/kg	
Walnut	FA test EIA-Walnut	ELISA	08637	0.31 – 20 mg walnut protein/kg	

Allergen	Method	Principle	Catalog or website	Analytical Range / Limits (mg/kg)	Validation Citation
Walnut	Morinaga BioSciences Walnut ELISA Kit II	ELISA	M2124	0.31 – 20 mg walnut protein/kg	
Walnut	RIDASCREEN Walnut	ELISA	R6601	0.16 – 2.84 mg walnut protein /kg	Manufacturer validation

INFORMATION DOCUMENT ON THE HARMONIZATION OF NAMES AND FORMAT FOR PRINCIPLES IN CXS 234-1999

(For publication on the Codex website)

1. General Guideline

The term “principle” mentions only the description of the technique related to determining the test result (Annex A). The techniques used for sample preparation, extraction and separation are not included.

2. Definitions

For the purposes of alignment and harmonization regarding what is considered the principle of an analytical method, the definitions from the [ISO Online Browsing Platform \(OBP\)](#) apply.

In addition to the OBP, the following definitions apply:

- **Biological assay:** A technique to determine the concentration, potency or effect of a substance *in vivo* or *in vitro*.
- **Chromatography:** A technique of separation in which the components to be separated are distributed between two phases, one of which is stationary (stationary phase) while the other (the mobile phase) moves in a definite direction.
- **Titrimetry:** The quantitative determination of a given component in a solution by adding a liquid reagent of known concentration (titrant) until past an endpoint where all of the component has reacted with the titrant.
- **Volumetry:** A technique that determines the volume that a test item occupies.

3. Criteria Used

3.1. Assays Whose Results Are Method Dependent

- A. Description in the principle of the predominant method parameters (but not all the method parameters) that makes the result(s) method dependent, if necessary, for example: temperature, conversion factor;
- B. Description only of the analytical technique used to obtain the numerical value of a “provision”, since the other information is described in the methods. Therefore, the following may not be included, unless critical for the determination of the numerical value of the “provision”, for example: equipment, solvents or reagents used; and
- C. For tests that involve the culturing of microorganisms at a certain temperature, the temperature may be included in the “principle” description because it is critical for the determination of the correct result.

Examples:

Provision	Principle
Moisture	Gravimetry (drying at 105 °C)
Protein (Nx6.25)	Titrimetry and calculation
Carbohydrates	Calculation based on the results of moisture, protein, fat, ash and dietary fibre
Halphen test	Colorimetry
Net weight	Gravimetry
Foreign Matter	Visual examination - Gravimetry
Fat	Gravimetry
<i>Lactobacillus acidophilus</i>	Colony count at 37 °C

3.2. Assays Whose Results Are Independent of the Method

For instrumental tests, the technique used must refer to the main equipment used, for example: for separation, and the detector used for determination. Ideally, these assays are collaboratively trialed, and where the measurand(s) are well defined entities, traceable to International System (SI) units.

Examples:

Provision	Principle
Aflatoxin M1	High Performance Liquid Chromatography with Fluorescence Detector (HPLC-FLD)
Fatty acids	Gas Chromatography with Flame Ionization Detector (GC-FID)
Nitrate	Ultraviolet-Visible (UV-Vis) Spectrometry
Manganese	Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)
pH	Potentiometry
Mercury	Atomic Absorption Spectrometry with Cold Vapor Generator (CVAAS)

4. Additional Information

Considering the acceptance of the criteria described above, it is considered necessary to remove secondary information from method principles such as: “ashing”, “ceramic filter filtration”, “complexometry”, “centrifugation”, “weighing”, “distillation”, “enzymatic”, “flotation”, “single sulfation”, “sieving” unless critical to the method as the following examples:

- ‘Calcium - Complexometry titrimetry’ or ‘Complexometric titrimetry’ methods remain in CXS 234. Suggest as ‘Titrimetry - complexometric’
- The principle ‘Gravimetry - sieving’ should be retained.
- ‘Particle size (granularity) - Sieving’ or Particle size (granularity) - Gravimetry (sieving), then the principle ‘sieving’ or ‘Gravimetry (sieving)’ will need to retained.

PRINCIPLES OF METHODS OF ANALYSIS

1. Anodic Stripping Voltammetry (ASV)
2. Atomic Absorption Spectrophotometry (AAS)
 - Cold Vapour (CVAAS)
 - Flame atomic absorption (FAAS)
 - Flow Injection Analysis (FIA AAS)
 - Graphite Furnace (GFAAS)
 - Hydride Generation (HGAAS)
3. Biological assay
 - Bioassay (in animals, tissue, plants)
 - Microbioassay
4. Immunoassay
 - Enzyme-Linked ImmunoSorbent Assay (ELISA)
5. Calculation
6. Colony count at (temperature) °C
7. Conductimetry/Resistivity
8. Confocal Laser Scanning Microscopy (CLSM)
9. Densitometry:
 - Hydrometer
 - Pycnometer
 - Digital Density
 - Vibratory density
10. DNA Assay
 - DNA Comet Assay
11. Polymerase chain reaction (PCR)
12. Electrophotometry
13. Enzymatic
14. Gravimetry
 - Incineration at (temperature) °C
 - Drying at (temperature) °C
 - Evaporation at (temperature) °C
 - Microwave oven drying
 - Röse-Gottlieb
 - Schmid-Bondzynski- Ratzlaff
 - Sieving
 - Soxhlet
 - Vacuum Drying at (temperature) °C
 - Weibull-Berntrop
15. Inductively Coupled Plasma (ICP)
 - Isotope Dilution Mass Spectrometry (ID MS)

- High Resolution Mass Spectrometry (HRMS)
- Mass Spectrometry (MS)
- Optical Emission Spectroscopy (OES)
- Collision/Reaction Cell Mass Spectrometry (CRCMS)
- Tandem Mass Spectrometry (MS/MS)

16. Chromatography

16.1 Liquid chromatography (LC):

- High Performance Liquid Chromatography (HPLC)
- Ultra-High Performance Liquid Chromatography (UHPLC)

Detector for HPLC and UHPLC:

- Charged Aerosol Detector (CAD)
- Diode Array Detector (DAD)
- Evaporative Light Scatter Detector (ELSD)
- Fluorescence Detector (FLD)
- Infrared (IR)
- Isotope Dilution Mass Spectrometry (ID MS)
- Mass Spectrometry (MS)
- High resolution Mass Spectrometry (HRMS)
- Isotope ratio Mass Spectrometry (IRMS)
- Pulsed amperometry detection (PAD)
- Refractive index (RI)
- Tandem Mass Spectrometry (MS/MS)
- Ultraviolet (UV)
- Ultraviolet-Visible (UV-Vis)

16.2 Gas chromatography (GC):

- Headspace (HS)
- Capillary gas chromatography (CGC)

Detector for HS and CGC:

- Electron Capture Detector (ECD)
- Flame Ionization Detector (FID)
- Flame Photometric Detector (FPD)
- Nitrogen Phosphorus Detector (NPD)
- Thermal Conductivity Detector (TCD)
- Mass Spectrometry (MS)
 - Tandem Mass Spectrometry (MS/MS)
 - High Resolution Mass Spectrometry (HRMS)

16.3 Ion Exchange Chromatography (IC)

Detector for IC:

- Diode Array Detector (DAD)
- Electrochemical Detector (EC)

- Mass Spectrometry (MS)
- Pulsed Amperometric Detector (PAD)
- Refractive index (RI)
- Conductivity Detector (CD)
- Ultraviolet-Visible (UV-Vis)
- Variable Wavelength Detector (VWD)

16.4 Thin Layer Chromatography (TLC)

- High Performance Thin Layer Chromatography (HPTLC)
Detector for HPTLC:
 - Densitometric detector
 - Fluorescence (FLD)
 - Ultraviolet-Visible (UV-Vis)

17. Microscopy

- Electronic microscopy
- Optical microscopy

18. Flotation

19. Nephelometry

20. Nuclear Magnetic Resonance Spectroscopy (NMR)

21. Panel test

22. Photometry

23. Photostimulated Luminescence (PSL)

24. Polarimetry

25. Potentiometry

- Ion selective electrode (ISE)
- pH electrode (pH)

26. Refractometry

27. Receptor Binding Assay (RBA)

28. Sensory analysis

29. Spectrometry

- Fluorescence (FL)
- Isotope ratio mass spectrometry (IRMS)
- Ultraviolet (UV)
- Ultraviolet-Visible (UV-Vis)
- Mass spectrometry (MS)
- Tandem mass spectrometry (MS/MS)
- High resolution mass spectrometry (HRMS)
- Fluorometry

30. Spectroscopy

- Electron Spin Resonance (ESR)
- Fourier Transform Infrared (FTIR)
- Infrared Spectroscopy (IR)

- Mid-infrared (Mid-IR)
 - Near Infrared Reflectance (NIRS)
 - Raman (RS)
 - Cavity Ringdown Spectroscopy (CRDS)
31. Stable Isotope Ratio Mass Spectrometry (IRMS)
 32. Thawing
 33. Thermoluminescence
 34. Thermometry
 35. Titrimetry
 - Acidity
 - Complexometry
 - Coulometry
 - Electrochemical
 - Iodimetry & Iodometry
 - Karl Fischer
 - Kjeldahl Digestion
 - Lane & Eynon
 - Mohr
 - Potentiometry
 - Wijs
 - Argentometry
 - Alkalimetry
 36. Turbidimetry
 37. Visual examination
 - Count
 - Gravimetry
 - Macroscopy
 - Micrometry
 38. Volumetry
 39. Weighing

ANNEX B

ACRONYMS AND ABBREVIATIONS OF PRINCIPLES OF METHODS OF ANALYSIS¹

AAS	Atomic Absorption Spectrophotometry
ASV	Anodic Stripping Voltammetry
CD	Conductivity Detector
CE	Capillary Electrophoresis
CLSM	Confocal Laser Scanning Microscopy
cPCR	Conventional Polymerase Chain Reaction
CRCMS	Collision/Reaction Cell Mass Spectrometry
CRDS	Cavity Ringdown Spectroscopy
CVAAS	Cold Vapour Atomic Absorption Spectrophotometry
DAD	Diode Array Detector
EC	Electrochemical Detector
ECD	Electron Capture Detector
IRMS	Isotope Ratio Mass Spectrometry
ISE	Ion Selective Electrode
ELISA	Enzyme-Linked ImmunoSorbent Assay
ESR	Electron Spin Resonance
FAAS	Flame Atomic Absorption Spectrophotometry
FIA	Flow injection Analysis
FID	Flame Ionization Detector
FLD	Fluorescence Detector
FPD	Flame Photometric Detector
FTIR	Fourier Transform Infrared Spectroscopy
GC	Gas Chromatography
GFAAS	Graphite Furnace Atomic Absorption Spectrophotometry
HGAAS	Hydride Generation Atomic Absorption Spectrophotometry
HPAEC	High Performance Anion Exchange chromatography
HPLC	High Performance Liquid Chromatography
HPTLC	High Performance Thin Layer Chromatography
HRMS	High Resolution Mass Spectrometry
IC	Ion Chromatography
ICP	Inductively Coupled Plasma
ID	Isotope Dilution
IMS	Isotope mass Spectrometry
IRS	Infrared Spectroscopy
LC	Liquid Chromatography

¹ The table will be included as an Annex to the *Recommended methods of analysis and sampling* (CXS 234-1999) and a link will be inserted in this document.

MALDI	Matrix-Assisted Laser Desorption Ionization
MS	Mass Spectrometry
MS/MS	Tandem Mass Spectrometry
NIRS	Near Infrared Reflectance Spectroscopy
NMR	Nuclear Magnetic Resonance Spectroscopy
NPD	Nitrogen Phosphorus Detector
OES	Optical Emission Spectrometry
PAD	Pulsed Amperometry Detection
PCR	Polymerase Chain Reaction
pH	pH electrode
PSL	Photostimulated Luminescence
qPCR	Real Time Qualitative Polymerase chain reaction
Q-ICPMS	Quadrupole Inductively couple plasma mass spectrometry
QTOF	Quadrupole Time-of-Flight
RI	Refractive Index
RS	Raman Spectroscopy
RT-PCR	Reverse Transcriptase PCR
TLC	Thin-Layer Chromatography
TOF	Time-of-Flight
UHPLC	Ultra-High Performance Liquid Chromatography
UV	Ultraviolet
UV-Vis	Ultraviolet-Visible
VWD	Variable Wavelength Detector

ANNEX C

LIST OF ACRONYMS FOR STANDARD METHOD REFERENCES²

AACC	Cereals & Grains Association	(www.cerealsgrains.org/)
AIIBP	International Association of the Bouillon and Soup Industry	(www.culinaria-europe.eu/)
Anal. Chim. Acta.	Analytica Chimica Acta	(https://www.sciencedirect.com/journal/analytica-chimica-acta)
AOAC	AOAC INTERNATIONAL	(www.aoac.org/)
AOCS	American Oil Chemists' Society	(www.aocs.org/)
BS	British Standard	(www.bsigroup.com)
EN	European Standards	(www.en-standard.eu/)
EPA	Environmental Protection Agency	(www.epa.gov/)
EUsalt	European Salt Producers Association	(https://eusalt.com/)
FDA	Food and Drug Administration [Laboratory methods]	(www.fda.gov/)
ICC	International Association for Cereal Science and Technology	(https://icc.or.at/)
ICUMSA	International Commission for Uniform Methods of Sugar Analysis	(www.icumsa.org/)
IDF	International Dairy Federation	(https://fil-idf.org/)
IFU	International Fruit and Vegetable Juice Association [IFU Methods Analysis IFUMA]	(https://ifu-fruitjuice.com/)
IHC	International Honey Commission	(www.ihc-platform.net/)
ICA	International Confectionery Association	(www.international-confectionery.org/)
ICCO	International Cocoa Organization	(www.icco.org/)
IOC	International Olive Council	(www.internationaloliveoil.org/)
IS	Indian Standard	(www.bis.gov.in/)
ISI	International Starch Institute	(www.starch.dk/)
ISO	International Organization for Standardization	(www.iso.org/)
IUPAC	International Union of Pure and Applied Chemistry	(www.iupac.org/); (www.old.iupac.org/)
NMKL	Nordic-Baltic Committee on Food Analysis	(www.nmkl.org/)
OIV	International Organisation of Vine and Wine	(www.oiv.int/)
Ph. Eur	European Pharmacopoeia	(www.edqm.eu/en/european-pharmacopoeia)
USP	US Pharmacopoeia	(www.usp.org/)
WEFTA	West European Fish Technologists Association	(www.wefta.org)

² The table will be included as an Annex to the *Recommended methods of analysis and sampling* (CXS 234-1999) and a link will be inserted in this document.