



**Food and Agriculture
Organization of
the United Nations**



**World Health
Organization**

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REP13/CF

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION

36th Session

Rome, Italy, 1-5 July 2013

REPORT OF THE SEVENTH SESSION OF THE CODEX COMMITTEE ON CONTAMINANTS IN FOODS

Moscow, Russian Federation

8 – 12 April 2013



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To: Codex Contact Points
Interested International Organizations

From: Secretariat,
Codex Alimentarius Commission,
Joint FAO/WHO Food Standards Programme,
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Subject: DISTRIBUTION OF THE REPORT OF THE SEVENTH SESSION OF THE CODEX COMMITTEE ON CONTAMINANTS IN FOODS (REP13/CF)

The Report of the Seventh Session of the Codex Committee on Contaminants in Foods is attached. It will be considered by the Thirty-sixth Session of the Codex Alimentarius Commission (Rome, Italy, 1-5 July 2013).

PART I: MATTERS FOR ADOPTION BY THE 36TH SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Proposed draft standards and related texts at Step 8 and 5/8 of the Procedure

1. **Proposed draft maximum levels for lead in fruit juices and nectars, ready-to-drink; canned fruits; and canned vegetables** (para. 42, Appendix II);
2. **Proposed draft maximum level for deoxynivalenol (DON) in cereal-based foods for infants and young children** (para. 70, Appendix III);
3. **Proposed draft Code of practice for the prevention and reduction of ochratoxin A contamination in cocoa** (para. 79, Appendix IV); and
4. **Proposed draft Code of practice for the presence of hydrocyanic acid in cassava and cassava products** (para. 92, Appendix VI).

Proposed draft standards and related texts at Step 5 of the Procedure

5. **Proposed draft maximum levels for DON in raw cereal grains (maize, wheat and barley) and associated sampling plan and in flour, semolina, meal and flakes from wheat, maize or barley** (para. 70, Appendix III).

Other amendments to standards

6. Consequential amendments to the Standards for Edible Cassava Flour (CODEX STAN 176-1989), Gari (CODEX STAN 151-1985), and Sweet Cassava (CODEX STAN 238-2003) (para. 88, Appendix V)

Governments and international organizations wishing to submit comments on the above documents should do so in writing, in conformity with the *Procedures for the Elaboration of Codex Standards and Related Texts* (Part 3 – *Uniform Procedure for the Elaboration of Codex Standards and Related Texts, Procedural Manual of the Codex Alimentarius Commission*) **preferably by e-mail**, to the above address, **before 15 June 2013**.

PART II: REQUEST FOR COMMENTS AND INFORMATION

7. **Priority list of contaminants and naturally occurring toxicants for evaluation by JECFA** (para. 148, Appendix VIII)

The Priority List of Contaminants and Naturally Occurring Toxicants for Evaluation by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) has been endorsed by the Codex Committee on Contaminants in Foods as indicated in para. 148 and presented in Appendix VIII of this Report. Submission of comments and/or information is requested as follows:

- Comments on substances that are already included in the Priority List (information on data availability of those substances should also be submitted where applicable); and/or
- Nomination of new substances for the Priority List (information on details of new substances, expected timeline for data availability should also be submitted).

For the second bullet point, it is requested to fill in the form as contained in Appendix VIII of this Report.

Governments and international organizations wishing to submit comments and/or information on the Priority List of Contaminants and Naturally Occurring Toxicants for Evaluation by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) should do so in writing, **preferably by e-mail**, to the above address, **before 31 January 2014**.

TABLE OF CONTENTS

| | Paragraph(s) |
|--|--------------|
| Introduction | 1 |
| Opening of the Session | 2 - 5 |
| Adoption of the Agenda (Agenda Item 1) | 6 - 8 |
| Matters referred to the Committee by the Codex Alimentarius Commission and/or its subsidiary bodies (Agenda Item 2) | 9 - 12 |
| Matters of interest arising from FAO and WHO (including JECFA) (Agenda Item 3) | 13 - 21 |
| Matters of interest arising from other international organizations - IAEA (Agenda Item 4) | 22 |
| Proposed draft revision of maximum levels for lead in the General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995)(Agenda Item 5) | 23 - 43 |
| Proposed draft revision of the guideline levels for radionuclides in Foods in the General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995) (Agenda Item 6) | 44 - 54 |
| Proposed draft maximum levels for deoxynivalenol (DON) in cereals and cereal-based products and associated sampling plans (Agenda Item 7) | 55 – 70 |
| Proposed draft Annex for the prevention and reduction of aflatoxins and ochratoxin A contamination in sorghum (<i>Code of practice for the prevention and reduction of mycotoxin contamination in Cereals - CAC/RCP 51-2003</i>) (Agenda Item 8) | 71 - 74 |
| Proposed draft Code of practice for the prevention and reduction of ochratoxin A contamination in cocoa (Agenda Item 9) | 75 – 79 |
| Proposed draft maximum levels for hydrocyanic acid in cassava and cassava products (Agenda Item 10) | 80 – 88 |
| Proposed draft Code of practice to reduce the presence of hydrocyanic acid in cassava and cassava products (Agenda Item 11) | 89 – 92 |
| Proposed draft Code of practice for weed control to prevent and reduce pyrrolizidine alkaloid contamination in food and feed (Agenda Item 12) | 93 - 96 |
| Editorial amendments to the General Standard for Contaminants and Toxins in Food and Feed (Agenda Item 13) | 97 – 103 |
| Discussion paper on the possibility to develop a Code of practice for the prevention and reduction of arsenic contamination in rice (Agenda Item 14) | 104 – 110 |
| Discussion paper on management practices to reduce exposure of food-producing animals (livestock and bees) to pyrrolizidine alkaloids: and to reduce presence of pyrrolizidine alkaloids in commodities (raw and processed) (Agenda Item 15) | 111 – 112 |
| Discussion paper on the review of the guideline levels for methylmercury in fish and predatory fish (Agenda Item 16) | 113 – 126 |
| Discussion paper on control measures for fumonisins in maize and maize products (Agenda Item 17) | 127 – 133 |
| Discussion paper on aflatoxins in cereals (Agenda Item 18) | 134 - 140 |
| Priority list of contaminants and naturally occurring toxicants proposed for evaluation by JECFA (Agenda Item 19) | 141 - 148 |
| Other business and future work (Agenda Item 20) | 149 - 151 |
| Proposal for new work on the establishment of a maximum level for total aflatoxins in ready-to-eat peanuts and associated sampling plans | |
| Date and place of the next session (Agenda Item 21) | 152 |

LIST OF APPENDICES

| | Page |
|--|-------------|
| APPENDIX I: List of Participants | 18 |
| APPENDIX II: Proposed draft maximum levels for lead in fruit juices and nectars; canned fruits; and canned vegetables | 37 |
| APPENDIX III: Proposed draft maximum Levels for DON in cereals and cereal-based products and associated sampling plan | 38 |
| APPENDIX IV: Proposed draft Code of practice for the prevention and reduction of ochratoxin A contamination in cocoa | 43 |
| APPENDIX V: Maximum levels for hydrocyanic acid and consequential amendments to the Standards for Edible Cassava flour, Gari and Sweet Cassava | 50 |
| APPENDIX VI: Proposed draft Code of practice for the reduction of hydrocyanic acid (HCN) in cassava and cassava products | 51 |
| APPENDIX VII: Priority list of contaminants and naturally occurring toxicants proposed for evaluation by JECFA | 63 |
| APPENDIX VIII: Nomination of new sustances for the priority list of contaminants and naturally occurring toxicants for evaluation by JECFA | 65 |

SUMMARY AND CONCLUSIONS

The Seventh Session of the Codex Committee on Contaminants in Foods reached the following conclusions:

MATTERS FOR ADOPTION/CONSIDERATION BY THE 36TH SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Proposed draft standards and related texts for adoption

The Committee agreed to forward:

- Proposed draft maximum levels for lead in fruits juices and nectars, ready-to-drink; canned fruits; and canned vegetables (para. 42, Appendix II);
- Proposed draft maximum levels for DON in raw cereal grains (wheat, maize and barley) and associated sampling plan; in flour, semolina, meal and flakes derived from wheat, maize or barley; and in cereal-based foods for infants and young children (para. 70, Appendix III);
- Proposed draft Code of practice for the prevention and reduction of ochratoxin A contamination in cocoa (para. 79, Appendix IV);
- Proposed draft Code of practice for the presence of hydrocyanic acid in cassava and cassava products (para. 92, Appendix VI); and
- Maximum levels for hydrocyanic acid for cassava flour and gari (transfer from commodity standards to the GSCTFF) (para. 88, Appendix V) and consequential amendments to the Standards for Edible Cassava Flour, Gari, and Sweet Cassava (para. 88).

Revocation of standards

- The Committee agreed to recommend the revocation of the maximum levels for lead in the individual standards for canned fruits and canned vegetables (para. 43).

Discontinuation of work

- The Committee agreed to inform the Commission on discontinuation of work on the revision of the guideline levels for radionuclides in the *General Standard for Contaminants and Toxins in Food and Feed* including development of guidance to facilitate the application and implementation of the GLs (para. 54) and on the establishment of maximum levels for hydrocyanic acid in cassava and cassava products (para. 87).

Matters of interest to the Codex Alimentarius Commission

The Committee:

- agreed to retain the current maximum levels for lead for milks, cereals, and juices and nectars from berries and other small fruits, ready-to-drink and to inform the Commission accordingly (para. 41);
- agreed to resume work on maximum levels for arsenic in rice and rice products and on fumonisins in maize and maize products and to prepare revised proposals for comments and consideration by its next session (paras. 109-110, 133);
- agreed to redraft the draft Annex for the prevention and reduction of aflatoxins and ochratoxin A contamination in sorghum (*Code of practice for the prevention and reduction of mycotoxin contamination in cereals*) (para. 74); and the proposed draft Code of practice for weed control to prevent and reduce pyrrolizidine alkaloid contamination in food and feed (para. 96) for comments and consideration by its next session;
- agreed to continue discussion on editorial amendments to the GSCTFF (paras 102-103);
- agreed to develop discussion papers on methylmercury in fish (para. 126); aflatoxins in cereals (para. 140); and total aflatoxins in ready-to-eat peanuts and associated sampling plans for consideration by its next session (para. 151);
- endorsed the *Priority list of contaminants and naturally occurring toxicants for JECFA evaluation* and agreed to re-convene the physical working group at its next session to review the Priority List (para. 148, Appendix VII).

Matters referred to Codex committees and task forces

Committee on Methods of Analysis and Sampling (CCMAS)

- The Committee agreed to request the advice of CCMAS on the appropriateness of the performance criteria for methods of analysis for DON to ensure consistency with the *Working Instructions for the Implementation of the Criteria Approach in Codex* (para. 63).

Matters of interest to Codex committees and task forces

Committee on Fats and Oils (CCFO)

- The Committee will consider the transfer of provisions for halogenated solvents from the *Standard for Table Olives and Pomace Oils* into the *General Standard for Contaminants and Toxins in Food and Feed* at its next session (para. 11)
- The Committee agreed to consider the allocation of maximum levels for lead and arsenic for fish oils once the Standard for Fish Oils is finalized by CCFO including the question on whether the MLs should apply to total arsenic or inorganic arsenic (para. 12)

INTRODUCTION

1. The Codex Committee on Contaminants in Foods (CCCF) held its 7th session in Moscow (Russian Federation) from 8 to 12 April 2013, at the kind invitation of the Government of the Russian Federation. Mr. Martijn Weijtens, Head of Unit, Department for Animal Supply Chain and Animal Welfare, Ministry of Economic Affairs of the Netherlands, chaired the meeting. The Session was attended by 63 Member countries, one Member Organization and 11 International Organizations. The list of participants is given in Appendix I to this report.

OPENING OF THE SESSION

2. Mr Igor Ivanovich Shuvalov, First Deputy Prime Minister of the Russian Federation, opened the Session. He welcomed the participants to the Committee and was honoured to co-host the first Codex meeting in the Russian Federation in the year of 50th anniversary of Codex. He highlighted the importance of Codex in relation to the Agreements of the World Trade Organization (WTO). He stated that the Russian Federation had joined the WTO and was willing to take responsibility to contribute to the development of balanced international food standards. He emphasized the importance of discussions that would lead to appropriate standards for foods to balance the health protection of consumers and facilitating fair trade.

3. Mr Hoogeveen, Vice Minister of Agriculture of the Netherlands, expressed his joy about the cooperation with the Russian Federation in organising the 7th CCCF. He said that the Russian Federation was an important global market player and that it was good to see that the Russian Federation took on an even bigger role in international organizations. He underlined the importance of a broad involvement in the Codex Alimentarius Commission, as Codex standard-setting was a crucial part of the comprehensive approach towards the global challenges which laid ahead in efforts to feed the world population in 2050. This needed involvement from developed as well as developing countries and from public, private and NGO stakeholders. He emphasized that producing more food was only useful if that food was safe for consumption and if it could be distributed globally. He also said that by setting standards for fair trade in safe food products, the Codex Alimentarius Commission had a leading role.

4. Ms Anna Popova, Deputy Head of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing welcomed the participants. In her address she highlighted the importance of science and research in the development of standards for food safety and the role that the various institutions in the Russian Federation played in this regard. She further emphasized that co-hosting the Committee with the Netherlands would have a positive impact on the corporation between the Russian Federation and the European Union.

5. Dr. Viktor Alexandrovich Tutelian, Head of the Russian Institute of Nutrition, also welcomed the participants and highlighted that no other organization had worked for food safety and quality as much as Codex.

Division of Competence¹

6. The Committee noted the division of competence between the European Union and its Member States, according to paragraph 5, Rule II of the Procedure of the Codex Alimentarius Commission, as presented in CRD 1.

ADOPTION OF THE AGENDA (Agenda Item 1)²

7. The Committee adopted the Provisional Agenda as its Agenda for the Session.

8. The Committee agreed to establish the following in-session working groups:

- Priority list of contaminants and naturally occurring toxicants proposed for evaluation by JECFA (Agenda Item 19, chaired by the United States of America),
- Editorial amendments to the General Standard for Contaminants and Toxins in Food and Feed (Agenda Item 13, chaired by the European Union).

MATTERS REFERRED TO THE COMMITTEE BY CODEX ALIMENTARIUS COMMISSION AND/OR ITS SUBSIDIARY BODIES (Agenda Item 2)³

9. The Committee noted matters for information and agreed to consider some matters for action under the relevant agenda items.

Executive Committee of the Codex Alimentarius Commission (CCEXEC)

10. The Committee noted the recommendation of CCEXEC on the need to manage its heavy workload relating to the uptake of new work and finalization of ongoing work within the allocated timeframe in an efficient manner.

¹ CRD 1.

² CX/CF 13/7/1.

³ CX/CF 13/7/2.

Committee on Fats and Oils (CCFO)

Standard for Olive Oils and Olive Pomace Oils

11. The Committee considered the proposal of CCFO to transfer maximum levels for halogenated solvents from the *Standard for Olive Oils and Olive Pomace Oils* (CODEX STAN 33-1981) to the *General Standard for Contaminants and Toxins in Food and Feed* (GSCTFF). The Committee noted that before such action could be taken, further consideration was necessary as to what substances were included in the term “halogenated solvents” and whether the levels were for food safety or quality purposes. The Committee agreed that the Delegation of European Union would prepare a discussion paper on this matter for consideration at its next session.

Standard for Fish Oils

12. The Committee noted that fish oils, which were currently covered by “Edible fats and oils” in the GSCTFF, would lose the provisions for lead and arsenic when the Standard for Fish Oils would be elaborated. The Committee agreed to consider the allocation of MLs for lead and arsenic for fish oils once the Standard for Fish Oils was finalized and whether the MLs should apply to total arsenic or inorganic arsenic as more appropriate for these products.

MATTERS OF INTEREST ARISING FROM FAO AND WHO (INCLUDING JECFA) (Agenda Item 3)⁴

13. The JECFA Secretariat informed the Committee that the forthcoming 77th JECFA would carry out the requested assessment of the exposure to cadmium from cocoa and cocoa products. If additional data became available in the near future the assessment would be updated.

14. The JECFA Secretariat also informed the Committee that FAO/WHO had organized a joint *Expert Meeting on the Public Health Risks of Histamine and other Biogenic Amines from Fish and Fishery Products* in Rome on 23-27 July, 2012⁵. The expert meeting reviewed for the first time the hazards associated with Scombrotoxin fish poisoning. It succeeded in identifying for histamine, the most significant causative amine, a maximum concentration in a serving that would not cause adverse effects. It was also agreed that application of Good Hygiene Practices and HACCP systems would mitigate risks associated with this hazard effectively.

15. The JECFA Secretariat stressed that FAO and WHO would continue with their commitment to provide scientific advice to the Committee and that members were encouraged to support such efforts by providing extrabudgetary resources via the *Global Initiative for Food-related Scientific Advice (GIFSA)*⁶.

16. The JECFA Secretariat further informed the Committee that FAO was developing a management tool that should assist in determining whether a sampling plan for mycotoxin determination in food items would be appropriate. Delegates were asked to support this work by providing data on distribution of mycotoxin contamination in individual lots to food-quality@fao.org.

17. In addition, the JECFA Secretariat informed the Committee of the recent publication of a guide to support national authorities in establishing and implementing an effective national food recall system to rapidly respond to food safety events and emergencies.

18. The JECFA Secretariat provided an update on the FAO/WHO project on mycotoxins in sorghum, which was made possible through funds provided by the European Commission through the Codex Trust Fund. Missions to the four pilot countries had been undertaken to identify national personnel, establish budgets, work plans and time lines for implementation. In order to assure reliability and comparability of data sampling protocols, a sample preparation process and a template for the value chain study had been established. An accredited laboratory has been contracted and interim results should be reported to the 8th session of CCCF in 2014 and final results in 2015.

19. The Delegation of Sudan, as one of the pilot countries, extended its appreciation for the work and informed the Committee that this initiative had stimulated further work on mycotoxins and collaboration between the countries beyond the project.

20. The Committee was informed that the cluster diets had been revised and information on the new 17 cluster diets was available at the WHO website.

21. The WHO Representative informed the Committee of the recent publication on the health risk assessment from the nuclear accident after the 2011 great east Japan earthquake and tsunami.⁷ An assessment of the health risk from radionuclide exposure was performed taking different geographic regions within Japan and the rest of the world into account. Potential increased cancer risk was the main health effect of concern at estimated exposure levels, and it was concluded that no increased cancer risk from the Fukushima event was expected outside Japan. For Japan a somewhat elevated cancer risk in certain age and sex group might be expected in the areas most affected within Fukushima prefecture. These estimates provided valuable information to prioritize follow-up actions and health monitoring.

⁴ CX/CF 13/7/3.

⁵ <http://www.fao.org/food/food-safety-quality/a-z-index/histamine/en/>

⁶ FAO: Policy Assistance and Resources Mobilization Division / WHO: Department of Food Safety and Zoonoses.

⁷ http://www.who.int/mediacentre/news/releases/2013/fukushima_report_20130228/en/index.html.

MATTERS OF INTEREST ARISING FROM OTHER INTERNATIONAL ORGANIZATIONS (Agenda Item 4)⁸

22. The Committee noted the activities of the Joint FAO/IAEA Division of Nuclear Techniques relevant to the work of CCCF. The Representative of IAEA indicated that more specific information relating to preparedness and response to nuclear and radiological emergencies affecting food and agriculture would be provided under the relevant agenda item. One delegation requested to include food safety experts in the consideration of this issue. The Representative of IAEA informed the Committee that, in addition to international organizations, invitations had also been sent to Japan, Russia and Ukraine through their missions.

PROPOSED DRAFT REVISION OF MAXIMUM LEVELS FOR LEAD IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED (CODEX STAN 193-1995): Fruit juices, milk, infant formula, canned fruits and vegetables and cereal grains (except buckwheat, cañihua and quinoa) (Agenda Item 5)⁹

23. The Delegation of the United States of America, as chair of the Electronic Working Group (EWG) on the Review of the Maximum Levels for Lead in the GSCTFF, introduced the document and summarized the background for the new work on the review of MLs for various commodities in the GSCTFF, the basis for the review, and the rationale for the proposals to revise or retain the MLs for fruit juices, milk, infant formula, canned fruits and vegetables and cereal grains (except buckwheat, cañihua and quinoa) as laid down in working document CX/CF 13/7/5.

24. In particular, the Delegation recalled that the 73rd JECFA Meeting had withdrawn the PTWI (provisional tolerable weekly Intake) of 25 µg/kg bw and concluded that it was not possible to establish a new PTWI that would be considered health protective. As no safe levels were identified by JECFA, the Delegation explained that the focus of the review was to assess the occurrence data of lead in the selected commodities to determine what percentage of samples could meet the revised MLs thus the proposals were not based on levels of exposure or consumption. The Delegation further explained that occurrence data were taken from the GEMS/Food Database and that the samples used to work on the proposals were based on LOQ-limited dataset that met the current and revised (lower) MLs.

25. The Committee had a general exchange of views on the approach used to derive the revised MLs. Several delegations questioned the lack of geographic representative data to justify the proposals for revised (lower) global MLs; the basis for the selection and the inconsistent application of the cut-off value to define the percentage of samples that would be eliminated from international trade and so to derive the revised (lower) MLs; the need for an adequate exposure assessment to determine which food categories contributed the most to the overall lead intake in different regions to determine whether the current ML was still health protective (especially for vulnerable groups such as infants and young children) even though lower levels might be technologically achievable before they could be finalized by the Committee. Other delegations recalled that lack of geographic distributed data was a recurring issue when discussing the establishment of MLs for contaminants and in this regard, countries were repeatedly invited to submit relevant data to GEMS/Foods; that the LOQ-based criteria should be applied on a commodity basis rather than generally applied to commodities; and that, if lower MLs were achievable while not being unnecessarily trade restrictive as shown in the working document, they would assist in reducing the dietary intake of lead by consumers especially the vulnerable groups, taking into account the withdrawal of the PTWI by JECFA.

26. In response to requests for more data, the JECFA Secretariat informed the Committee that a large number of analytical data were considered in the JECFA re-evaluation of lead, in total over 110,000 data points from all regions of the world except Africa.

27. Based on the above considerations, the Committee proceeded with the discussion on the proposals for revised MLs as follows:

Milks and cereals

28. The Committee agreed to retain the current MLs of 0.02 mg/kg (milks) and 0.2 mg/kg (cereals).

29. The Committee noted that the ML for milk might be reviewed in future when new data became available and might be revised in light of the review of the MLs for milk products. The Committee also noted that if different MLs would be considered for cereal grains in future, stricter MLs could be applied to certain cereal grains in light of available data.

Fruit juices

30. The Committee agreed with a revised ML of 0.03 mg/kg for fruit juices and nectars, ready-to-drink.

31. The Committee further agreed to assign a higher ML of 0.05 mg/kg to juices and nectars from berries and other small fruits since these type of fruits had a higher concentration of lead as shown by the higher ML allocated to this group of fruits in the GSCTFF.

32. The Committee noted that in future, there might be a need for different MLs for fruit juices depending on the outcome of discussions on the ML for lead in fruit.

⁸ CX/CF 13/7/4, CRD 13 (India)

⁹ CX/CF 13/7/5; CX/CF 13/7/5-Add.1 (comments of Argentina, Brazil, Costa Rica, European Union, India, Kenya, Republic of Korea, Russian Federation, Uruguay, African Union, FoodDrinkEurope and ISDI); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 17 (comments of Norway); CRD 18 (comments of Egypt); CRD 19 (comments of China); CRD 20 (comments of Nigeria); CRD 21 (comments of Indonesia); CRD 22 (comments of Mali); CRD 24 (comments of Colombia).

Canned fruits and vegetables

33. The Committee agreed to consolidate the MLs for the individual canned fruits and vegetables and to assign a revised ML of 0.1 mg/kg for canned fruits and canned vegetables and canned mixed fruits and vegetables with the exclusion of canned berries and small fruits (see paragraph 31). In reply to a question on whether the ML would apply to the solid foods in the can, the packing liquid, or the composite of the solids and liquid, the Committee agreed that the MLs applied to the product as consumed.

34. The Committee further agreed to exclude brassica, leafy and legume vegetables as the corresponding raw vegetables had higher MLs as shown in the GSCTFF.

Infant formula

35. The Committee noted that there was general support for the inclusion of a note indicating that the ML also applied to powdered infant formula with a dilution factor. However, there was a wide range of proposals on the MLs that should be applied in addition to the proposed revised ML of 0.01 mg/kg.

36. A country questioned the approach taken to retain the ML for milk in relation to lower the ML for infant formula since milk was the main component of this product; that the proposed revised ML of 0.01 mg/kg might not be manageable for countries that did not have the required LOQ analytical method to verify the ML; and that the proposed revised ML might entail up to 50% rejection of product from the market. Some countries indicated that they could compromise on the proposed revised ML if applied to the products as consumed. Other countries indicated that the proposed revised ML could be achievable however, more data from other countries and regions were desirable before finalizing the level. The small dataset used to derive the MLs was also questioned and in this regard, it was indicated that these products were marketed by a limited number of countries and that data available represented those concerned countries trading these products. In addition, the approach taken for the derivation of the lower ML clearly indicated that almost 100% of the samples analyzed for the LOQ-limited dataset ($LOQ \leq 0.01$ mg/kg) could meet the proposed revised ML of 0.01 mg/kg as shown in paragraph 21 of the working document. As regards the inclusion of follow-up-formulas, it was noted that the result of the analysis summarized in paragraph 23 of the working paper clearly indicated that the proposed revised ML could be extended to follow-up-formulas. In addition, the *Standard for Infant Formula and Formulas for Special Medical Purposes* (CODEX STAN 72-1981) specified that the ML for lead in formula for special medical purposes intended for infants was identical to the ML for lead in infant formula.

37. In view of the diversity of opinions, the Committee agreed to reconsider MLs for infant formula, including follow-up-formulas, at its next session and encouraged interested countries to submit relevant data to GEMS/Foods in order to facilitate finalization of the ML at its next session. The Committee further agreed that if no additional data were made available, it would consider the proposed lower ML for adoption to further ensure health protection of infants and young children as they were within the most vulnerable groups to lead exposure.

Methods of analysis

38. As regards the recommendation to refer to the Committee on Methods of Analysis and Sampling (CCMAS) the proposed revised MLs for consideration of whether analytical methodology supported the lower MLs, the Committee noted that its terms of reference stated that consideration and elaboration of methods of analysis and sampling for the determination of contaminants and naturally occurring toxicants in food and feed was in the remit of the CCCF and therefore no further action needed to be taken in this regard.

Future work on the review of MLs in various foods in the GSCTFF

39. The Committee agreed to continue with the review of MLs for lead in fruits, vegetables, milk products and infant formula, follow-up formula and formula for special medical purposes for infants.

40. The Committee therefore agreed to re-establish the EWG led by the United States of America and working in English to continue with the review of the MLs for lead for the above-mentioned commodities in the GSCTFF.

STATUS OF THE PROPOSED DRAFT REVISION OF MAXIMUM LEVELS FOR LEAD IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED

41. The Committee agreed to retain the current MLs of 0.02 mg/kg for milks, 0.2 mg/kg for cereals, and 0.05 mg/kg for juices and nectars from berries and other small fruits, ready-to-drink and to inform the Commission accordingly.

42. The Committee agreed to advance the proposed draft ML of 0.03 mg/kg for fruit juices and nectars, ready-to-drink (excluding juices from berries and other small fruits); the proposed draft ML of 0.1 mg/kg for canned fruits, including canned mixed fruits (excluding canned berry and other small fruits); and the proposed draft ML of 0.1 mg/kg for canned vegetables, including canned mixed vegetables (excluding canned brassica vegetables, canned leafy vegetables and canned legume vegetables) to the 36th Session of the Commission for adoption at Step 5/8 (Appendix II).

43. Following this decision, the Committee agreed to request the Commission to revoke the MLs for lead for the individual standards for canned fruits (i.e. canned fruit cocktail, canned tropical fruit salad, canned grapefruit, canned mandarin oranges, canned mangoes, canned pineapples, canned raspberries and canned strawberries) and to revoke the MLs for lead for the individual standards for canned vegetables (i.e. canned asparagus, canned carrots, canned green beans and canned wax beans, canned green peas, canned mature processed peas, canned mushrooms, canned palmito (palm hearts), canned sweet corn, canned tomatoes and table olives).

PROPOSED DRAFT REVISION OF THE GUIDELINE LEVELS FOR RADIONUCLIDES IN FOODS IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED (CODEX STAN 193-1995) (Agenda Item 6)¹⁰

44. The Delegation of the Netherlands, as chair of the EWG on Radionuclides, introduced the document which was basically divided into (1) information on GLs in relation to Codex; (2) Japanese limits and issues of interpretation of these limits; (3) issues considered for the review of the GLs; and (4) conclusions and recommendations for consideration and action by the Committee.

45. Regarding the recommendation to keep the present structure of the GLs, consisting of applying GLs for groups of radionuclides to be assessed independently for infant foods or foods other than infant foods, the Delegation of the Russian Federation indicated that the 10% limit of consuming contaminated foods and to assess groups of radionuclides independently in relation to the method of establishing GLs in the GSCTFF, might lead to situations where the annual dose of exposure would exceed 1 mSv/year. The proposal was therefore to consider the radionuclides concentrations inside groups as well as between such groups and when radionuclides from different groups were consumed the food product acceptability assessment (for infant food and other foods) should be made by applying a mathematical formula by which the product was considered as edible if the sum of partial inputs of all radionuclides was less than 1.

46. The Representative of IAEA indicated that the calculations of radiation dose due to the ingestion of foods containing radionuclides of concentrations at GLs in the GSCTFF provide an annual effective dose of 10 mSv, if the diet contamination factor (the portion of contaminated foods in the diet) was not taken into account. Having in mind this factor (which was equal to 10% according to Codex), the annual effective dose of internal exposure would be 1 mSv, which was in agreement with public exposure dose limit (i.e. formula to assess the human internal exposure when the Codex GLs were applied, Annex 2 of the GSCTFF).

47. The JECFA Secretariat indicated that the matter raised by the Delegation of the Russian Federation was explained in the *Codex Fact Sheet on the Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency in the Standard for Contaminants and Toxins in Food and Feed* and could be further elaborated following the proposal to update the Fact Sheet as a way forward to facilitate interpretation and implementation of the GLs in the GSCTFF by member countries.

48. The Delegation of Japan indicated that, in response to the Chernobyl accident the Codex Alimentarius Commission had adopted the first GLs for radionuclides in foods in 1989. The GLs were intended to apply for a short period of time after the nuclear accident and were based on an intervention level of 5 mSv/year. Later, the Commission adopted revised GLs based on an intervention exemption level of 1 mSv/year for long-term application assuming that 10% of foods consumed were contaminated and all those contaminated foods contained radionuclides at the respective GLs. Immediately after the accident at the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant, Japan established provisional regulatory values. The values were based on 5 mSv/year and the contamination rate of 50% as they were targeted for domestically produced products. One year after the accident, Japan established new levels for radioactive cesium in April 2012. These were derived from an intervention exemption level of 1 mSv/year consistent with the current Codex GLs. These levels also covered other radionuclides using the factor of 1.2 derived from the ratio of other radionuclides and radioactive cesium in soil samples. Since the accident, Japan had accumulated a huge number of analytical results. They show that radioactive cesium levels had already decreased with most foodstuffs at Not Detectable (ND) level. Using these data and food consumption data, Japan evaluated actual dietary exposure and found that the average exposure was less than 2% of 1 mSv/year. In addition, through the extensive decontamination measures, exposure would decrease further. Japan had focused on the analyses of gamma-ray emitting cesium because analysis of radionuclides not emitting gamma-ray, such as strontium, took a long time and was not feasible for fresh produce.

49. The Representative of IAEA informed the Committee that the IAEA Secretariat had decided to establish an Inter-agency Working Group, together with relevant international organizations including FAO and WHO to carry out work in relation to the control of foodstuffs and drinking water contaminated with radioactive substances. A discussion paper would be developed by the Working Group to document the various national and international standards, the basis on which they had been derived and the circumstances in which they were intended to be used. The document would provide a full and detailed explanation of existing standards, including numerical values and their application. It would be developed and submitted to the Radiation Safety Standard Committee (RASSC) composed of Member States' representatives for consideration in late 2013; presented as an information document to the 8th Session of the Committee on Contaminants in Foods in early 2014; and finalized for publication in mid-2014. The first meeting of the Working Group is planned for early May 2013; specialists from relevant countries such as the Russian Federation and Japan have been invited to attend this meeting.

¹⁰ CX/CF 13/7/6; CX/CF 13/7/6-Add.1 (comments of Costa Rica, European Union, Ghana, India, United States of America and African Union); CRD 15 (comments of Malaysia); CRD 18 (comments of Egypt); CRD 20 (comments of Nigeria); CRD 22 (comments of Mali).

50. As regards the possibility to discuss GLs for potable water in the GSCTFF in view of serious concerns raised over the safety of potable water after the Fukushima Daiichi nuclear accident, the Representative of IAEA informed the Committee that the issue of drinking water contaminated by radionuclides after a nuclear or radiological accident was still unclear and existing international recommendations (WHO Guidelines for drinking-water quality developed before Fukushima-Daiichi nuclear plant accident) were not applicable to post-accidental contamination. This subject would be discussed by the aforementioned Working Group and addressed in the same manner as described above for foodstuffs.

STATUS OF THE REVISION OF THE GUIDELINE LEVELS FOR RADIONUCLIDES IN FOOD IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED

51. Based on the conclusions and recommendations put forward in working document CX/CF 13/7/6 on the revision of the GLs for radionuclides in food in the GSCTFF, the Committee agreed not to change the current GLs to MLs for radionuclides in the GSCTFF as GLs provide countries flexibility to determine whether and under what conditions food could be distributed within their territory or jurisdiction; not to change the present approach using GLs for groups of radionuclides to be assessed independently; and not to change the current GL values in the GSCTFF and therefore to discontinue work on the revision of the GLs for radionuclides in food in the GSCTFF.

52. Based on the information provided by the IAEA Representative on the ongoing work of the Inter-agency Working Group as described in paragraph 49 and CX/CF 13/7/4, the Committee further decided to discontinue work on the development of guidance to facilitate the interpretation and implementation of the GLs for radionuclides in food in the GSCTFF. Along these lines, the Committee also agreed not to consider the appropriateness to develop additional GLs for drinking water for inclusion in the GSCTFF.

53. The Committee noted that after completion of the work carried out by the Inter-agency Working Group, the CCCF could decide to start new work on radionuclides as necessary.

54. The Committee therefore agreed to inform the 36th Session of the Commission on discontinuation of work on the revision of the GLs for radionuclides in the GSCTFF including the development of guidance to facilitate the application and implementation of the GLs.

PROPOSED DRAFT MAXIMUM LEVELS FOR DEOXYNIVALENOL (DON) IN CEREALS AND CEREAL-BASED PRODUCTS AND ASSOCIATED SAMPLING PLANS (Agenda Item 7)¹¹

55. The Delegation of the European Union, as co-chair of the EWG on DON introduced the item and highlighted the proposals for the commodities as described in paragraph 5 of the report of the EWG (CX/CF 13/7/7, Appendix I) and the rationale for these proposals; and the proposal for the associated sampling plan for raw cereals. The Delegation explained that bran products were excluded from the proposed ML for semi-processed products derived from wheat, maize/corn and barley as limited occurrence data for DON in bran products suggested that DON levels for such products might be higher than in other semi-processed commodities and that members should be encouraged to collect and submit DON occurrence data for wheat and corn brans for possible future work.

MLs for raw cereal grains (wheat, maize and barley) and flour, semolina, meal and flakes derived from wheat, maize or barley

56. The Committee first had a discussion on MLs for the raw cereal grains and for the flour, semolina, meal and flakes derived from wheat, maize or barley. Several delegations supported the establishment of a ML of 2 mg/kg for raw cereal grains (wheat, maize and barley) prior to sorting and removal of damaged kernels and the level of 1 mg/kg for the flour, semolina, meal and flakes derived from wheat, maize or barley. Several delegations proposed to limit the establishment of MLs to only the raw cereal grains as these were the commodities most traded internationally and would be in line with the mandate of Codex which was to protect the health of consumers while also ensuring fair practices in the food trade. Some delegations and an Observer questioned the need for a ML for raw cereals grains, pointing out that milling could substantially reduce DON levels and that setting of MLs could be trade restrictive. It was further pointed out that wet milling of maize to produce starch would also significantly reduce DON levels as DON was water-soluble and therefore levels for raw cereals for use as starch should be excluded. However, it was noted that it was not always clear the destination or use of the grains received at the port of entry of an importing country and therefore such an exclusion would be difficult to apply.

57. One Delegation proposed a ML of 0.7 mg/kg for wheat and major wheat products as this would be more health protective due to the high consumption of bread and wheat products along with other grain products, including barley and maize in their country. Another Delegation pointed out that a new risk assessment based on actual occurrence and consumption data had been conducted in their country and that one of the major conclusions of this risk assessment was that the infants and children up to 9 years could exceed the tolerable daily intake of DON and therefore could not support the MLs for DON in any of the commodities.

¹¹ CX/CF 13/7/7; CX/CF 13/7/7-Add.1 (comments of Argentina, Costa Rica, European Union, Ghana, India, Iran, Kenya, Philippines, Republic of Korea, Russian Federation, African Union and FoodDrinkEurope), CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 17 (comments of Norway); CRD 18 (comments of Egypt); CRD 22 (comments of Mali); CRD 24 (comments of Colombia).

58. The JECFA Secretariat in reference to the detailed JECFA evaluation informed the Committee that high consumption of cereals, in particular wheat consumption in the range of 390 – 420 g per day, had been considered in the exposure assessment. Moreover, the exposure assessment was based on actual occurrence data rather than hypothetical MLs, resulting in a more realistic exposure assessment. Some exceedance of the PMTDI (provisional maximum tolerable daily intake) had been noted, and therefore it was important to establish MLs to remove high contamination levels.

Cereal-based foods for infants and young children

59. There was general support to establish a ML for cereal-based foods for infants and young children with several proposals to lower the proposed ML from 0.5 mg/kg to values ranging from 0.1 mg/kg, 0.2 mg/kg and 0.3 mg/kg, while an Observer proposed that the ML of 0.5 mg/kg was sufficiently health protective and achievable. Most of the delegations that spoke were however in favour of a ML of 0.2 mg/kg and a proposal to limit this ML to cereal-based foods for infants and young children as consumed.

Sampling plans and analytical methods

60. The Committee considered the proposals for either one sample size of 5 kg for all three cereal grains or 2 different sample sizes of 1 kg for raw wheat and barley and 5 kg for maize in lots exceeding 50 tonnes.

61. Several delegations supported sampling provisions of 5 kg for maize, wheat and barley. Most other delegations supported the sample sizes of 5 kg for maize and 1 kg for wheat and barley, while one Delegation expressed support for 0.5 kg for wheat and barley, which took into account the difference in kernel weight between maize and the smaller grain, such as wheat and barley. The Delegation explained that the operating characteristic curves demonstrated no significant gain by increasing the sample size above 0.5 kg for wheat and barley, but in the spirit of compromise, could agree to the sample size of 1 kg.

62. The Committee therefore agreed with 5 kg for raw maize and 1 kg for raw wheat and barley.

63. The Committee agreed to include the performance criteria for methods of analysis, and to request advice from CCMAS on the appropriateness of the performance criteria to ensure consistency with the *Working Instructions for the Implementation of the Criteria Approach in Codex* (Procedural Manual).

Conclusion

MLs for raw cereal grains; flour, semolina, meal and flakes derived from wheat, maize or barley; and cereal-based foods for infants and young children

64. The Committee agreed to the ML of 2 mg/kg for raw cereals (maize, wheat and barley) prior to sorting and removal of damaged kernels with the associated sampling plan with sample size of 5 kg for maize and 1 kg for wheat and barley. The Delegations of the United States of America and the Russian Federation expressed their reservation to this decision. The Delegation of the European Union expressed their reservation to the associated sampling plan.

65. For flour, semolina, meal and flakes derived from wheat, maize or barley, the Committee agreed to establish a ML of 1 mg/kg. The Delegations of the European Union and Norway asked for more time to consult with their risk assessment bodies before agreeing to the proposed ML and the Delegation of the Russian Federation expressed its reservation to this decision.

66. For cereal-based foods for infants and young children, the Committee agreed to establish the ML of 0.2 mg/kg and that this ML would apply to cereal-based foods as consumed. The Delegation of Norway expressed their reservation to this decision.

Bran products

67. With regard to MLs for bran products, the Committee agreed to encourage members to collect and submit occurrence data for DON in wheat and corn brans for possible future work.

MLs for acetylated derivatives of DON in cereals

68. The Committee recalled its earlier decision taken at the 5th Session of the Committee that it would consider the extension of the MLs for DON to its acetylated derivatives at the 8th Session of the Committee and agreed that an EWG led by Canada and Japan, working in English, would prepare a discussion paper and proposals for the extension of MLs for DON to its acetylated derivatives for consideration at the next session of the Committee.

69. The Representative of the JECFA Secretariat reminded the Committee that the health-based guidance values, PMTDI and ARfD (acute reference dose), refer to DON and its acetylated derivatives.

STATUS OF THE PROPOSED DRAFT MAXIMUM LEVELS FOR DEOXYNALENOL (DON) IN CEREALS AND CEREAL-BASED PRODUCTS AND ASSOCIATED SAMPLING PLANS

70. The Committee agreed to forward the proposed draft MLs for raw cereal grains including sampling plans, and for flour, semolina, meal and flakes from wheat, maize or barley to Step 5 and the proposed draft ML for cereal-based foods for infants and young children to Step 5/8 for adoption by the 36th Session of the Commission (Appendix III).

PROPOSED DRAFT ANNEX FOR THE PREVENTION AND REDUCTION OF AFLATOXINS AND OCHRATOXIN A CONTAMINATION IN SORGHUM (CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF MYCOTOXIN CONTAMINATION IN CEREALS – CAC/RCP 51-2003) (Agenda Item 8)¹²

71. The Delegation of Nigeria, as chair of the EWG on the Annex on OTA in Sorghum, introduced the item and explained the background to the development of the proposed draft Annex, the process followed and the key issues covered. The Delegation further emphasized the importance of the Code of Practice (COP) for some member countries, in particular in Africa, where sorghum was a staple food.

72. The Committee generally supported the proposed draft Annex, but indicated that some key issues needed to be addressed e.g. reducing the level of detail which could be seen as too restrictive and not practicable such as related to the anaerobic atmosphere conditions and the cooling temperatures; to delete some of the measures that were not appropriate (such as the washing of equipment); and to limit the measures to those that were proven to be effective on a large scale and therefore to delete the guidance in paragraphs 36 to 40 and to delete paragraph 41, although important, but not applicable to a COP.

73. The Committee agreed to re-establish the EWG led by Nigeria and co-chaired by Sudan, working in English, to redraft the Annex taking into account the points raised in the discussion and the comments submitted to this session, for circulation for comments and consideration by the next session with the view to its finalization.

STATUS OF THE PROPOSED DRAFT ANNEX FOR THE PREVENTION AND REDUCTION OF AFLATOXINS AND OCHRATOXIN A CONTAMINATION IN SORGHUM (*Code of practice for the prevention and reduction of mycotoxin contamination in cereals*)

74. The Committee agreed to return the proposed draft Annex to Step 2/3 for further development by the EWG, circulation for comments and further consideration by the next session of the Committee.

PROPOSED DRAFT CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF OCHRATOXIN A CONTAMINATION IN COCOA (Agenda Item 9)¹³

75. The Delegation of Ghana, as chair of the EWG on the Code of Practice for Ochratoxin A in Cocoa, introduced CX/CF 13/7/9 and highlighted the key issues addressed in the COP. The Delegation also emphasized the importance of the COP, as cocoa is an important crop in some countries, including Ghana.

76. There was general support for the COP and its advancement to Step 5/8, but with the need to improve certain parts of the text. In view of the comments and proposals made, i.e. need to ensure correctness of terminology; and inclusion of other considerations, the Committee agreed to establish an in-session Working Group, led by Ghana, to consider the comments submitted and to prepare a revised draft to facilitate discussion in plenary.

77. The Delegation of Ghana presented the revised COP (CRD 26) and explained that the working group had made very limited editorial changes to the COP and had added a requirement on bags for storage and transport in paragraph 44.

78. The Committee considered the revised COP and supported its adoption with some further editorial amendments.

STATUS OF THE PROPOSED DRAFT CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF OCHRATOXIN A CONTAMINATION IN COCOA

79. The Committee agreed to forward the proposed draft Code to Step 5/8 for adoption by the 36th Session of the Commission (Appendix IV).

PROPOSED DRAFT MAXIMUM LEVELS FOR HYDROCYANIC ACID IN CASSAVA AND CASSAVA PRODUCTS (Agenda Item 10)¹⁴

80. The Delegation of Australia, as chair of the EWG on HCN in Cassava, highlighted the main points considered in the document namely the review of the existing MLs for HCN in Codex standards and the possibility to establish new MLs for cassava (raw and processed) including the identification of suitable methods of analysis to identify HCN in these products. The Delegation noted that work on the review of the MLs and the development of a COP to reduce the presence of HCN in cassava and cassava products was divided between Australia (MLs) and Nigeria (COP) as co-chair of the EWG (see Agenda Item 11).

Review / Establishment of MLs for HCN in cassava and cassava products including availability of methods of analysis for HCN in these products

81. The Delegation of Australia summarized the discussion, conclusions and recommendations of the EWG as presented in working document CX/CF 13/7/10.

¹² CX/CF 13/7/8; CX/CF 13/7/8-Add.1 (comments of Argentina, Brazil, Costa Rica, European Union, Ghana, India, Kenya, Russian Federation and African Union); CRD 14 (comments of USA); CRD 18 (comments of Egypt); CRD 19 (comments of China); CRD 20 (comments of Nigeria); CRD 22 (comments of Mali); CRD 24 (comments of Colombia).

¹³ CX/CF 13/7/9; CX/CF 13/7/9-Add.1 (comments of Brazil, Costa Rica, European Union, Ghana, India, Philippines, Russian Federation, African Union); CRD 14 (comments of USA); CRD 15 (comments of Malaysia); CRD 18 (comments of Egypt); CRD 19 (comments of China); CRD 20 (comments of Nigeria); CRD 22 (comments of Mali); CRD 24 (comments of Colombia); CRD 25 (comments of Bolivia); CRD 26 (proposed draft revised *Code of practice for the prevention and reduction of ochratoxin A contamination in cocoa*).

¹⁴ CX/CF 13/7/10; CX/CF 13/7/10-Add.1 (comments of Costa Rica, European Union, Ghana, India, Kenya, Philippines, Russian Federation, African Union); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 18 (comments of Egypt); CRD 19 (comments of China); CRD 20 (comments of Nigeria); CRD 22 (comments of Mali); CRD 24 (comments of Colombia).

82. The Committee noted general support for the conclusions and recommendations provided in the working document and agreed that further work on collection of occurrence data; processing studies and their effect on reducing the presence of HCN in the final products; as well as consumption patterns, amongst other relevant information, should first be carried out before considering the revision of existing or establishment of new MLs for HCN in cassava and cassava products.

83. The Committee agreed that the MLs for cassava flour and gari should be kept unchanged and transferred to the GSCTFF as there were no available estimates that the dietary exposure to cassava flour exceeded the ARfD or the PMTDI and JECFA did not characterize risk from gari consumption. The ML for gari should be recalculated in future to adjust the HCN descriptor to account for all the contributors to the presence of HCN in the final product in order to achieve consistency in expressing the total level of HCN arising from cyanogenic glycosides in foods derived from cassava. This would require new data and information to allow the safety assessment of this product.

84. The Committee noted that the levels of HCN in the standards for bitter and sweet cassava do not refer to MLs of HCN in the fresh product, but to the upper limit to differentiate between bitter and sweet varieties of cassava. However, the section on contaminants in the *Standard for Sweet Cassava* (CODEX STAN 238-2003) should be aligned to the corresponding provisions in the *Standard for Bitter Cassava* (CODEX STAN 300-2010) by referring to the national legislation of the importing country as no MLs for HCN in cassava roots could be established by CCCF at present.

85. As regards methods of analysis, the Committee noted the need for further validation work and that preference should be given to methods of analysis that could determine HCN (total) by measuring all potential contributors to the formation of HCN.

86. The Committee encouraged member countries to collect occurrence data on HCN in cassava and cassava products; information on processing (cooking) methods; and consumption patterns following the implementation of the COP with a view to determine the need and feasibility to establish MLs for cassava (raw and processed) in the future.

STATUS OF THE PROPOSED DRAFT MAXIMUM LEVELS FOR HYDROCYANIC ACID IN CASSAVA AND CASSAVA PRODUCTS

87. Based on the above considerations the Committee agreed to discontinue work on the revision or establishment of MLs for cassava and cassava products and to inform the 36th Session of the Commission accordingly.

88. The Committee agreed to transfer the MLs for HCN for cassava flour and gari to the GSCTFF with the current descriptors for the content of HCN in these products. In taking this decision, the Committee agreed to introduce consequential amendments to the standards for edible cassava flour and gari to remove these MLs from the standard and to include a general reference to the GSCTFF in the section on contaminants. Along these lines, the Committee also agreed to make a consequential amendment in the section on contaminants in the *Standard for Sweet Cassava* to refer the ML for HCN to the national legislation of the importing country (Appendix V).

PROPOSED DRAFT CODE OF PRACTICE TO REDUCE THE PRESENCE OF HYDROCYANIC ACID IN CASSAVA AND CASSAVA PRODUCTS (Agenda Item 11)¹⁵

89. The Delegation of Nigeria, as co-chair of the EWG on HCN in Cassava, introduced CRD 27 containing relevant revisions made by an in-session Working Group based on the comments submitted to this meeting. The Delegation explained that the information available on management practices to reduce the presence of HCN in cassava and cassava products were sufficiently inclusive to ensure global application of the COP.

90. The Committee considered the COP and made a few additional amendments to improve the accuracy of the provisions and to widen the range of products to which the scope applied (inclusion of a type of processed cassava consumed in Jamaica together with a corresponding production flow chart). The Committee agreed that provisions should remain as general as possible to encompass different types of cassava and cassava products grown and manufactured across the world in particular to differentiate between bitter and sweet cassava when necessary as both varieties were grown and used for human consumption by applying different processing (cooking) methods.

91. The Committee agreed that the revisions made at this session took into account available management practices to ensure worldwide implementation of the COP and was therefore ready for final adoption.

STATUS OF THE PROPOSED DRAFT CODE OF PRACTICE TO REDUCE THE PRESENCE OF HYDROCYANIC ACID IN CASSAVA AND CASSAVA PRODUCTS

92. The Committee agreed to forward the proposed draft Code to the 36th Session of the Commission for adoption at Step 5/8 (Appendix VI).

¹⁵ CX/CF 13/7/11; CX/CF 13/7/11-Add.1 (comments of Brazil, Costa Rica, European Union, Ghana, India, Kenya, Russian Federation, African union); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 20 (comments of Nigeria); CRD 21 (comments of Indonesia); CRD 22 (comments of Mali); CRD 27 (proposed draft revise *Code of practice to reduce the presence of hydrocyanic acid in cassava and cassava products*).

PROPOSED DRAFT CODE OF PRACTICE FOR WEED CONTROL TO PREVENT AND REDUCE PYRROLIZIDINE ALKALOID CONTAMINATION IN FOOD AND FEED (Agenda Item 12)¹⁶

93. The Delegation of the Netherlands, as the chair of the EWG on PAs, introduced the document and requested the Committee to provide inputs on the structure and possible missing information on available management practices for weed control to prevent and reduce PAs contamination.

94. The Committee generally agreed with the structure and content of the COP and noted that practices and other relevant information on regional and local situations should be included to provide for a wide application of the COP. The Committee took note that the COP could be structured by land as proposed in the working document, and that specific measures depending on the type of land could be consolidated in separated annexes in order to avoid repetition of certain management practices.

95. The Committee encouraged members to actively participate and submit additional management practices and complementary information to the EWG in order to facilitate finalization of the COP at its next session.

STATUS OF THE PROPOSED DRAFT CODE OF PRACTICE FOR WEED CONTROL TO PREVENT AND REDUCE PYRROLIZIDINE ALKALOID CONTAMINATION IN FOOD AND FEED

96. The Committee agreed to return the Code to Step 2/3 for redrafting, circulation for comments and consideration at the next session of the Committee.

EDITORIAL AMENDMENTS TO THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED (CODEX STAN 193-1995) (Agenda Item 13)¹⁷

97. The Delegation of the European Union, as chair of the EWG on the GSCTFF, introduced the report of the in-session Working Group and highlighted the main points of discussion in particular the approach to be taken in relation to the description of the commodities for which MLs had been established in the GSCTFF. The Delegation suggested focusing on the recommendations in order to make progress with the finalization of the editorial revision.

98. In considering a recommendation to re-insert the commodity codes linked to the food/feed categorization system of the Classification of Food and Feed developed by the Committee on Pesticide Residues, the Codex Secretariat recalled that work on the editorial amendments of the GSCTFF followed the decision of the 3rd Session of the Committee to discontinue work on the food categorization system to be used for the purpose of the GSCTFF, but to instead provide a clear description of the food/feed for which a ML applies and to screen the existing MLs in Schedule I of the GSCTFF to provide, where necessary, a clearer description of the food/feed to which the ML applies. The Secretariat noted that the GSCTFF recognized the use of the Classification as a supporting document to assist the CCCF in the definition of the product, but not as a classification system to be used in the GSCTFF and by taking this approach, the CCCF had kept the structure of the GSCTFF simplified and understandable.

99. The Secretariat also noted that the Committee had acknowledged that this approach would provide for flexibility to accommodate definitions of commodities for the purposes of setting MLs for contaminants in the GSCTFF, especially in view that the Classification was undergoing a comprehensive revision that might take quite some time for finalization by the CCPR; the Classification did not fully cover processed commodities; the commodity definitions in the Classification might not always be appropriate for the purposes of setting MLs for contaminants in the GSCTFF; and that there might be cases where the full correspondence between the commodity in the GSCTFF and the commodity code of the Classification might not be possible.

100. A delegation noted that the application of commodity codes would simplify the process of revision especially for those raw agricultural commodities and that deviations from the Classification could be indicated in the notes/remarks as they would rather be exceptional cases. The delegation also noted that the revision of the Classification might not entail major changes in the codification system and that the ongoing revision, especially in regard to the addition of new commodities/commodity codes, would not imply major deviations in relation to the description of the product/portion of the product to which the ML applies. Another delegation noted that the use of commodity codes might be restrictive and not always possible to fully apply hence, it would be advisable to keep the structure of the GSCTFF flexible to allow a definition that would be best suited for the purposes of establishing MLs for contaminants in the GSCTFF.

101. The Chair of the Committee noted that this discussion had already taken place in the past and that the CCCF had taken the decision to refer to the Classification where appropriate, but to not apply a classification system or to use commodity codes and that this approach provided for flexibility in the description of the products. To go back on this decision might introduce further delays in the completion of work while not facilitating future work on the definitions of commodities for which MLs might be established.

¹⁶ CX/CF 13/7/12; CX/CF 13/7/12-Add.1 (comments of Costa Rica, European Union, Ghana, India, Russian Federation, United States of America, African Union); CRD 19 (comments of China); CRD 22 (comments of Mali).

¹⁷ CX/CF 13/7/13; CRD 3 (comments of African Union); CRD 16 (comments of Thailand); CRD 22 (comments of Mali); CRD 28 (report of the in-session Working Group on the GSCTFF).

Conclusion

102. The Committee generally supported the recommendations in CRD 28 related to the application of the current approach to describe commodities in the GSCTFF; the need for time to consider the amendments proposed in CX/CF 13/7/13 while recognizing that progress had already been made in the revision of the food descriptors; and the need to re-establish the EWG to continue work on the editorial revision with a view to their finalization at the next session of CCCF.

103. The Committee therefore agreed to re-establish the EWG led by the European Union and co-chaired by the Netherlands, working in English, to prepare a revised version of the editorial amendments to the GSCTFF for comments and consideration at the next session of the CCCF. The document should be revised taking into account changes suggested by this Committee, and should be circulated as soon as possible to the members of the EWG for comments. A revised draft GSCTFF would then be circulated to all members and observers for comments by end of September 2013.

DISCUSSION PAPER ON POSSIBILITY TO DEVELOP A CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF ARSENIC CONTAMINATION IN RICE (Agenda Item 14)¹⁸

104. The Delegations of China and Japan, as chair and co-chair of the EWG on Arsenic in Rice, introduced the item and highlighted the conclusions and recommendations in paragraphs 104 and 105 of the discussion paper (CX/CF 13/7/14). The Delegations informed the Committee that due to time constraints, the EWG was not able to conclude on the necessity of a COP, but had recommended some discussion points for consideration by the Committee as indicated in paragraph 105. Key to the discussion was whether a COP should be developed and if so, that a clear scope should be agreed. On the other hand, if the Committee were to agree that a COP should not be developed, the Committee should then consider the development of "principle or policy for developing a code of practice" and/or the possible revision of the *Code of practice for source directed measures to reduce contamination of food and feed with chemicals* (CAC/RCP 49-2001) to complement with specific measures for the reduction of arsenic in rice.

105. The Committee noted general support for the development of a COP to reduce inorganic arsenic concentration in rice, which should be based on science, supported by field studies, and take into account regional differences in agricultural and processing practices, geo-climatic conditions, consumption patterns, amongst other elements identified in the conclusions and recommendations in the discussion paper. In addition, when considering GAPs/GMPs, the interaction of arsenic in the presence of other compounds naturally present or added to the soil that might impact on the uptake of arsenic by rice should be considered. Nutritional considerations on the balance between the risk of intake of arsenic and the benefit of eating rice should also be taken into consideration. In considering the benefits of specific agricultural measures to reduce arsenic, consideration also needed to be paid to the possible adverse effects on yield and quality. By taking these and other relevant factors into account, the development of such a COP would be helpful to governments, farmers, industry and consumers.

106. The Committee however noted that there was not enough agreement on the development of the COP at this stage and that more information on readily available risk management measures that could be generally implemented by countries across regions, needed to be identified before proceeding with the development of the COP. In order to facilitate the development of the paper, members were encouraged to conduct research and field studies and to provide information as describe in paragraph 105(d) of the discussion paper.

Conclusion

107. Based on the above considerations, the Committee agreed to re-establish the EWG led by China and co-chaired by Japan, working in English, to further develop the discussion paper, and to look into those management practices identified in paragraph 104 to determine which risk management measures were readily available to the extent that could provide the basis for the preliminary development of a COP and, if so, to attach a proposed draft COP for consideration by the next session of the Committee.

Methods of analysis for determination of inorganic arsenic in rice

108. Information on an internationally validated method of analysis for inorganic arsenic in rice and availability of data in support of the further development of MLs was provided in CRD 23.

Maximum level for arsenic in rice

109. The Committee recalled that at its last session it had agreed to retain the proposed draft maximum levels for inorganic or total arsenic in rice at Step 4 until the Committee resumed the consideration of the MLs at its 8th Session based on the outcome of proposals to be prepared by China following identification of additional relevant data and information provided by member countries, especially rice-producing countries, to GEMS/Food.

¹⁸ CX/CF 13/7/14; CRD 3 (comments of African Union); CRD 4 (comments of Kenya); CRD 8 (comments of Philippines); CRD 9 (comments of Russian Federation); CRD 11 (comments of Ghana); CRD 12 (comments of European Union); CRD 13 (comments of India); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 21 (comments of Indonesia); CRD22 (comments of Mali); CRD 23 (comments of Japan).

110. The Committee agreed that the above-mentioned EWG would also prepare a discussion paper on proposals for maximum levels for inorganic arsenic in rice and rice products for consideration at the next session. The Committee encouraged members to submit relevant data to the EWG, especially those from rice-producing countries, and data on *indica* rice, to reflect them into the discussion paper.

DISCUSSION PAPER ON MANAGEMENT PRACTICES TO REDUCE EXPOSURE OF FOOD-PRODUCING ANIMALS (LIVESTOCK AND BEES) TO PYRROLIZIDINE ALKALOIDS; AND TO REDUCE PRESENCE OF PYRROLIZIDINE ALKALOIDS IN COMMODITIES (RAW AND PROCESSED) (Agenda Item 15)¹⁹

111. The Delegation of the Netherlands, as chair of the EWG on PAs, explained that information on management practices available to reduce PAs' contamination in commodities (raw and processed) and to reduce exposure of food-producing animals (livestock and bees), and the possible carry-over of PAs from feed to food of animal origin, was not yet sufficient to include it in the Code of practice to prevent and reduce PAs contamination in food and feed (see Agenda Item 12).

Conclusion

112. In view of the above, the Committee agreed to resume the consideration of this matter if more information would become available e.g. in 2 or 3 years time.

DISCUSSION PAPER ON THE REVIEW OF THE GUIDELINE LEVELS FOR METHYLMERCURY IN FISH AND PREDATORY FISH (Agenda Item 16)²⁰

113. The Delegation of Norway, as chair of the EWG on Methylmercury in Fish, introduced the discussion paper and explained that the paper was developed following the availability of the report on the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption (2011) to explore, amongst others, whether guideline levels for methylmercury in fish were required, but that due to time constraints the discussion section could not be sufficiently elaborated and therefore firm conclusions could not be reached.

114. The Delegation of Japan, co-chair of the EWG, indicated that discussions in the working group had indicated the effectiveness of consumer advice as a good measure to maximize the benefits of fish consumption and minimize the risk from methylmercury in fish and therefore proposed that the Committee also discuss the need for consumer advice.

115. The Codex Secretariat drew the attention of the Committee to the recommendation of the Commission that the preferred format of a Codex standard in food or feed was a Maximum Level and that the present existing or proposed guideline levels should be reviewed for their possible conversion to a maximum level after a risk assessment performed by JECFA, if appropriate (footnote 2 of the GSCTFF) and that this recommendation should be taken into account when considering how to deal with the GLs.

116. The Committee considered the recommendations of the EWG and noted the following key points raised by delegates.

117. Several delegations were of the opinion that Guideline levels (GLs) were not appropriate for risk management and could result in reduced consumption of fish and should therefore be revoked. These delegations were of the view that consumer advice would be more effective. In this regard, the tables in the Joint FAO/WHO Report could serve as models for this advice. Some countries were compiling data for each of the fish species that could be used for this purpose. On the other hand, other delegations expressed the opinion that GLs or MLs in combination with consumer advice were appropriate. One observer supported the proposal for MLs and directed the Committee's attention to CRD 10.

118. Those delegations further noted that the GLs in the GSCTFF had been adopted in 1991 and did not take into account the benefits of fish consumption and since new information on risks and benefits had become available, the GLs needed to be reviewed and possibly revised. If the GLs were retained in its current form, predatory fish would need to be defined.

119. It was noted that the terminology used, i.e. "predatory fish" was not appropriate and data showed that certain "non-predatory" fish had higher levels of methylmercury than "predatory fish".

120. Some delegations also proposed that consideration should be given to developing MLs for total mercury rather than methylmercury. A proposal was also made that JECFA should be requested to conduct a further risk assessment as scientific knowledge of the adverse effects of low levels of exposure to methylmercury has expanded rapidly in the last few years.

121. The Representative of WHO informed the Committee that the aspect of fish consumption advisories had been considered in the consultation on risks and benefits of fish consumption and that these needed to be developed more on national rather than international level due to different consumption patterns and other more local aspects. The Representative also informed the Committee of the joint UNEP WHO publication to identify populations at risk of mercury exposure, which could be used as a tool for national authorities when developing fish consumption advisories.

¹⁹ CX/CF 13/7/15; CRD 3 (comments of African Union); CRD 9 (comments of Russian Federation); CRD 11 (comments of Ghana); CRD 12 (comments of European Union); CRD 13 (comments of India); CRD 14 (comments of USA); CRD 19 (comments of China); CRD 22 (comments of Mali).

²⁰ CX/CF 13/7/16; CRD 3 (comments of African Union); CRD 4 (comments of Kenya); CRD 6 (comments of Argentina); CRD 7 (comments of Republic of Korea); CRD 9 (comments of Russian Federation); CRD 10 (comments of IACFO); CRD 11 (comments of Ghana); CRD 12 (comments of European Union); CRD 13 (comments of India); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 22 (comments of Mali).

122. Regarding the aspect of analysis of methylmercury versus total mercury, the Representative informed the Committee that while the majority of total mercury in fish was in fact methylmercury, routine analysis was mostly undertaken for total mercury and as a precautionary or conservative measure compared with the PTWI for methylmercury. In case of problems, detailed confirmatory analysis could then be undertaken to quantify methylmercury.

123. The Codex Secretariat clarified that there had been previous discussion on the establishment of a level for total mercury and that it had been noted an analysis for total mercury would generally be adequate to ensure that the levels for methylmercury were not exceeded (i.e. total mercury was approximately 90% methylmercury) and therefore it had been decided that the establishment of a GL for total mercury in fish was not necessary.

124. While noting that there was support for either GLs or MLs for methylmercury in fish, it was agreed that no firm decision could be taken at this time. The Committee therefore agreed that further information was needed to inform on the approach to the current GLs, taking into account the benefits of fish consumption. With regard to guidance on consumer advice, it was noted that such advice would be more appropriate at the national or regional level as the advice would vary between countries because the risk of mercury exposure from the diet would depend on, amongst others, the patterns of consumption of fish and the types of fish consumed.

Conclusion

125. It was agreed that consumer advice should not be developed at the international level and that such guidance was more appropriate at the national level since national consumption patterns and types of fish would need to be taken into account and that tools, such as the joint UNEP WHO publication, to assist national authorities to develop such guidance were available.

126. It was agreed to review the GLs with a view to their revision or conversion to MLs. The Committee therefore re-established the EWG, led by Japan and co-chaired by Norway, and working in English, to prepare a discussion paper; collect data on total mercury and methylmercury in fish species important in international trade in order to review the current GLs; and explore the possibility of revising the GLs or their conversion to MLs and to identify the fish for which the level or levels could apply.

DISCUSSION PAPER ON CONTROL MEASURES FOR FUMONISINS IN MAIZE AND MAIZE PRODUCTS (Agenda Item 17)²¹

127. The Delegation of Brazil, as chair of the EWG on Fumonisin in Maize and Maize Products, introduced the discussion paper and reminded the Committee of the background to the request for the development of the discussion paper in relation to the discussion on the MLs for fumonisins in maize and maize products and the subsequent suspension of these MLs until the outputs of the discussion paper were considered. The Delegation recalled that the discussion paper had been developed to identify the gaps in the *Code of Practice for Prevention and Reduction of Mycotoxin Contamination in Cereals*, the need for a separate code of practice for fumonisins in maize, and whether there were any other measures to control fumonisins in maize.

128. The Delegation informed the Committee that in reviewing the *Code of Practice for Prevention and Reduction of Mycotoxin Contamination in Cereals* it was found that, the Code mainly focused on primary production and that it would be useful to include effective GMPs such as sorting and cleaning to remove damaged kernels and other foreign matter at the industry level; that predictive models have been proposed for control of mycotoxins, including fumonisins and could be included in the COP; that the COP at the time of its adoption included a section on HACCP as a food safety management system "in the future" and in view of this, consideration should be given to review the *FAO/IAEA Manual on the Application of the HACCP System in Mycotoxin Prevention and Control* to consider its adoption for the control of mycotoxins in maize and other cereals.

129. Noting that the COP had been adopted ten years ago and that new information was available as raised above, it was proposed to revise the COP to take into account this new information. It was noted that the measures noted above were not necessarily specific for fumonisins and that the revision would therefore apply to all mycotoxins in general.

130. The Delegation further informed the Committee that the revision of the COP would not impact on the proposed draft MLs for fumonisins.

131. It was also noted that a revision of the general section of the COP could have an impact on the annexes, and that the annexes should therefore also be reviewed to ensure consistency with the main Code. Consideration should also be given to expand the section on HACCP taking into account, amongst others, the available information from *FAO/IAEA Manual on the Application of the HACCP System in Mycotoxin Prevention and Control*.

Conclusion

132. The Committee agreed that it was too early to start new work on the revision of the COP and that it needed more information on the nature of the revision. It was therefore agreed to re-establish the EWG, led by Brazil and co-chaired by the United States of America, working in English, to further develop the discussion paper based on the discussions at the session and, if possible, to prepare a proposed draft revision of the COP for consideration by the next session of the Committee.

²¹ CX/CF 13/7/17, CRD 3 (comments of African Union); CRD 4 (comments of Kenya); CRD 9 (comments of Russian Federation); CRD 11 (comments of Ghana); CRD 12 (comments of European Union); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 22 (comments of Mali).

Proposed draft maximum levels for fumonisins in maize and maize products and associated sampling plans

133. The Committee noted that the work on the possible revision of the *Code of Practice for Prevention and Reduction of Mycotoxin Contamination in Cereals* would not impact on the MLs for fumonisins and agreed that the MLs should be further discussed at the next session of the Committee. It was agreed that the proposed draft MLs for fumonisins in maize and maize products and associated sampling plans previously discussed at the 6th Session of the Committee (CX/CF 12/6/18) would be circulated for comments and a revised proposal for proposed draft MLs for fumonisins in maize and maize products and associated sampling plans would be prepared by Brazil for comments and consideration by the next session of the Committee.

DISCUSSION PAPER ON AFLATOXINS IN CEREALS (Agenda Item 18)²²

134. The Delegation of Brazil, as chair of the EWG on Aflatoxins in Cereals, introduced the item and explained that the aim of the paper was to provide an overview of aflatoxins in cereals with the view to identify possible actions or new work on this issue. The Delegation explained the approach taken in preparing the paper. It was reported that because no raw data were available, that data from a literature search were used to undertake the exercise of comparing exposure and the BMDL10 (benchmark dose level) of aflatoxin to calculate the MOE (margin of exposure). The 13 GEMS/Food cluster diets had been used in this exercise.

135. The Delegation reported that in order to conduct a more sound evaluation of the current situation of aflatoxin contamination in cereal grains, the exposure levels and the impact to human health, it would be necessary to have original data on cereal grains such as rice, corn, sorghum, wheat, rye, oat and barley as well as processed products from different parts of the world.

136. It was further recommended that the Committee should request JECFA to conduct an assessment on the effects of various MLs on aflatoxin exposure and the risk from the consumption of AF contaminated cereals and cereal products.

137. The JECFA Secretariat reminded the Committee that JECFA had performed a quantitative risk assessment for aflatoxins, estimating the increased cancer risk at defined levels of exposure. Moreover, JECFA had already undertaken an impact assessment for different hypothetical MLs, and at the levels considered no definable difference in health risk would be distinguishable. However, the analysis would allow defining the percentage of the food commodity which would be non-compliant to the hypothetical MLs.

138. The Committee supported further work on aflatoxins in cereals and considered that further data should be submitted to allow a better assessment of aflatoxins in cereals. It was proposed that occurrence data be requested on total aflatoxins and aflatoxin B1 (AFB1) in raw cereals, rice, maize, sorghum, wheat, rye, oats and barley as traded, and in processed cereal-based products, for this data to be reviewed in order for the Committee to make a more informed decision on how to proceed with aflatoxins in cereals and whether further advice was necessary from JECFA.

139. A delegation noted that AFB1 was the most toxic and most widely distributed of the aflatoxins and proposed that if levels were set for aflatoxins in cereals, this should be restricted to AFB1.

Conclusion

140. The Committee agreed that the JECFA Secretariat would put out a public call for data; that this data would be submitted to GEMS/Food; and that the re-established EWG, chaired by Brazil and co-chaired by the United States of America, working in English, would review and analyze the data and provide a report and recommendations on how to proceed with aflatoxins in cereals for consideration by the next session of the Committee.

PRIORITY LIST OF CONTAMINANTS AND NATURALLY OCCURRING TOXICANTS PROPOSED FOR EVALUATION BY JECFA (Agenda Item 19)²³

141. The Delegation of the United States of America, as the Chair of the in-session Working Group on the Priority List of Contaminants and Naturally Occurring Toxicants for Evaluation by JECFA, presented the report on the outcome of the discussion of the working group.

142. The Committee was informed that four substances remain on the priority list, viz. 3-MCPD esters, glycidyl esters, pyrrolizidine alkaloids, and non-dioxin like PCBs. The Committee was further informed that cadmium had been removed from the list since an exposure assessment for cadmium in cocoa would be conducted by JECFA in June 2013.

143. The Committee agreed with the recommendations of the Working Group with some editorial amendments to the priority list.

144. In relation to the exposure assessment of cadmium in cocoa, the Delegation of Ecuador, extended their appreciation to the members of the Committee for supporting the request for an exposure assessment on cadmium in cocoa and cocoa products in the previous meeting, and for including this proposal in the list of priorities. Similarly JECFA was thanked for including this work in the agenda for their meeting in June 2013.

²² CX/CF 13/7/18; CRD 3 (comments of African Union); CRD 4 (comments of Kenya); CRD 7 (comments of Republic of Korea); CRD 9 (comments of Russian Federation); CRD 11 (comments of Ghana); CRD 12 (comments of European Union); CRD 13 (comments of India); CRD 14 (comments of USA); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 22 (comments of Mali).

²³ REP12/CF Appendix XI; CX/CF 13/7/19 (comments of Costa Rica); CRD 2 (report of the in-session Working Group on Priorities); CRD 9 (comments of Russian Federation).

145. The Delegation further reminded delegates that according to the International Cocoa Organization (ICCO), Latin America and the Caribbean produced more than 12% of the global cocoa production, with over 93% production of fine cocoa. From this volume, Ecuador contributed 62%, which supported over 120,000 families of small and medium producers, to whom cocoa represented over 65% of their family income and generated more than 400 USD million dollars for the country. Since several countries in Latin America and the Caribbean had been working in generating additional data sets for cadmium in cocoa and cocoa products, this information could be used to strengthen the JECFA evaluation and improve the representativeness of the data on cadmium occurrence and exposure in the Region. This clearly fulfilled the objectives of Codex to protect the health of consumers and sustain fair practices in the international food trade.

146. Several delegations supported the statement and informed the Committee that they would be submitting their data for the JECFA evaluation.

147. The FAO JECFA Secretariat welcomed additional data submission, but informed the Committee that JECFA would conduct the exposure assessment in June 2013 based on the data submitted in response to the call for data, which had already passed. Should any new data be made available, this could be used to update the assessment.

Conclusion

148. The Committee endorsed the priority list of contaminants and naturally occurring toxicants for JECFA evaluation as proposed by the Working Group (Appendix VII) and agreed to re-convene the in-session Working Group at its next session. The Committee further agreed to continue to request comments and/or information on the Priority List for consideration by the next session of the Committee.

OTHER BUSINESS AND FUTURE WORK (Agenda Item 20)

Proposal for new work on the establishment of a maximum level for total aflatoxins in ready-to-eat peanuts and associated sampling plan²⁴

149. The Delegation of India introduced the document and explained that a harmonized ML for total aflatoxins in ready-to-eat peanuts based on science should be established to avoid trade barriers and protect consumers' health. The Delegation indicated that most countries had not established MLs for ready-to-eat peanuts and that Codex had established an ML for total aflatoxins in peanuts intended for further processing. In recent years the trade in ready-to-eat peanuts showed an increasing trend as requiring establishment of maximum levels for aflatoxins for such items.

150. Many delegations supported the proposal and indicated that they would provide data to support the work. Some other delegations, while not opposed to the establishment of a ML in principle, proposed that a discussion paper be developed to provide an overview of the concern with ready-to-eat peanuts and to assemble data on consumption and aflatoxin levels in ready-to-eat peanuts in international trade, to allow the Committee to make a more informed decision on new work. Such data would be useful for JECFA should they conduct a risk assessment. It was noted that some of the information on MLs from different countries needed to be corrected, and countries should provide correct information on their MLs. Further proposals were made to consider AFB1 rather than total aflatoxins as this aflatoxin was considered the most widespread and toxic compound among aflatoxins.

Conclusion

151. The Committee agreed to establish an EWG, chaired by India and working in English, to prepare a discussion paper for consideration at the next session that defines the issue, identifies the available data and specifies data requirements for establishing the ML for aflatoxins in ready-to-eat peanuts.

DATE AND PLACE OF NEXT SESSION (Agenda Item 21)

152. The Committee was informed that its eighth Session would be held in approximately one year's time in The Netherlands. The exact venue and date would be determined by the Host Government in consultation with the Codex Secretariat.

²⁴ CX/CF 13/7/20; CRD 3 (comments of African Union); CRD 4 (comments of Kenya); CRD 6 (comments of Argentina); CRD 7 (Republic of Korea); CRD 9 (comments of Russian Federation); CRD 11 (comments of Ghana); CRD 14 (comments of USA); CRD 15 (comments of Malaysia); CRD 16 (comments of Thailand); CRD 19 (comments of China); CRD 22 (comments of Mali).

SUMMARY STATUS OF WORK

| SUBJECT MATTER | STEP | ACTION BY: | DOCUMENT REFERENCE (REP13/CF) |
|--|--------------|---|----------------------------------|
| Proposed draft maximum levels for lead in fruit juices and nectars, ready-to-drink; canned fruits and canned vegetables | 5/8 | Governments 36 th CAC | para. 42, Appendix II |
| Proposed draft MLs for deoxynivalenol (DON) in cereal-based foods for infants and young children | 5/8 | | para. 70, Appendix III |
| Proposed draft Code of practice for the prevention and reduction of Ochratoxin A contamination in cocoa | 5/8 | | para. 79, Appendix IV |
| Proposed draft Code of practice to reduce the presence of hydrocyanic acid in cassava and cassava products | 5/8 | | para. 92, Appendix VI |
| Consequential amendments to the Standards for Edible Cassava Flour, Gari and Sweet Cassava | - | | para. 88, Appendix V |
| Proposed draft maximum levels for hydrocyanic acid for cassava flour and gari (transfer to the <i>General Standard for Contaminants and Toxins in Food and Feed</i>) | discontinued | | |
| Proposed draft revision of guideline levels for radionuclides in foods in the General Standard for Contaminants and Toxins in Food and Feed | discontinued | | |
| Proposed draft maximum levels for DON in raw cereal grains (wheat, maize and barley) including sampling plans and in flour, semolina, meal and flakes derived from wheat, maize or barley | 5 | Governments 36 th CAC 8 th CCCF | para. 70, Appendix III |
| Proposed draft Annex for the prevention and reduction of aflatoxins and ochratoxin A contamination in sorghum (<i>Code of practice for the prevention and reduction of mycotoxin contamination in cereals</i>) | 2/3 | Electronic Working Group (Nigeria/Sudan) 8 th CCCF | para. 74 |
| Proposed draft Code of practice for weed control to prevent and reduce pyrrolizidine alkaloid contamination in food and feed | 2/3 | Electronic Working Group (The Netherlands) 8 th CCCF | para. 96 |
| Proposed draft maximum levels for arsenic in rice and rice products | 2/3 | Electronic Working Group (China/Japan) 8 th CCCF | para. 110 |
| Proposed draft maximum levels for fumonisins in maize and maize products and associated Sampling Plans | 2/3 | Brazil 8 th CCCF | para. 133 |
| Proposed draft revision of the maximum levels for lead in fruits, vegetables, milk products, and infant formula, follow-up formula and formula for special medical purposes for infants in the General Standard for Contaminants and Toxins in Food and Feed | 2/3 | Electronic Working Group (USA) 8 th CCCF | paras 39-40 |

| SUBJECT MATTER | STEP | ACTION BY: | DOCUMENT REFERENCE (REP13/CF) |
|--|------|--|----------------------------------|
| Editorial amendments to the General Standard for Contaminants and Toxins in Food and Feed | - | Electronic Working Group (European Union/The Netherlands) 8 th CCCF | Paras 102-103 |
| Discussion Papers | | | |
| Discussion paper on the review of guideline levels for methylmercury in fish | - | Electronic Working Group (Japan/Norway) 8 th CCCF | Para. 126 |
| Discussion paper on the review of the <i>Code of practice for the prevention and reduction of mycotoxin contamination in cereals</i> | - | Electronic Working Group (Brazil/USA) 8 th CCCF | para. 132 |
| Discussion paper on aflatoxins in cereals | - | Electronic Working Group (Brazil/USA) 8 th CCCF | para. 140 |
| Discussion paper on the establishment of maximum levels for total aflatoxins in ready-to-eat peanuts and associated sampling plan | - | Electronic Working Group (India) 8 th CCCF | para. 151 |
| Priority list of contaminants and naturally occurring toxicants proposed for evaluation by JECFA | - | Governments 8 th CCCF | para. 148, Appendix VII |

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APPENDIX II

PROPOSED DRAFT MAXIMUM LEVELS FOR LEAD

(Step 5/8)

| Product name | Maximum level (mg/kg) | Notes/Remarks |
|-------------------|-----------------------|---|
| Canned fruits | 0.1 | As consumed; including canned mixed fruits; excluding canned berries and other small fruits |
| Canned vegetables | 0.1 | As consumed; including canned mixed vegetables; excluding canned brassica vegetables, canned leafy vegetables (including canned brassica leafy vegetables) and canned legume vegetables |
| Fruit juices | 0.03 | Including nectars, ready to drink; excluding juices from berries and other small fruits |

**REVOCAION OF MAXIMUM LEVELS FOR LEAD FOR INDIVIDUAL STANDARDS FOR CANNED FRUITS AND VEGETABLES
IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED**
(following the establishment of maximum levels for lead in in the above-mentioned commodities)

| Product name | Maximum level (mg/kg) | Notes/Remarks |
|---|-----------------------|---------------|
| Canned fruit cocktail | 1 | |
| Canned grapefruit | 1 | |
| Canned mandarin oranges | 1 | |
| Canned mangoes | 1 | |
| Canned pineapples | 1 | |
| Canned raspberries | 1 | |
| Canned strawberries | 1 | |
| Canned tropical fruit salad | 1 | |
| Canned asparagus | 1 | |
| Canned carrots | 1 | |
| Canned green beans and canned wax beans | 1 | |
| Canned green peas | 1 | |
| Canned mature processed peas | 1 | |
| Canned mushrooms | 1 | |
| Canned palmito (palm hearts) | 1 | |
| Canned sweet corn | 1 | |
| Canned tomatoes | 1 | |
| Table olives | 1 | |

APPENDIX III

**Proposed Draft Maximum Levels for Deoxynivalenol (DON)
(Step 5/8)**

| Product name | Maximum level (mg/kg) | Notes/Remarks |
|--|------------------------------|---|
| Cereal-based foods for infants and young children* | 0.2 | ML applies to the commodity as consumed |

* All cereal-based foods intended for infants (up to 12 months) and young children (12 to 36 months)

**Proposed Draft Maximum Levels for Deoxynivalenol (DON)
(Step 5)**

| Product name | Maximum level (mg/kg) | Notes/Remarks |
|--|------------------------------|---|
| Raw cereal grains (wheat, maize and barley) | 2 | ML applies to raw cereal grains prior to sorting and removal of damaged kernels For sampling plan, see Annex below |
| Flour, semolina, meal and flakes derived from wheat, maize or barley | 1 | |

PROPOSED DRAFT SAMPLING PLANS FOR DEOXYNIVALENOL (DON) IN RAW CEREALS

(Step 5)

DEFINITIONS

Lot - an identifiable quantity of a food commodity delivered at one time and determined by the official to have common characteristics, such as origin, variety, type of packing, packer, consignor, or markings.

Sublot - designated part of a larger lot in order to apply the sampling method on that designated part. Each sublot must be physically separate and identifiable.

Sampling plan - is defined by a deoxynivalenol test procedure and an accept/reject level. A deoxynivalenol test procedure consists of three steps: sample selection, sample preparation and analysis or deoxynivalenol quantification. The accept/reject level is a tolerance usually equal to the Codex maximum level (ML).

Incremental sample - the quantity of material taken from a single random place in the lot or sublot.

Aggregate sample - the combined total of all the incremental samples that is taken from the lot or sublot. The aggregate sample has to be at least as large as the laboratory sample or samples combined.

Laboratory sample – the smallest quantity of cereal/cereal based product comminuted in a mill. The laboratory sample may be a portion of or the entire aggregate sample. If the aggregate sample is larger than the laboratory sample(s), the laboratory sample(s) should be removed in a random manner from the aggregate sample.

Test portion – a portion of the comminuted laboratory sample. The entire laboratory sample should be comminuted in a mill. A portion of the comminuted laboratory sample is randomly removed for the extraction of the deoxynivalenol for chemical analysis.

Operating Characteristic (OC) Curve – a plot of the probability of a accepting a lot versus lot concentration for a specific sampling plan design. The OC curve provides an estimate of the chances of rejecting a good lot (exporter's risk) and the chances of accepting a bad lot accepted (importer's risk) by a specific deoxynivalenol sampling plan design. A good lot is defined as having a deoxynivalenol concentration below the ML; a bad lot is defined as having a deoxynivalenol concentration above the ML.

SAMPLE SELECTION

Material to be sampled

A) Sampling procedure for cereals and cereal products for lots \geq 50 tonnes

Each lot, which is to be examined for deoxynivalenol must be sampled separately. Lots larger than 50 tonnes should be subdivided into sublots to be sampled separately. If a lot is greater than 50 tonnes, the lot has to be subdivided into sublots following Table 1

Table 1 Subdivision of lots into sublots depending on product and lot weight

| Commodity | Lot weight (ton) | Weight or number of sublots | No incremental samples | Aggregate sample Weight (kg) |
|----------------------|--------------------------|-----------------------------|------------------------|------------------------------|
| Raw wheat and barley | \geq 1 500 | 500 tonnes | 100 | 1 |
| | $>$ 300 and $<$ 1 500 | 3 sublots | 100 | 1 |
| | \geq 50 and \leq 300 | 100 tonnes | 100 | 1 |
| | $<$ 50 | -- | 3-100* | 1 |
| Raw maize | \geq 1 500 | 500 tonnes | 100 | 5 |
| | $>$ 300 and $<$ 1 500 | 3 sublots | 100 | 5 |
| | \geq 50 and \leq 300 | 100 tonnes | 100 | 5 |
| | $<$ 50 | -- | 3-100* | 1-5 |

* Depending on the lot weight - see Table 2

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 sublot may exceed the mentioned weight by a maximum of 20%.

- Each sublot must be sampled separately.

- Number of incremental samples: 100

- If it is not possible to carry out the method of sampling set out in this point because of the commercial consequences resulting from damage to the lot such as packaging forms, means of transport, an alternative method of sampling may be applied provided that it is as representative as possible and is fully described and documented.

Sampling procedure for cereals and cereal products for lots < 50 tonnes

For lots of cereals and cereal products less than 50 tonnes, the sampling plan must be used with 10 to 100 incremental samples, depending on the lot weight, resulting in an aggregate sample of 1 to 5 kg. For very small lots (≤ 0.5 tonnes) a lower number of incremental samples may be taken, but the aggregate sample uniting all incremental samples shall be also in that case at least 1 kg.

The figures in Table 2 may be used to determine the number of incremental samples to be taken.

Table 2: Number of incremental samples to be taken depending on the weight of the lot of cereals and cereal products

| Lot weight (tonnes) | No of incremental samples |
|---------------------|---------------------------|
| ≤ 0.05 | 3 |
| $> 0.05 - \leq 0.5$ | 5 |
| $> 0.5 - \leq 1$ | 10 |
| $> 1 - \leq 3$ | 20 |
| $> 3 - \leq 10$ | 40 |
| $> 10 - \leq 20$ | 60 |
| $> 20 - \leq 50$ | 100 |

Sampling procedure for cereals and cereal products for lots >>> 500 tonnes

Number of incremental samples (of about 100 g) to be taken:

100 incremental samples + $\sqrt{\text{metric tonnes}}$

Static Lots

A static lot can be defined as a large mass of cereals/cereal-based product contained either in a large single container such as a wagon, truck or railcar or in many small containers such as sacks or boxes and the cereal/cereal-based product is stationary at the time a sample is selected. Selecting a truly random sample from a static lot can be difficult because all containers in the lot or subplot may not be accessible.

Taking incremental samples from a static lot usually requires the use of probing devices to select product from the lot. The probing devices should be specifically designed for the commodity and type of container.

The probe should (1) be long enough to reach all products, (2) not restrict any item in the lot from being selected, and (3) not alter the items in the lot. As mentioned above, the aggregate sample should be a composite from many small incremental samples of product taken from many different locations throughout the lot.

For lots traded in individual packages, the sampling frequency (SF), or number of packages that incremental samples are taken from, is a function of the lot weight (LT), incremental sample weight (IS), aggregate sample weight (AS) and the individual packing weight (IP), as follows:

$$SF = (LT \times IS) / (AS \times IP).$$

The sampling frequency (SF) is the number of packages sampled. All weights should be in the same mass units such as kg.

Dynamic Lots

Representative aggregate samples can be more easily produced when selecting incremental samples from a moving stream of cereals/cereal-based product as the lot is transferred from one location to another. When sampling from a moving stream, take small incremental samples of product from the entire length of the moving stream; composite the incremental samples to obtain an aggregate sample; if the aggregate sample is larger than the required laboratory sample(s), then blend and subdivide the aggregate sample to obtain the desired size laboratory sample(s).

Automatic sampling equipment such as a cross-cut sampler is commercially available with timers that automatically pass a diverter cup through the moving stream at predetermined and uniform intervals. When automatic sampling equipment is not available, a person can be assigned to manually pass a cup through the stream at periodic intervals to collect incremental samples. Whether using automatic or manual methods, incremental samples should be collected and put together at frequent and uniform intervals throughout the entire time the flow past the sampling point.

Cross-cut samplers should be installed in the following manner: (1) the plane of the opening of the diverter cup should be perpendicular to the direction of the flow; (2) the diverter cup should pass through the entire cross sectional area of the stream; and (3) the opening of the diverter cup should be wide enough to accept all items of interest in the lot. As a general rule, the width of the diverter cup opening should be about two to three times the largest dimensions of items in the lot.

The size of the aggregate sample (S) in kg, taken from a lot by a cross cut sampler is:

$$S = (D \times LT) / (T \times V),$$

where D is the width of the diverter cup opening (cm), LT is the lot size (kg), T is interval or time between cup movement through the stream (seconds), and V is cup velocity (cm/sec).

If the mass flow rate of the moving stream, MR (kg/sec), is known, then the sampling frequency (SF), or number of cuts made by the automatic sampler cup can be computed as a function of S, V, D, and MR.

$$SF = (S \times V) / (D \times MR).$$

Packaging and Transportation of Samples

Each laboratory sample shall be placed in a clean, inert container offering adequate protection from contamination, sunlight, and against damage in transit. All necessary precautions shall be taken to avoid any change in composition of the laboratory sample, which might arise during transportation or storage. Samples should be stored in a cool dark place.

Sealing and Labelling of Samples

Each laboratory sample taken for official use shall be sealed at the place of sampling and identified. A record must be kept of each sampling, permitting each lot to be identified unambiguously and giving the date and place of sampling together with any additional information likely to be of assistance to the analyst.

SAMPLE PREPARATION

Precautions

Sunlight should be excluded as much as possible during sample preparation, since some mycotoxins may gradually break down under the influence of ultra-violet light. Also, environmental temperature and relative humidity should be controlled and not favour mould growth and deoxynivalenol formation.

Homogenization - Grinding

As the distribution of deoxynivalenol is non-homogeneous, laboratory samples should be completely homogenized by grinding the entire laboratory sample received by the laboratory. Homogenization is a procedure that reduces particle size and disperses the contaminated particles evenly throughout the comminuted laboratory sample.

The laboratory sample should be finely ground and mixed thoroughly using a process that approaches as complete homogenization as possible. Complete homogenization implies that particle size is extremely small and the variability associated with sample preparation approaches zero. After grinding, the grinder should be cleaned to prevent deoxynivalenol cross-contamination.

Test portion

The suggested weight of the test portion taken from the comminuted laboratory sample should be approximately 25 g.

Procedures for selecting the 25 g test portion from the comminuted laboratory sample should be a random process. If mixing occurred during or after the comminution process, the 25 g test portion can be selected from any location throughout the comminuted laboratory sample. Otherwise, the 25 g test portion should be the accumulation of several small portions selected throughout the laboratory sample.

It is suggested that three test portions be selected from each comminuted laboratory sample. The three test portions will be used for enforcement, appeal, and confirmation if needed.

ANALYTICAL METHODS

Background

A criteria-based approach, whereby a set of performance criteria is established with which the analytical method used should comply, is appropriate. The criteria-based approach has the advantage that, by avoiding setting down specific details of the method used, developments in methodology can be exploited without having to reconsider or modify the specific method. The performance criteria established for methods should include all the parameters that need to be addressed by each laboratory such as the detection limit, repeatability coefficient of variation (within lab), reproducibility coefficient of variation (among lab), and the percent recovery necessary for various statutory limits. Analytical methods that are accepted by chemists internationally (such as AOAC) may be used. These methods are regularly monitored and improved depending upon technology.

Performance Criteria for Methods of Analysis

A list of possible criteria and performance levels are shown in Table 3. Utilizing this approach, laboratories would be free to use the analytical method most appropriate for their facilities.

Table 3 Performance characteristics for deoxynivalenol

| Level µg/kg | Deoxynivalenol | | |
|----------------|--------------------|--------------------|-----------|
| | RSD _r % | RSD _R % | Recovery% |
| > 100 - ≤ 500 | ≤ 20 | ≤ 40 | 60 to 110 |
| > 500 | ≤ 20 | ≤ 40 | 70 to 120 |

APPENDIX IV

PROPOSED DRAFT CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION
OF OCHRATOXIN A CONTAMINATION IN COCOA

(Step 5/8)

1. INTRODUCTION

1. This document is intended to provide guidance for all interested parties producing and handling cocoa beans for human consumption. All cocoa beans should be prepared and handled in accordance with the General Principles of Food Hygiene¹, which are relevant for all foods being prepared for human consumption. This code of practice indicates the measures that should be implemented by all persons that have the responsibility for assuring that food is safe and suitable for consumption.
2. Ochratoxin A (OTA) is a toxic fungal metabolite classified by the International Agency for Research on Cancer as a possible human carcinogen (group 2B). JECFA established a PTWI of 100 ng/kg bodyweight for OTA. OTA is produced by a few species in the genera *Aspergillus* and *Penicillium*. In cocoa beans, the studies have shown that only *Aspergillus* species, specifically *A. carbonarius* and *A. niger* aggregate, with lower numbers of *A. westerdijkiae*, *A. ochraceus* and *A. melleus* are involved. OTA is produced when favourable conditions of water activity, nutrition and temperature required for growth of fungi and OTA biosynthesis are present.
3. The fruit of cocoa derived from the cocoa tree, *Theobroma cacao* L., is composed of pericarp, tissue that arises from the ripened ovary wall of a fruit, and the ovary. When the fruit is ripe the external tissue, also known as the pod, consisting of thick and hard organic material, could be used as compost, animal feed and a source of potash. The ovary contains numerous seeds embedded in an aqueous, mucilaginous and acidic pulp. This white and off-white edible pulp is composed of about 12% sugars and due to its high citric acid content has a low pH (3.3 – 4.0). The pulp contains up to 10% pectin. The pulp might be used for making jams and jellies as well as alcoholic beverages and vinegar.
4. The main commercial use resides in the seeds, also known as cocoa beans. The cocoa bean is composed of an episperm or integument, embryo and cotyledon. The integument, the protective layer of the seed, is also called shell when it is dried. During fermentation the embryo dies and upon drying, the fat content of the cocoa bean ranges between 34% and 56%.
5. After proper fermentation and drying processes the cocoa beans are further processed industrially to produce various commercial cocoa products.
6. Since the cocoa beans are extracted from a fruit, contamination by microorganisms may occur and the development of OTA producing fungi could begin when conditions become appropriate for growth. Generally the fermentation and drying processes could create this favorable condition when these processes are not properly done.
7. It is important to emphasize that the next manufacturing steps that involve removing shells, roasting (or vice versa), liquoring and refining, only the stage of shell removal can significantly reduce OTA levels. As these steps are performed at the industry level, industry should establish food safety specific programs to reduce the OTA level in the processed cocoa products meant for human consumption.

2. DEFINITIONS

Parts of cocoa fruit (figure 1)

Cocoa bean: The seed of the cocoa fruit composed of episperm (integument), embryo and cotyledon.

Cocoa pod: The cocoa fruit pericarp that arises from the ripened ovary wall of a fruit.

Episperm or integument: The protective layer of the seed also called shell when it is dried.

Pulp: Aqueous, mucilaginous and acidic substance in which the seeds are embedded.

Dry cocoa: A commercial term designating cocoa beans which have been evenly dried throughout and which the moisture content corresponds to the requirements of this standard.

Mouldy bean: A cocoa bean in which mould is visible on the internal parts to the naked eye.

Slaty bean: A cocoa bean which shows a slaty colour over half or more of the surface exposed by a cut made lengthwise through the centre using the method described in ISO/R 1114.

Insect Damaged Bean: A cocoa bean with the internal parts of which contains insects at any stage of development, or has been attacked by insects which have caused damage visible to the naked eye.

Germinated bean: A cocoa bean with the shell pierced, slit or broken by the growth of seed germ.

Flat bean: A cocoa bean of which the two cotyledons are so thin that it is not possible to obtain a cotyledon surface by cutting.

¹ General Principles of Food Hygiene (CAC/RCP 1- 1969).

Smoky bean: A cocoa bean which has a smoky smell or taste or which shows signs of contamination by smoke.

Broken bean: A cocoa bean of which a fragment is missing, the missing part being equivalent to less than half the bean.

Fragment: A piece of cocoa bean equal to or less than the original bean.

Piece of shell: Part of the shell without any of the kernel

Adulterations: Adulteration of the composition of a parcel of cocoa beans by means whatsoever so that the resulting mixture or combination does not conform to the contractual description.

Foreign matter: Any substance other than cocoa beans or residue.

Harvesting and opening the fruits: Fruits are manually harvested and opened using a sickle, machete or wooden baton.

Fermentation: Process intended to degrade the pulp and initiate biochemical changes in the cotyledon by inherent enzymes and micro-organisms from the farm environment.

Drying process: Drying of cocoa beans either under sunlight or in mechanical/solar dryers (or a combination of both) in order to reduce the moisture content to make them stable for storage.

Sorting: Handling and technological operation intended to remove foreign matter, fragments of dried cocoa beans, pod and pulp; as well as defective beans from dried cocoa beans.

Roasting: Heat treatment that produces fundamental chemical and physical changes in the structure and composition of cocoa beans and brings about darkening of the beans and the development of the characteristic chocolate flavor of roasted cocoa.

3. PROCESSING OF COCOA

8. Harvesting involves removing ripe fruits from the trees. The fruits are harvested manually by making a clean cut through the stalk with a cleaned and well sharpened blade.
9. The pods are opened to remove the cocoa beans with the pulp as soon as possible or within a few days after harvesting.
10. The cocoa beans with pulp removed from the pod are heaped together or put in boxes, trays, baskets or platforms to allow micro-organisms to develop and initiate the fermentation process.
11. The fermented cocoa beans are usually sun dried in an open drying yard, or on suspended tables with many variations and technological innovations. Sun and mechanical drying can be combined and used together.
12. When the beans are appropriately dried to target moisture levels, they must be sorted to remove flat beans, shriveled beans, black beans, mouldy beans, small and fused beans, beans with insect damage, germinated beans and others defects.
13. Once the drying and sorting processes are completed, the dried cocoa beans must be put into appropriate bags and stored. Appropriate bagging and storage of the processed beans is just as important as proper fermentation and drying.
14. A major part of OTA originally present in cocoa beans is found in the shell fraction. Accordingly, the industrial processing of removing cocoa shells, as well as dried epispem or integument of cocoa seed, before and after the roasting can reduce OTA levels significantly.

4. RECOMMENDED PRACTICES

4.1 Pre-harvest

15. The pulp and the cocoa beans are microbiologically sterile in relation to OTA producing fungi while inside the healthy cocoa pod. The contamination by spores of fungi that can produce OTA occurs during the opening process of cocoa pod and in subsequent processes.
16. Consequently the cocoa plantation should be properly maintained to ensure as low a level of mould infestation as possible, in order to avoid inoculation by OTA producing fungal spores during opening of the cocoa pod.
17. Recommended practices to reduce the development and spore load from OTA-producing fungi on cocoa beans are:
 - a) Keep cocoa plants healthy, through the appropriate use of good agricultural practices (GAP) such as weeding, improving soil texture, prevention of soil erosion, pruning, fertilizer application, pest and disease control, and irrigation. For establishment of new cocoa farms, cocoa trees should be planted in the most suitable soil, pattern and density to ensure easy management of the farms.
 - b) Do not use overhead irrigation during the flowering and fruit development period. This could augment normal spore dispersal rates and increase the chance of infection of beans by OTA producers.
 - c) Avoid disposal of uncomposted organic wastes from cocoa or any other source, in or around the plantation. Cocoa seeds and seed associated material, such as dust, earth, and other seed may promote proliferation of OTA producing fungi.

4.2 Harvest

18. Cocoa fruits should be harvested as soon as they are ripe. Harvesting should be done every week during peak periods and every two weeks in non-peak periods. Likewise, it is important to do a separate round of farm sanitation every week to remove diseased cocoa fruits with a machete, *bolo* or cocoa hook that is used only for that purpose. Separate diseased pods from healthy pods right in the field to avoid contamination during transport and storage.
19. Discard mummified fruits because they are more likely to be infected.
20. Avoid harvesting unripe fruits. The unripe cocoa fruits have a solid pulp, without mucilage, hence the cocoa beans are difficult to separate from the pod, do not ferment properly and can contribute to slaty beans.
21. The harvester should avoid unnecessary cutting/wounding of the cocoa pods to prevent inoculation and development of OTA producing fungi in the cuts/wounds in the pod.
22. Harvesting must be carried out using specific techniques and tools. The tools and baskets used to transport the fruits must be clean and the tools sharpened regularly.

4.3 Storage and pod opening

23. Once a sufficiently large quantity of fruits suitable for fermentation has been harvested, the pods must be opened, manually (using wooden batons, pod splitters or machetes) or mechanically (using cocoa pod breaking machines) and beans extracted. Care should be taken not to damage the seeds during pod breaking. It is recommended opening the fruits as soon as possible or within 7 days after harvesting in order to avoid fungal proliferation. Tools used to open cocoa pods should be clean and sharpened regularly as appropriate. An appropriate degree of personnel hygiene should be maintained by personnel during manual removal of seeds.
24. Wounded or damaged fruits should not be stored longer than one day before opening and fermenting.
25. During the opening process any defective parts of the cocoa pod, mouldy beans, diseased beans, and damaged beans should be removed and appropriately disposed of. Good quality beans should be placed in a suitable container during transport. Transport of fresh/wet beans from pod opening sites to on-farm fermentation facility should be done under conditions that will prevent contamination e.g. spilled beans must be free of soil before being fermented.

4.4 Fermentation of cocoa beans

26. The cocoa beans with pulp should be placed in reasonably clean, dry and suitable boxes, baskets, trays or platforms for the fermentation. Care should be taken to prevent cocoa beans from getting in contact with water during fermentation.
27. The mucilaginous mass should be turned frequently to ensure uniform heat in the heaps, to allow for aeration, to break up any lumps and to prevent fungal proliferation. The frequency depends on the method of fermentation.
28. The duration of fermentation is usually 4 to 7 days which will also depend on the method of fermentation. It is however recommended that fermentation beyond 7 days be avoided as this could lead to fungal proliferation and seed germination.
29. Tools (paddle and shovel used for manual turning) and materials used during fermentation should be cleaned regularly. Organic materials used for fermentation should be discarded when appropriate.
30. Fermentation is recommended to avoid ochratoxigenic fungal growth and ochratoxin A production because acetic, lactic and citric acid produced by bacteria during fermentation can compete with and inhibit these undesirable fungal species. Research has shown that fermentation carried out during drying on a drying mat; and partially depulped cocoa also being fermented directly on the drying mat can increase OTA production in cocoa beans.

4.5 Drying process

31. After fermentation, the cocoa beans must be removed and immediately spread on appropriate elevated surfaces (i.e. not directly on bare ground or concrete floor) to dry, preferably under direct sunlight. If the drying is not started immediately, the cocoa beans will keep fermenting and over-ferment resulting in a loss of cocoa flavour.
32. The drying process could be done by direct sunlight or artificial drying or a combination of both. A moisture content of less than 8% in cocoa beans is considered optimal in order to avoid growth of microorganisms and for good storage.
33. The drying area should be located away from contaminant sources and should receive maximum sun exposure and air circulation during most times of the day, to speed up the drying process of cocoa beans. Shady areas should be avoided.
34. In rainy or wet regions, cocoa beans must be covered and re-spread once the drying surface has dried. Ensure that the drying surface is clean and located away from contaminants sources.
35. The layer of drying cocoa beans should not exceed 6 cm thick, which corresponds to 40 kg of wet cocoa beans per square meter of drying area to avoid slow or inadequate drying that may lead to mould growth.
36. Beans must be turned several times each day to ensure uniformly dried beans. Rake over the cocoa bean layer frequently during the day time to allow faster drying and reduce the risk of fungal growth (5 - 10 times per day).

37. Protect cocoa beans during drying from rain and dew. The cocoa beans should be heaped and covered at night or during rainy weather to avoid re-wetting.
38. Do not mix cocoa beans at different drying stages. Use specific identification methods in order to distinguish and identify each drying stage.
39. Re-wetting of cocoa beans should be avoided because cocoa beans with a level of moisture above 8% can allow rapid growth of the mycelium and the possibility of OTA production. Mouldy cocoa bean should be discarded.
40. Protect the cocoa beans during drying from domestic animals, which can be a source of biological contamination.
41. Drying equipment and tools should be cleaned regularly.

4.6 Storage, transportation and trading of dried cocoa beans

42. Before storage of dried cocoa beans, they must be sorted to remove flat beans, slaty beans, shrivelled beans, black beans, mouldy beans, small and/or fused beans, germinated beans, beans with insect damage, etc.
43. Ensure the facilities and equipment that are related with sorting process are regularly inspected, maintained and cleaned, in order to avoid physical damage to cocoa beans that make them more susceptible to contamination and deterioration and to prevent the introduction of new contamination and undesirable materials. An appropriate degree of personal hygiene should be maintained by all personnel.
44. The dried cocoa beans that will be stored must be properly identified by lots, at the farm level or in out-of-farm warehouses, in bulk or in clean bags under appropriate storage conditions as prescribed in paragraph 43. Bags used in storage and transport of cocoa beans need to be free of noxious substances such as mineral oils.
45. Cocoa beans should be packaged in clean bags which are sufficiently strong and properly sewn or sealed to withstand transport and storage and which are suitable for food contact use and discourage pest infestation.
46. The bagged cocoa beans must be placed in warehouses or storage sheds that are weatherproof, well aerated, cleaned, free from dampness and insect pests and away from smoke and other odoriferous materials that could contaminate the cocoa.
 - a) The design and structure of the warehouses or storage sheds should be adequate to maintain dryness and uniformity of the stored dried cocoa beans.
 - b) The cocoa bags should be arranged on pallets and away from walls, to allow good air circulation.
 - c) The stored beans should not be exposed to direct sunlight nor stored near heating sources, to avoid the possibility of temperature differentials and water migration.
 - d) Cleaning and maintenance programs should be implemented and storage facilities should be periodically inspected, cleaned and repaired.
47. During the entire process, the cocoa beans must also be protected from re-wetting, degradation and cross – contamination. In long term storage conditions, humidity should be kept below 70% RH. Appropriate storage facilities should follow the use of good storage practices and conduct regular monitoring in order to prevent or reduce mould growth.
48. The moisture content of the stored cocoa beans should be periodically checked and kept below 8% by re-drying.
49. Any infestation must be dealt with by proper and approved methods of fumigation. Appropriate documentation accompanying the cargo should state in clear and correct terms the fumigants and the quantities that were used.
50. From the production areas, cocoa may be conveyed by various means to the trading points. The main aspect of concern here is to avoid rewetting of cocoa beans, due to possible climatic changes between different regions, and taking the necessary control measures.
51. Transport of cocoa beans also requires the adoption of practices to avoid re-wetting, to maintain temperature as uniform as possible and to prevent contamination by other materials. The main requirements here are:
 - a) Cover cocoa bean loading and unloading areas to protect against rain.
 - b) Before receiving a new cargo, the vehicles must be cleaned from residues of previous cargo.
 - c) The vehicles must have floor, side walls and ceilings (in closed vehicles) checked for the presence of points where exhaust fumes or water from rain can be channeled into the cocoa cargo. Tarpaulins and plastic canvas used to cover the cargo should also be regularly checked to ensure that they are clean and without holes. The vehicles should also receive regular maintenance and should be kept in good condition.
 - d) Reliable transport service-providers that adopt the recommended good transportation practices should be selected by operators.

4.7 Cargo Ship loading and transport

52. Cocoa beans are transported from producing to consuming countries in bags or in bulk, usually in 15 to 25 tonnes capacity containers. Temperature fluctuations, during the transportation time, can cause condensation of the remaining water (present even in well-dried beans) and local re-wetting. The redistribution of water can lead to fungal growth, with the possibility of OTA production. The recommended practices during transportation in the port are:
- Cover cocoa loading and unloading areas to protect against rain.
 - Check cocoa lots to ensure that they are uniformly dried and below 8% moisture content, free of foreign matter and conforming to the established defect levels.
 - Check containers before loading to ensure they are clean, dry and without structural damage that could allow water to enter into the container.
 - Bags should be well stacked and crossed over for mutual support in order to avoid the formation of empty vertical columns (chimneys). The top layer and sides of bags should be covered with materials that can absorb condensed water, such as silica gel or cardboard for protection against the growth of fungi that could result in OTA production. For cocoa in bulk, a sealable plastic liner (e.g. big bag which allows aeration) is desirable and this should be kept away from the roof of the container.
 - Choose an appropriate place, not directly exposed to outside elements, aboard the ship to store the cocoa to reduce the possibility of undesirable situations mentioned that can lead to OTA contamination.
 - Keep the ventilation holes in the containers free from clogging.
 - Avoid unprotected stowage on the deck (top layer) and stow away from boilers and heated tanks or bulkheads.
 - The moisture content should not exceed 8% anywhere, from the point where the cocoa beans leave the loading area to the point at which the cocoa is unloaded, stored and/or subjected to other processing procedures such as roasting.
53. The complete cocoa value chain flowchart is shown in Figure 2.

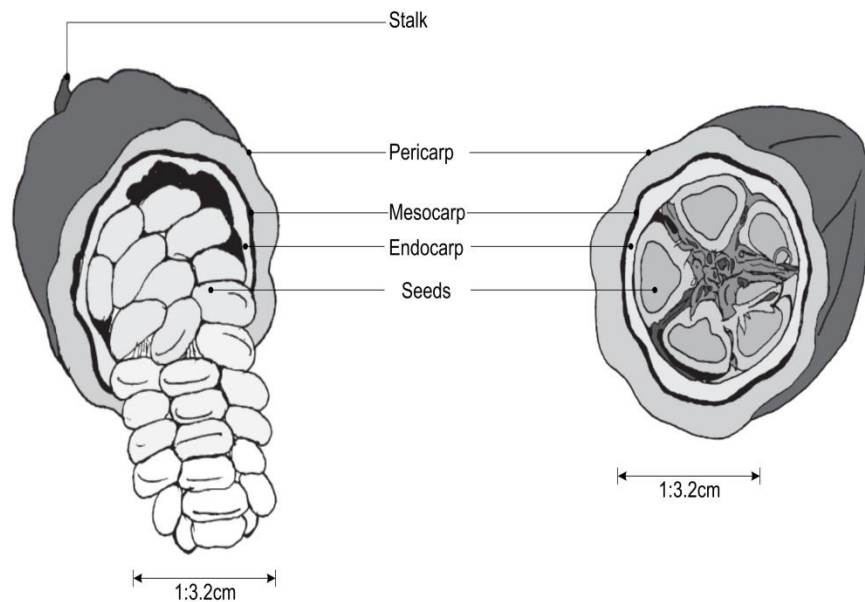


Figure 1a: Longitudinal and transverse sections of a cocoa pod Scale: 1:3.2 cm

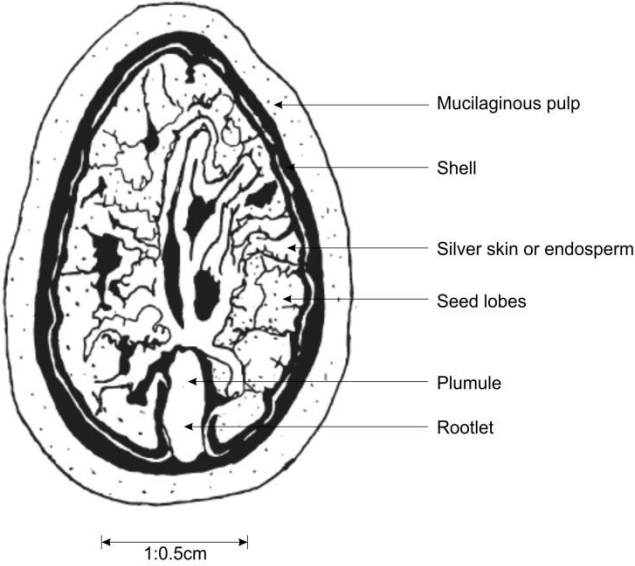


Figure 1b: Longitudinal section of a cocoa seed Scale: 1:0.5 cm

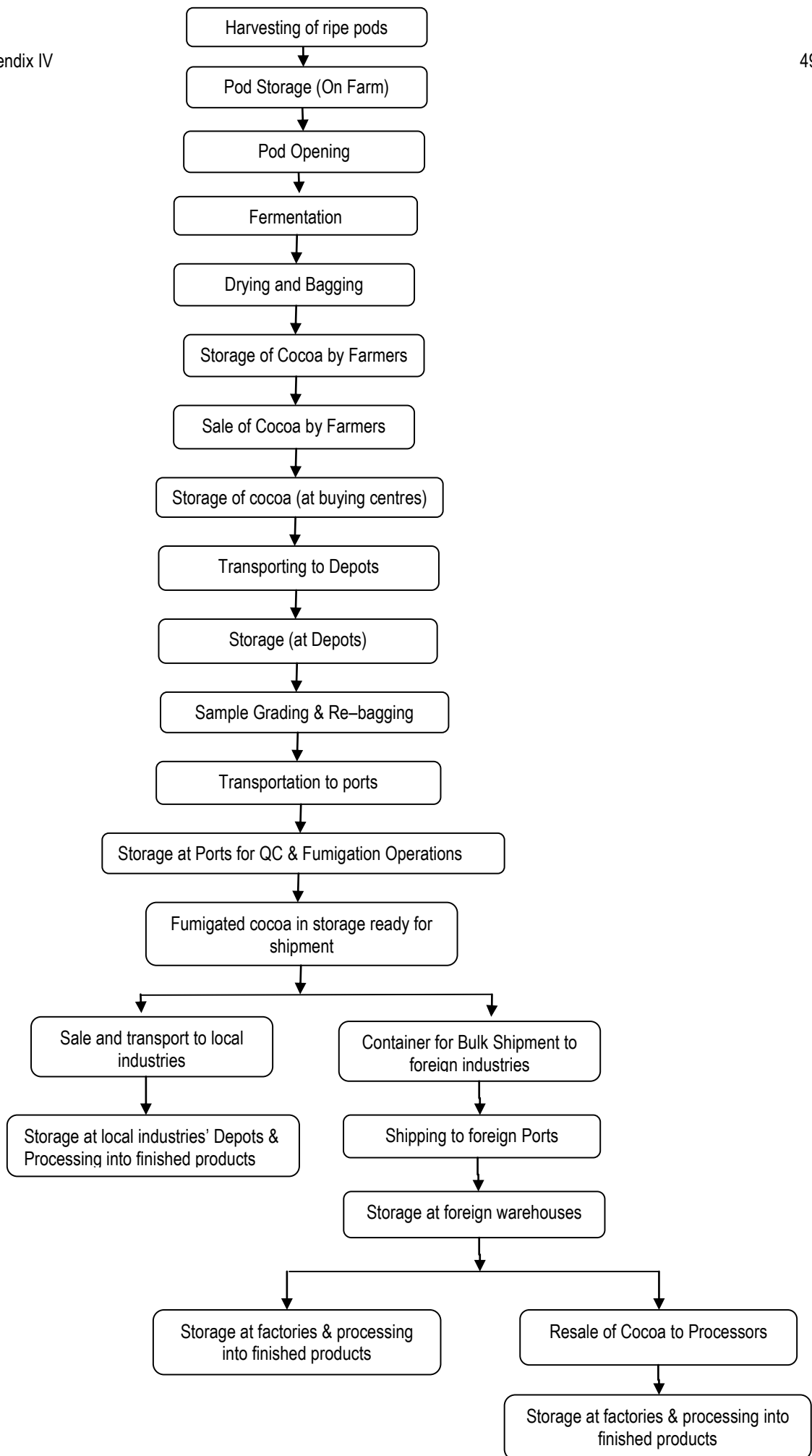


Figure 2: COCOA VALUE CHAIN

APPENDIX V

MAXIMUM LEVELS FOR HYDROCYANIC ACID

(transfer from commodity standards to GSCTFF, for adoption by the Commission)

GENERAL STANDARD FOR CONTAMINANTS AND TOXINS FOR FOOD AND FEED (CODEX STAN 193-1995)

| Commodity | Maximum level [mg/kg] |
|---------------|--|
| Gari | 2 (expressed as free hydrocyanic acid) |
| Cassava flour | 10 (expressed as total hydrocyanic acid) |

CONSEQUENTIAL AMENDMENTS TO THE FOLLOWING STANDARDS FOR ADOPTION BY THE COMMISSION:

(for adoption by the Commission)

STANDARD FOR GARI (CODEX STAN 151-1989)*3.2.2 Cyanogenic glycosides and hydrocyanic acid*

Total hydrocyanic acid content shall not exceed 2 mg/kg determined as free hydrocyanic acid.

4. CONTAMINANTS*4.1 Heavy metals*

Gari shall be free from heavy metals in amounts which may represent a hazard to human health.

4.3 Mycotoxins

Gari shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

4.1 The products covered by this Standard shall comply with the Maximum Levels of the *General Standard for Contaminants and Toxins in Food and Feed* (CODEX STAN 193-1995).**STANDARD FOR EDIBLE CASSAVA FLOUR (CODEX STAN 176-1989)***3.2.2 Hydrocyanic acid content*

The total hydrocyanic acid content of edible cassava flour shall not exceed 10 mg/kg.

4. CONTAMINANTS*4.1 Heavy metals*

Edible cassava flour shall be free from heavy metals in amounts which may represent a hazard to human health.

4.3 Mycotoxins

Edible cassava flour shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

4.1 The products covered by this Standard shall comply with the Maximum Levels of the *General Standard for Contaminants and Toxins in Food and Feed* (CODEX STAN 193-1995).**STANDARD FOR SWEET CASSAVA (CODEX STAN 238-2003)****7. CONTAMINANTS**7.1 The produce covered by this Standard shall comply with the maximum levels of the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995). In the absence of a Codex maximum level for hydrogen cyanide, an acceptable maximum level shall be set on a safety basis by the national legislation of the importing country.

APPENDIX VI

**PROPOSED DRAFT CODE OF PRACTICE FOR THE REDUCTION OF
HYDROCYANIC ACID (HCN) IN CASSAVA AND CASSAVA PRODUCTS**

(Step 5/8)

INTRODUCTION

1. Hydrogen cyanide is a volatile compound which evaporates rapidly in the air at temperatures over 28°C and dissolves rapidly in water. It may easily be lost during transport, storage and analysis of samples.
2. Hydrogen cyanide is a chemical compound that can be released from cyanogenic glycosides that are natural constituents of some plants such as: bitter almonds, sorghum, cassava, lima beans, stone fruits and bamboo shoots. Therefore reduction and removal measures of hydrogen cyanide (HCN) should focus on the precursor i.e. cyanogenic glycosides and cyanohydrins.
3. Hydrogen cyanide may be toxic to humans and animals, and the severity of the toxicity depends on the quantity consumed.
4. Cassava is an important staple crop containing cyanogenic glycosides. The cassava plants including the roots also contain the enzyme linamarase that breaks down the cyanogenic glycosides to release cyanohydrin, which dissociates at low levels of acidity to produce hydrogen cyanide. The extent of the breakdown of the cyanogenic glycosides and the eventual release of hydrogen cyanide depends on the amount of linamarase present in the cassava tissue; the extent of the disruption of the tissue, the acidity of the product, and the heat treatment are key factors in determining the concentration of residual cyanogens in cassava products. It is evident that high concentrations of cyanogenic glycosides may result in higher concentrations of hydrogen cyanide.

SCOPE

5. This Code of Practice intends to provide national and local authorities, manufacturers and other relevant bodies with guidance on how to produce cassava products with safe concentrations of residual cyanogenic compounds.

GENERAL REMARKS

6. This Code outlines measures that have been proven to prevent and/or reduce concentrations of hydrogen cyanide in cassava products. When applying the code for cassava processing methods should be carefully chosen from the viewpoint of benefit and feasibility. In addition, these should be implemented in accordance with the relevant national and international legislation and standards.
7. It is recognized that reasonable application of technological measures such as Good Manufacturing Practices (GMP), can be taken to prevent or reduce significantly the concentrations of hydrogen cyanide in cassava products.

MEASURES TO REDUCE THE PRECUSOR OF HYDROGEN CYANIDE

8. The potential cyanide content in cassava varies with the variety of cassava, the environmental conditions in which it is grown (e.g. drought) and time of harvest.
9. Varieties with low cyanide content have been developed and might be useful in reducing occurrence of hydrogen cyanide in cultivated cassava. Where bitter cassava varieties are used then adequate post harvest processing is essential.
10. Harvesting should be done at the appropriate time because studies have shown increased cyanide in late harvested cassava.

TYPICAL PRODUCTION PROCESS

11. Processing is effective in reducing cyanogenic compound content to minimum concentrations when done appropriately. Inadequate or poor processing as sometimes occurs during famine and periods of social stress or the rush to market can lead to high residues of HCN in the final product.
12. The production process for cassava products varies with the intended product. Some examples of cassava products include gari, fufu, cassava flour, cassava starch(tapioca), cassava chips etc. Figures 1-8 illustrate the steps in the production processes of some cassava products.

GARI PRODUCTION

13. For gari, a fermented, granular cassava food product; the production process involves selection of cassava tubers, peeling, washing, grating, dewatering and fermentation, sieving, frying, cooling/drying, sieving and packaging. The process typically follows the steps listed below.

- a. **Selection:** Fresh and wholesome cassava tubers are selected from the lots for processing
- b. **Peeling:** Peeling is carried out to remove the outer inedible parts of the roots; these are known to contain most of the cyanogenic glycosides.
- c. **Washing:** This is done to remove dirt and other contaminants. It is advisable to also wash before peeling to reduce the microbial load.
- d. **Grating the cassava roots:** Grating is done either manually by rubbing peeled and washed cassava roots against a metal sheet with perforations made with a nail or mechanically using a grater. During grating, the cyanogenic glycosides are hydrolyzed by the enzyme, linamarase.
- e. **Dewatering and Fermentation:**
 - i. In traditional fermentation, fermentation and dewatering are carried out at the same time by packing the grated cassava in sacks and pressed under pressure by putting weights on the sacks or using hydraulic press.
 - ii. Fermentation is done to develop the taste of the gari. The fermentation period could be between 12 – 24 hours, resulting in the production of gari with an almost bland taste and high starch content, or could vary from 48 – 164 hours resulting in the production of gari with sour taste and lower starch content.
 - iii. During fermentation, especially within 12 – 24 hours, cyanohydrins, which is the intermediate product of the breakdown of the cyanogenic glycoside rapidly dissociates to produce hydrogen cyanide which is volatile and easily lost. However as fermentation is allowed to progress beyond this time, the cassava mash becomes acidic (this is responsible for the sour taste) and the acidity retards the spontaneous dissociation of the cyanohydrins and fixes them in the food. These cyanohydrins slowly dissociate under normal storage conditions; the rate of dissociation is increased by contact with alkalis and/or heat.
- f. **Sieving:** Sieving is done to remove the large lumps and fibres and also to obtain a homogeneous product for a more uniform roasting of individual particles during the roasting operation.
- g. **Roasting:** Should be properly done by placing the sieved fermented grated cassava on a pan stirring until it becomes dry. Palm oil may be added during roasting as is done in some parts of Nigeria. Roasting has an effect on the amount of residual cyanogenic compounds in the final product and the shelf life/storability of the product.

FUFU AND FUFU POWDER PRODUCTION

14. The production of fufu, and fufu flour involves: Peeling of the roots, washing, cutting, fermentation, mashing and sieving/pounding, dewatering and drying. The process follows the steps listed below.

- a. Selection of fresh whole cassava roots
- b. **Peeling:** peeling is carried out to remove the outer inedible part which is known to contain most of the cyanogenic glycosides.
- c. **Washing:** the peeled cassava roots are washed with water.
- d. **Cutting:** the washed cassava roots are cut into small pieces. These will facilitate the fermentation process.
- e. **Fermentation:** Fermentation is carried out in tanks or other suitable fermentation vessels for 3-4 days.
- f. **Mashing/Pounding:** The fermented cassava pieces are mashed and passed through a sieve, and when the roots are not soft enough to be mashed by hand, they are pounded or passed through a grater before the fibres are removed by adding water to the mash and filtering.
- g. **Dewatering:** Excess water is removed from the mash by packing the mash into a woven polyethylene sack and pressing with weights or a hydraulic press to produce fufu.
- h. **Drying:** Instant fufu flour is produced by either sun drying of the dewatered mash or artificially using a mechanical dryer.

DRIED CASSAVA CHIPS

15. Cassava chips are dried granules derived from clean, fresh cassava. The production of dried cassava chips involves peeling, slicing or chipping, and drying.

- a. **Peeling:** Peeling is carried out to remove the outer inedible parts of the root; these are known to contain most of the toxic cyanogenic glycosides.
- b. **Chipping/slicing:** The objective of chipping is to expose the maximum surface of the cassava roots and encourage rapid drying. Best drying in terms of quickness and quality of the end product is achieved when the peeled cassava is thinly sliced - less than 10 mm thick.
- c. **Drying:** Sun-drying of cassava chips is carried out on any convenient flat surface, the objective is to produce dry cassava chips which are clean, having white colour, free from extraneous matter and can be safely stored for long periods.

OTHER CASSAVA PRODUCTS

16. Cassava chips used as a snack food may be made from extruded flour or from dried cassava chips.
 - a. **Peeling:** Peeling is carried out to remove the outer inedible parts of the root; these are known to contain most of the cyanogenic glycosides.
 - b. **Slicing:** The objective of slicing is to expose the maximum surface of the cassava roots and encourage a rapid drying. Best drying in terms of quickness and quality of the end product is achieved when the peeled cassava is thinly sliced less than 2 mm
 - c. **Frying, heating food up to temperatures above 180°C:** The surface dries out, sealing the water content inside.

17. Cassava starch is one of the most commonly used starches in food manufacturing and functions as a thickener, emulsifier or confectionery ingredient. The production of cassava starch involves selection, peeling, washing, grating, starch separation and drying.
 - a. **Selection:** cassava roots are harvested and selected for starch extraction
 - b. **Peeling:** peeling is carried out to remove the outer inedible part which is known to contain most of the cyanogenic glycosides
 - c. **Washing:** the peeled cassava roots are washed with water
 - d. **Grating:** after peeling and washing, the roots are grated to release the starch granules and then they are added with water to extract the starch.
 - e. **Starch separation:** Starch is separated from the pulp and water by sedimentation or by means of a centrifugation.
 - f. **Drying:** starch is sun-dried or an artificial dryer is used before milling and sieving

18. There are several other cassava based food products such as Lafun, an unfermented cassava flour; Attieke - steamed fermented cassava granules; Chikwangué, Bila - a soaked cassava Fijian food; Farinha - a roasted cassava product produced in Brazil; Bikedí - a traditional fermented cassava root food; Ntobambodi - a semi solid fermented cassava leaves soup both consumed in Congo; and Bammy – a baked/ fried cassava cake consumed in Jamaica. Their methods of preparation are similar to the foregoing process steps although in some instances may differ; examples are soaking, wrapping of tubers, etc.

PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES

19. Cultivars of cassava should be carefully selected and planted
20. Conditions of severe drought during planting should be avoided or minimized through cultivation practices such as wetting, and conditions leading to high moisture content should also be avoided.

RECOMMENDED PRACTICES BASED ON GOOD MANUFACTURING PROCESSES

21. Raw Materials Selection

Selection of cassava Roots: Cassava roots for the preparation of cassava products should be processed as soon as practicable after harvest.
22. The cassava selected from the lots should be of high quality and incidences of bruises, mechanical damage, should be minimised. Spoiled and woody cassava should be avoided.

Preparation of Cassava Products

23. Process flow charts for preparation of different cassava products are given in Figures 1-7. However the following, not in any particular order, are recommended practices for each of the unit operations in the flow charts of the products.
24. **Peeling:** This should be done with clean stainless knives. Ensure that the peels including rinds (inedible part) are completely removed; they are known to contain very high concentrations of cyanogenic glycosides which can be toxic.

25. **Washing:** Wash the peeled roots in water at least twice to remove pieces of the peel, sand and other dirt.
26. **Grating:** Grating should be properly done using stainless steel equipment to rupture the cassava tissue for a fast breakdown of cyanogenic glycosides.
27. **Soaking:** Soaking in water is often done for one to three (1-3) days, before or after the chipping operation during which some fermentation takes place that gives the chips the sour flavour favoured by some consumers. It also allows hydrogen cyanide to diffuse out making the product safer for human consumption. The National Root Crop Research Institute in Nigeria suggested that optimal hydrocyanic acid reduction can be achieved through a combination of 15 minute soaking and 2 minute blanching of cassava chips.
28. **Fermenting:** Put cassava mash in a clean sack and tie. Allow to stand in a fermenting trough for 2-3 days. Arrange the sacks in such a way that there is no contact with sand or dirt that can contaminate the mash. Allow free seeping of water from the sacks. Fermenting should not be less than 2 days to ensure adequate cyanide detoxification. The practice of processing cassava roots which have stored overnight without fermenting the mash is not encouraged because the gari produced by this method invariably contains high concentrations of cyanide.
29. **Pressing:** At the end of the fermentation period the mash in the sacks is pressed to remove as much moisture as possible. Pressing is completed when water is no longer dripping from the sacks. If dewatering is not complete, there would be lumps during roasting which reduce the quality and yield of gari.
30. **Cake breaking / Sifting or Sieving:** The cassava mash cake produced by the dewatering/pressing process is disintegrated using clean hands followed by sifting/sieving with a non-rusting sifter into a clean basin. A sifter made of stainless steel material is preferable.
31. **Roasting:** Roast and stir constantly in a large shallow cast-iron pan over fire, with a piece of gourd or wooden paddle until the product, gari in this instance, is dried.
32. **Cooling:** Collect the roasted product in a clean basin and spread on a raised platform lined with clean polythene material or white cloth to cool to room temperature.
33. **Packaging:** Packaging of processed cassava products should be in clean, insect-and moisture-proof materials that guarantee the wholesomeness of the product and retention of its nutritional, physical and sensory qualities. The packaging material should not impart any toxic substance or undesirable odour/flavour to the cassava product.
34. **Chipping:** Chipping of cassava should be done thinly 10 mm for efficient, fast and adequate drying.
35. **Drying:** should be done in a hygienic and dust free environment where animals and birds cannot get to it.
36. **Storage:** Storage of finished product or dried intermediate product should be in a cool, dry, well-ventilated, insect-and rodent-free store/enclosure.
37. **Cooking:** Only Cassava known to have low cyanide should be used for direct cooking and consumption i.e. the sweet type, because cyanogenic glycosides are heat stable.

GENERAL RECOMMENDATIONS

38. National, state and local governments as well as non-governmental organizations (NGOs, commercial associations and cooperatives) should be involved in promoting effective cassava cultivation with the introduction of low cyanide, high yielding and well-adapted varieties of cassava and processing methods as a means to ensure maximum reduction of residual cyanogens in cassava food products.
39. Campaigns for introduction of other staples, vegetables, pulses and fruits to decrease the daily cyanide intake and broaden the diet could also result in lower consumption of cyanogenic glycosides.
40. Non-industrial, small-scale producers of cassava and cassava products should have access to materials with information on the specific recommendations based on Good Manufacturing Practice and guidance on methods for reducing residual cyanogens in cassava products.
41. Food Safety Authorities and Public Health Monitoring bodies may consider introducing scientific kits such as picrate kits to monitor cyanide concentrations in cassava products the point of use and urinary thiocyanate concentrations in the population.

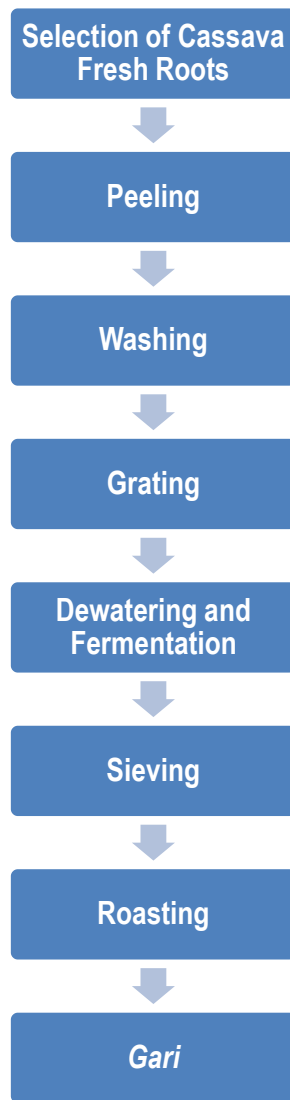


Figure 1: Flow chart for production of Gari

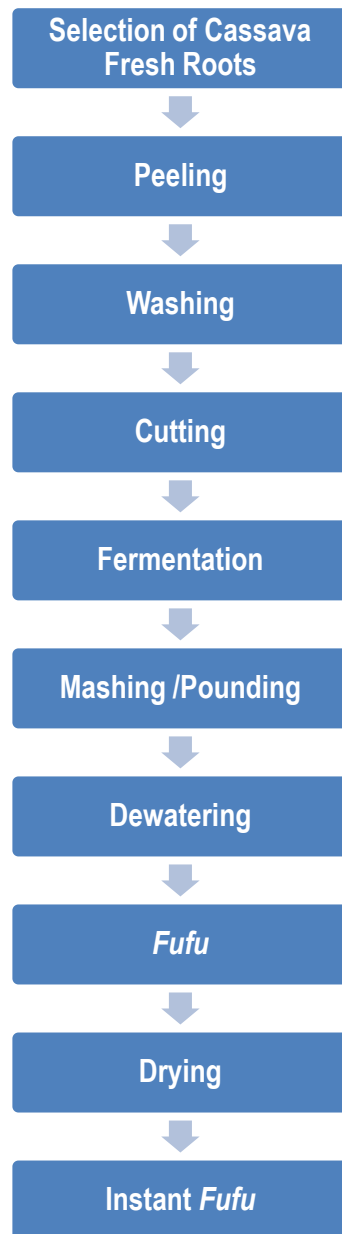


Figure 2: Flow chart for production of Fufu/Instant fufu

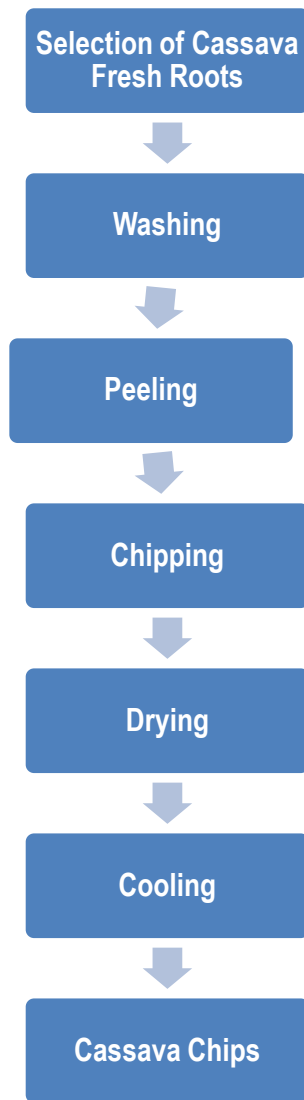


Figure 3: Flowchart for production of Cassava chips

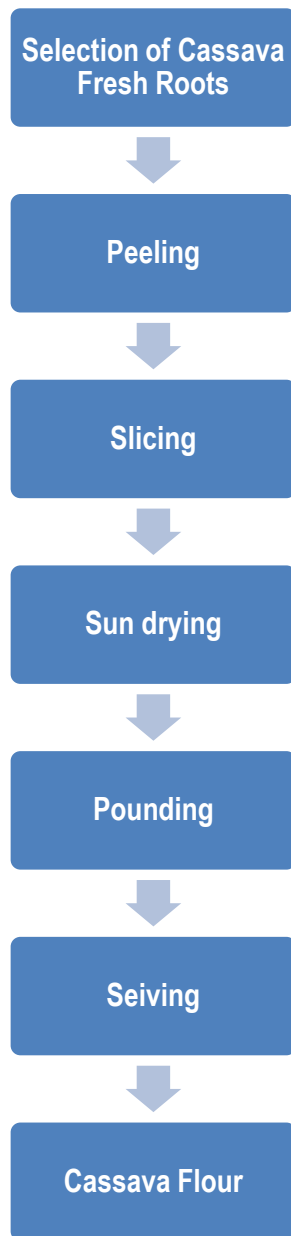


Figure 4: Flowchart for Production of Unfermented Cassava Flour

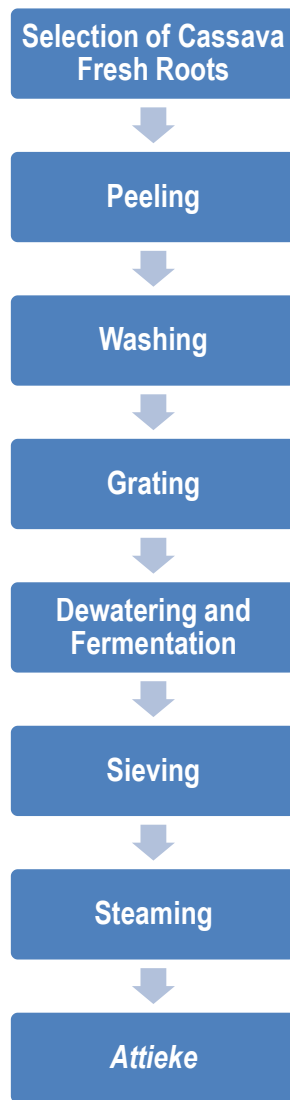


Figure 5: Flowchart for production of Attieke

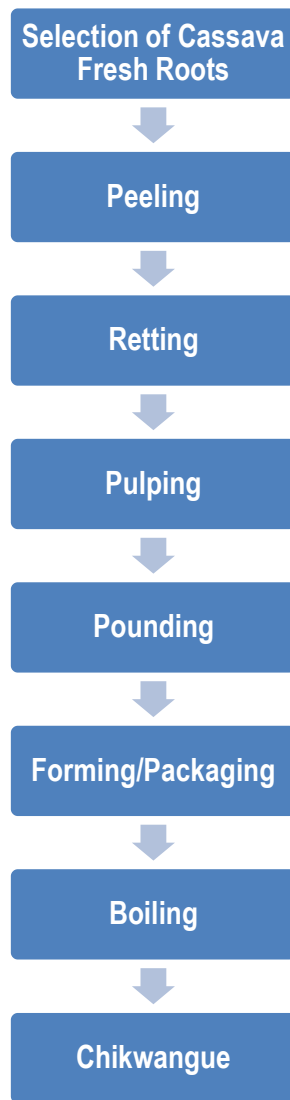


Figure 6: Flowchart for Production of Chikwangu

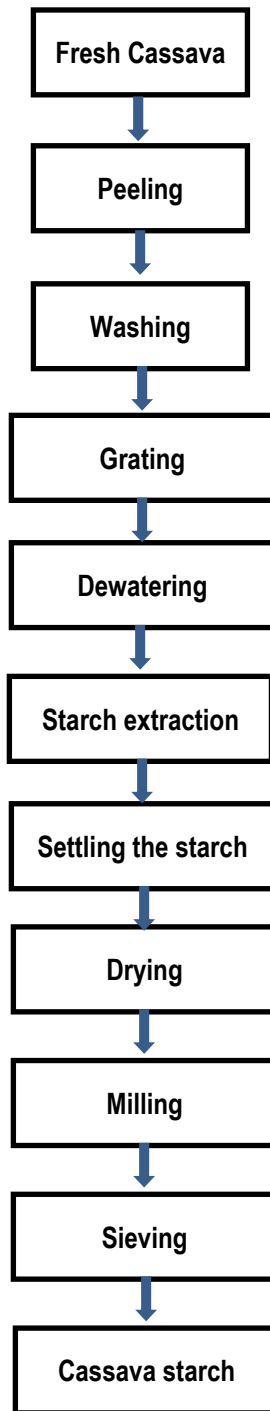


Figure 7 Flow chart for the preparation of Cassava Starch

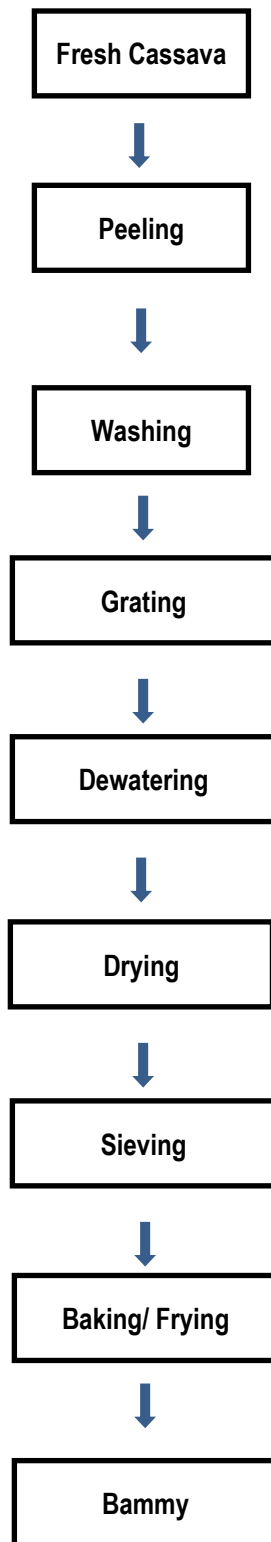


Figure 8 Flow chart for the preparation of Bammy

APPENDIX VII

PRIORITY LIST OF CONTAMINANTS AND NATURALLY OCCURRING TOXICANTS PROPOSED FOR EVALUATION BY JECFA

| Contaminants and naturally occurring toxicants | Background and Question(s) to be answered | Data availability (when, what) | Proposed by |
|--|--|---|---|
| 3-MCPD esters | Full evaluation (toxicological assessment and exposure assessment) | Germany: occurrence data and data on hydrolysis (humans – in vivo) available Japan: subchronic toxicity data and occurrence data by end of 2013 China: Total Diet Study on 3-MCPD esters available Canada: surveillance data EU: occurrence data US: occurrence data | Germany, supported by EC, Canada, Japan |
| Glycidyl ester | Full evaluation (toxicological assessment and exposure assessment) Bioavailability of free compounds | Japan: Surveillance in fats and oils by end of 2013; subchronic toxicological studies end 2013 USA: occurrence data available EU: occurrence data available | Germany; USA |
| Pyrrolizidine alkaloids (PAs) | Identify most relevant PAs (occurrence and toxicity) for human health Full risk assessment Identify of data gaps Consideration of PAs in feed as it carries over from feed to animal products | All data collected by the eWG Australia additional toxicological data ongoing EU: on-going occurrence data collection (DATEX unit of EFSA) Netherlands: genotoxicity testing, milk transfer, PBPK modeling Japan: reference material synthesis, analysis of food and feed items | CCCF |

| Contaminants and naturally occurring toxicants | Background and Question(s) to be answered | Data availability (when, what) | Proposed by |
|--|---|--|-----------------------------|
| Non dioxin-like PCBs | Full risk assessment | Canada: data from total diet studies, monitoring data - available Netherlands: provides monitoring data to EFSA database Republic of Korea: monitoring data - available EU: to assure that EFSA data will be made available Belgium: total diet study available end 2012 Tunisia: monitoring data - available | Republic of Korea Canada |

APPENDIX VIII

**NOMINATION OF NEW SUBSTANCES FOR THE PRIORITY LIST OF CONTAMINANTS
AND NATURALLY OCCURRING TOXICANTS FOR EVALUATION BY JECFA****1. Basic information**

- 1) Proposal for inclusion submitted by:
- 2) Name of compound; chemical name(s):
- 3) Identification of (additional) data (toxicology, metabolism, occurrence, food consumption) which could be provided to JECFA:
- 4) List of countries where surveillance data are likely to be available, and if possible list of contact person who could provide such data, including quality assurance information on the data.
- 5) Timeline for data availability:

2. Detail information

- 1) Whether or not the occurrence of the compound in commodities will have potential to cause public health and/or trade problems;
- 2) Whether or not commodities containing the compound are in international trade and represent a significant portion of the diet; and,
- 3) Commitment that a dossier (as complete as possible) will be available for evaluation by the JECFA.
- 4) Relevant justification and information on the following prioritization criteria¹
 - Consumer protection from the point of view of health and prevention of unfair trade practices;
 - Compliance with CCCF's Terms of Reference;
 - Compliance with JECFA's Terms of Reference;
 - Compliance with the Codex Alimentarius Commission's Strategic Plan, its relevant plans of work and Criteria for the Establishment of Work Priorities;
 - The quality, quantity, adequacy, and availability of data pertinent to performing a risk assessment, including data from developing countries;
 - The prospect of completing the work in a reasonable period of time;
 - The diversity of national legislation and any apparent impediments to international trade;
 - The impact on international trade (i.e. magnitude of the problem in international trade);
 - The needs and concerns of developing countries; and,
 - Work already undertaken by other international organizations.

¹ Section 3, para.10 of the Risk Analysis Principles Applied by the Codex Committee on Contaminants in Foods (See Procedural Manual of the Codex Alimentarius Commission).