CODEX ALIMENTARIUS COMMISSION

E

Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 12 **CX/CF 22/15/12**

April 2022

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

15th Session
Virtual
9-13 and 24 May 2022

CODE OF PRACTICE FOR PREVENTION AND REDUCTION OF MYCOTOXIN CONTAMINATION IN CASSAVA AND CASSAVA-BASED PRODUCTS

(At Step 4)

(Prepared by the Electronic Working Group
chaired by Nigeria and co-chaired by Ghana)

Codex members and observers wishing to submit comments at Step 3 on this document should do so as instructed in CL 2022/21-CF available on the Codex webpage[1]

BACKGROUND

1. Background information on the discussion of mycotoxin contamination in cassava and cassava-based products that took place during 2017-2021[2] and can be found in the reports of the Codex Committee on Contaminants in Foods (CCCF) and corresponding working documents. Detailed information on the discussion of risk management practices available to support the development of a Code of practice for the prevention and reduction of mycotoxin contamination in cassava and cassava-based products can be found in the working presented at CCCF14 (2021)[3].

2. CCCF14 (2021) considered the discussion paper prepared by the Electronic Working Group (EWG). Nigeria, as Chair of the EWG, highlighted that, based on the replies to the circular letters CL 2019/74-CF and CL 2020/51-CF, as well as data and information provided by members of the EWG on risk management measures available to contain mycotoxin contamination in cassava and cassava-based products. The EWG Chair indicated that it was possible to identify risk mitigation measures available to date that have proven to be cost-effective and applicable worldwide by large, medium and small-scale farmers and producers. The replies also provided the scope of the code of practice (COP) as to the relevant mycotoxins (i.e. aflatoxins and ochratoxin A) and the stages of the production chain to be covered by the COP (i.e. pre-planting, planting, post-harvest processing including fermentation, drying, storing and distribution). The EWG Chair further informed CCCF that based on these facts, there was general support for the development of a COP to prevent and reduce mycotoxins contamination in these products as presented in working document CX/CF 21/14/12, Appendix I.

3. CCCF14 agreed with the development of the COP and submitted a project document on the development of a Code of Practice for the prevention and reduction of mycotoxins contamination in cassava and cassava-based products to 44th Session of the Codex Alimentarius Commission (CAC44) for approval as new work (Appendix VII). CAC44 approved the new work and noted that one Member stated that it was important to clarify that the scope of the new work was limited to cassava as food[4].

---

1 Codex webpage/Circular Letters: http://www.fao.org/fao-who-codexalimentarius/resources/circular-letters/en/.
Codex webpage/CCCF/Circular Letters: http://www.fao.org/fao-who-codexalimentarius/committees/committee/related-circular-letters/en/?committee=CCCF

2 REP17/CF11, paras. 14-15; REP18/CF12, para. 125; REP19/CF13, paras. 128-145; CX/CF 18/12/13; CX/CF 19/13/14
Working documents, including reports, of sessions of CCCF are available on the Codex website at: https://www.fao.org/fao-who-codexalimentarius/committees/committee/related-meetings/en/?committee=CCCF

3 CX/CF 21/14/12

4 REP21/CAC44, paras 46-47, Appendix VI

4. In order to develop the COP, CCCF14 further agreed to establish an EWG, chaired by Nigeria, and co-chaired by Ghana, to work on the development of a Code of Practice for the prevention and reduction of mycotoxins contamination in cassava and cassava-based products, with focus on aflatoxins and OTA, and the stages of production as identified in the project document, based on the data and information provided in working document CX/CF 21/14/12, Appendix II to.[5]

WORK PROCESS IN THE EWG

5. The EWG focused on collating information on practices that control contamination of cassava and cassava fermented products with mycotoxins.

SUMMARY OF THE DISCUSSION IN THE EWG

6. This Code of Practice provides current information on the required practices to control contamination of cassava and cassava fermented products with mycotoxins. Emphasis were on the following:

- Stages at which best practices should apply in prevention or reduction of mycotoxins in cassava and cassava-based products.
- The processing conditions required to prevent or reduce mycotoxin contamination.
- Critical parameters which are applicable to comply with from farm selection, farm clearing, cassava variety selection, planting to harvesting as well as post harvest activities.
- Education and Personnel hygiene measures.
- The identified storage conditions to prevent or reduce mycotoxins contamination.
- Prevention or reduction measures during transport and distribution.

CONCLUSION

7. The EWG built on the information available in CX/CF 21/14/12, Appendix II as instructed by CCCF14 and prepared a Code of practice for the prevention and reduction of mycotoxin contamination in cassava and cassava-based products as presented in Appendix I to this document.

RECOMMENDATIONS

8. CCCF is invited to consider the COP as set out in Appendix I and determine its readiness for advancement in the Step Procedure and if not, to identify key issues that would need further consideration in order to progress with the development or finalization of the COP at CCCF16 (2023).

5 REP21/CF14, paras 167-169, Appendix VII

APPENDIX I

PROPOSED CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF MYCOTOXINS CONTAMINATION IN CASSAVA AND CASSAVA-BASED PRODUCTS
(For comments)

1. INTRODUCTION

1. Mycotoxins are fungi toxins that pose health and economic consequences. The most occuring mycotoxins are aflatoxins and ochratoxins. Aflatoxins (AFs) are highly potent toxins that are reported in a wide variety of agricultural products. They are mainly produced by *Aspergillus flavus*, *Aspergillus parasiticus* and *Aspergillus nomius*. Aflatoxins are among the most potent carcinogenic, teratogenic, and mutagenic compounds known. The major aflatoxins commonly found in agricultural commodities are aflatoxin B1, B2, G1, and G2, of which aflatoxin B1 is the most potent. Depending on the host species, these mycotoxins can act as nephrotoxins, hepatotoxins, immunotoxins, neurotoxins, teratogens, or carcinogen, however, the kidney is the primary target for toxicity.

2. The prevalence of several species of fungi that are implicated in mycotoxin production usually differs from one region to another. The fungi which can be found in soil and dust, residues of cultivated crops, stored cassava and cassava-based products at processing or storage facilities are usually associated with pre-harvest and/or post-harvest contamination of cassava and cassava-based products. Mould presence is associated with regions having climate and soil conditions that permit both small or large scale cassava cultivation.

3. The severity of pre-harvest fungi infection and propagation largely depends on the prevailing environmental and climatic factors which may differ from year to year and from region to region. It also depends on the presence of inoculums, and the farming practice. The degree of damage of the crop by rodents, insects and other organisms also influences the contamination severity. Good agricultural practices (GAP) and good manufacturing practices (GMP) could play a major role in the reduction of severity. Risk of postharvest fungal infection and production of mycotoxins in stored grain increases with the duration of storage as indicated in the *Code of practice for the prevention and reduction of mycotoxin contamination in cereals* (CXC 51-2003).

4. There are many cultivars and species of cassava however, they fall under one or two categories, bitter and sweet varieties depending on the cyanogenic glucoside levels. The bitter and sweet varieties have high (≥ 100/mg/kg) and low (≤ 50 mg/kg) HCN content respectively. Cassava is usually processed and consumed in various forms which may differ across countries. Generally, one target of cassava processing is to reduce its cyanogenic glucoside content to the lowest level possible. The intermittent presence of certain mycotoxins in cassava and cassava-based products destined for human food and animal feed use is to be expected. Therefore, it is important to diligently monitor products for indications of the various conditions that promote fungal contamination and mycotoxin accumulation as indicated in the *Code of practice for the prevention and reduction of mycotoxin contamination in cereals* (CXC 51-2003).

5. This Code of Practice provides relevant information for all countries to contemplate in their efforts to prevent and reduce mycotoxin contamination in cassava and cassava based products.

6. The effectiveness of this Code of Practice will be determined by regulatory authorities, agriculture extension workers, farmers, producers, processors, distributors and food business owners in each country by considering the general principles and examples of GAP and GMP provided in the Code. Other local crops, climate, and agronomic practices as well should be examined to facilitate implementation of these practices where applicable. This Code of Practice is expected to apply to all cassava and cassava-based products relevant to human dietary intake and health as well as international trade.

7. This Code of Practice provides information on general principles for the reduction of various mycotoxins in cassava and cassava based products; training and education of farmers, agricultural workers, processors, maufacturers, and distributors.

SCOPE

8. This Code of Practice intends to provide national and local authorities, farmers, producers, manufacturers, distributors and other relevant bodies with information and guidance to prevention and reduction of mycotoxin in cassava and cassava based products. This guidance covers: (i) Good agricultural practices, (ii) Good manufacturing practices, Good storage Practices and Good distribution practices.

2. RECOMMENDED PRACTICES APPLICABLE TO PRE-PLANTING STAGE

9. A fertile soil should be selected and this is critical. Most preferred is a loamy soil with good drainage. The farmer should avoid planting in valleys, to avoid flooding. Flood water could transport fungi inoculum from an infected farm. Where possible, ensuring a proper planning forcrop rotation for successive seasons is vital. This will help in the reduction of the inoculum in the farm which may from waste after harvest that harbours toxigenic fungal spores. Particular crops have been found to be susceptible to certain species of toxigenic fungi and rotating planting with these crops should be monitored and evaluated. Crops that are said to be of low susceptibility to toxigenic fungi should be used in rotation to reduce the cross contamination from the inocula.

2.1 Farm land clearing and preparation

10. After the land selection, it should be cleared and waste properly disposed to avoid contamination of the cassava roots with innocula from infected weed or other crops. The soil should be loosened by **tilling with clean and suitable farm tools and equipment**, to reduce stress to cassava roots particularly during enlarging period and also encourage healthy root development. Farmers should promote Good Agricutural Practices(GAP) to avoid soil erosion. Soil tests where possible should be determined and if there is a need to apply fertilizer and/or soil conditioners to assure adequate soil pH and plant nutrition to avoid plant stress. This should be done with the guidance of agricutural advisors.

2.2 Organic fertilizers

11. They should be added during tilling to increase soil fertility or to address specific soil nutrient deficiencies. **Ridges or mounds** should be up to 0.75 m - 1 m apart. This should also be determined by the farming practice either with cassava alone or planted along with other crops. Healthy organic waste, such as pruning debris, peels and any other organic material, that are free from fungi infestation and disease-free, at the farm(s) should be used. Where needed, farmers should have access to homologated fertilizer

2.3 Cassava variety (cultivar) selection

12. Selection and use of improved, healthy, pest and diseases free cassava stems is important for good yield without rot. The following should be considered when selecting cassava variety:

- ability to germinate, ability to store well in the soil, ability to resist fungi and other plant pathogens;
- resistance to pests and diseases;
- longer shelf life and high starch content;
- cassava cuttings that are free of toxigenic fungi should be planted.

3. RECOMMENDED PRACTICES APPLICABLE TO PLANTING AND PRE-HARVEST STAGE

3.1 Planting

13. To achieve maximum yield, the stem cuttings of 25 cm length is recommended for planting at space of 1m x 1m; no dead stem should be planted. However, different producers may adopt slightly modified practices depending on cassava variety and the region. When cassava cuttings are to be planted, the method used depends on the climatic and rainfall conditions.

- **Horizontal Planting involves placing the plants** 5 – 10 cm deep into the soil in *dry climates*,
- **Vertical Planting** involves placing the cuttings vertically to avoid rot, especially *during the rainy season*, while
- **Inclined Planting** involves placing the cuttings at 45 degrees and leaving 2 - 3 nodes above the ground. This is recommended in areas with the least rainfall. Planting should be done when the sun heat is minimal or absent such as early morning or in the evening.

14. Avoid planting cassava on land where groundnut, maize, sugarcane or other highly susceptible crops were cultivated the previous year because such soils are likely contaminated with *Aspergillus flavus, Aspergillus parasiticus* and related species. The farmers should plant during the right month, based on geographical location.

3.2 Weed control

15. The use of post emergence herbicide could be recommended immediately weeds are spotted on the field. In some cases, pre-emergence herbicides could be used before planting to minimize weed growth. Small-scale farms could use hoes and cutlasses to remove weeds but care should be taken not to induce mechanical injury on the plant. While mechanised equipment could be used in large-scale farms. Note that, land preparation needs to be done properly to control the weeds at least for the first 3 months to achieve optimum yield.

16. Certain weeds can harbour toxigenic fungi. The weeds can also increase plant stress when they are in competition for nutrients during the plant development. Either manual or mechanical approaches can be used for weed control; approved herbicides could also be used.

3.3 Fertilizer application

17. The type and quantity of fertilizer to be use are based on the cassava variety and nature of the soil. Fertilizers could be applied around 4 - 8 weeks after planting and 16 weeks after planting, and be applied 6 cm in width and 10 cm from the stems or leaves of the cassava plant. Also, it is advisable to conduct a soil test to determine the type of fertilizer to apply.

3.4 Pesticide use

18. Approved pesticides could be used to minimize insect damage and fungal infection around the crop. Predictive weather models could be used to plan the best application timing and mode of pesticide application. Ensure safe use of spraying equipment. Where needed, ensure access to agrochemicals authorized for use.

3.5 Irrigation

19. Where irrigation is used, ensure that it is applied evenly and that all plants in the field have an adequate supply of water. Irrigation is a valuable method of reducing plant stress in some growing situations. Excess precipitation during anthesis (flowering) makes conditions favourable for dissemination and infection by *Fusarium spp*.; thus irrigation during anthesis and the maturation of the roots should be avoided.

4. RECOMMENDED PRACTICES APPLICABLE TO HARVEST STAGE

4.1 Mechanical / Manual Harvesting

20. Harvesting should involve adequate planning in the areas of timing, age of products and methods to be used. Manual harvesting usually is labor intensive and expensive. For cost effectiveness in commercial operation, farmers are informed to consider using mechanical methods. In the prevention of loss of quality and quantity, amount of roots to be harvested should also be determined depending on market needs and demand.

21. If mechanized processing materials are available, it is advisable to harvest cassava immediately the roots mature. Harvesting manually by hand is done by raising the lower portion of the cassava plant stem and cutting off a part leaving a small portion at the base of the plant to serve as a handle to pull the cassava root out of the ground. Here, the stems are kept for reuse in the next planting season or sold to other cassava farmers. The leaves can also serve as animal feed.

22. Cassava should be harvested when the soil is slightly soft but has no excessive water to easily remove soil from the roots and avoid contamination during peeling.

4.2 Conveyance tools

23. Containers and conveyances (e.g. trucks) to be used for collecting and transporting the harvested roots from the field to the further processing facilities, and to storage facilities, should be clean, dry and free of crop residues, insects and visible fungal growth before use and re-use.

4.3 Holding conditions

24. Prior to the processing step, cassava roots should not be exposed to the sun, high temperatures, mechanical damage, etc., since the roots still have high water activity suitable for microbial development. The water activity at this stage varies from 0.922 to 0,996. A continuous flow from harvest to final product should be planned, in order that the roots will not be stored for a long period. The ideal time is 2 to 3 days and the excess should be taken to a suitable raw material storage room.

25. Enhanced storage methods for roots help to extend shelf life of fresh roots by Two (2) – Six (6) weeks. Other storage methods such as using low temperatures can be combined with fungicide treatment or waxing and is suitable for export of large amount of roots. Food handlers that can afford the needed specialized equipment with the necessary technical skills may use improved storage methods to store fresh roots thereby protecting.

5. RECOMMENDED PRACTICES APPLICABLE TO POST-HARVEST STAGES

5.1 Cassava-based products

26. Cassava roots can be processed into fermented or unfermented cassa-based products. These products, which depend on the region, have a wide range of applications including food for humans, animal feed, industrial uses such as fillers, and cloth starch among others. The processing steps by which these various products are arrived at differs and can be found in the *Code of practice for the reduction of HCN in cassava and cassava products* (CXC 73-2013). The approach here is to discuss the various steps individually but not under any specific product name. Processing of cassava should be initiated within 8-12 hours of harvest to avoid spoilage.

5.1.1 Washing

27. After harvest, if cassava root is to be processed immediately, it should be washed to remove the surface dirt and soil acquired microbes. The source of water is an important factor not to be ignored. Potable water should be used or treat other sources of water for washing to avoid contamination. Proper washing is vital to ensure sand or mud is removed from all parts especially the contours of the root.

5.1.2 Peeling

28. Peeled cassava roots should be processed immediately and should not be stored unprocessed. Peeling is either done manually using a knife or is done mechanically. It is done to remove the outer inedible portion of the cassava roots. Peeling should be carried out in a clean environment, and not in one where other crops have been stored otherwise, they will serve as sources of spores for the cassava.

5.1.3 Boiling

29. For sweet varieties cassava roots that can be consumed after peeling or boiling, it is recommended to boil roots immediately after peeling and washing. This will expose any fungus to temperatures they cannot survive.

5.2 Size reduction: Grating, pulping and slicing or chipping

30. Depending on the size of the roots to be processed, varieties of cassava, as well as available equipment, grating of cassava roots can be done manually using a grater or mechanically to produce pulp. In many parts of Africa, a perforated metal sheet is used for manual grating. During grating, the cyanogenic glycosides are hydrolyzed by the enzyme, linamarase. Bitter cassava variety, which contain high amount of cyanogens must be grated. High cyanide cassava should not be chipped to produce cassava flour meant for human consumption.

31. Chipping or slicing is done by cutting cassava into chips, which is dried and milled into flour. Usually low-cyanide(sweet) cassava variety is used, while other variety may be used for making animal feed.

32. Where cassava chips or slices are dried at farm level or in a processing facility, the chips or slices should be dried on raised platforms and at least 100 meters away from probable sources of contamination, such as refuse dump, filling station. where sun-drying is carried out, it should be done on drying mats such as raffia palm, bamboo, oil palm mat, banana leaves amongst others that would ensure good hygienic practice.

33. If chips or slices are dried artificially, the dryers should be cleaned, maintained, as well as protected from smoke and fuel contamination.

34. Unhygienic practices at this stage could serve as a source of innoculation. The environment should be kept clean, and the grater cleaned and washed after each use and adequately stored dry.

5.2.1 Fermentation

35. The is for further cyanide elimination, flavor development and product stability. Fermentation of cassava for traditional food processing is usually allowed to take a natural course, some optimization research has been carried out to the effect of using selected starter cultures, however this method is not widely used. The sack in which the grated pulp or the container in which the peeled root will be kept, allowing for 2-5 days fermentation should be kept clean at all times and especially well cleaned before use, to ensure it does not become a natural source of inoculum.

5.2.2 Dewatering

36. This process involves removing water from grated cassava roots and it is usually done by pressing. The dewatering process could last up to two days. Dewatering could be done before or after fermentation. Water removal should be optimal and care should be taken not to use contaminated processing materials such as sacs as they may become sources of fungi inoculation. Food grade sacs should be used. Adequate cleaning and sterilization of the sacs should be done frequently.

5.3 Cake breaking / granulating

37. The process involves feeding the cassava cake into a cassava grater that will break it into granules. wet cakes can be sifted to remove lumps. Where cassava grater is not available, a manual sifter are most times used used to break the cake and sift the granules at the same time. The grater should be clean and the Sacks containing cake or granules should not be placed on dirty surfaces (such as floors). Clean containers should be used to hold the wet granules to ensure product is not contaminated. Clean pans, bowls or sacks should be used in emptying the cakes.

5.4 Drying

38. This is a very important stage, fermented cassava pulp is usually spread in the open air to be dried under non-aseptic conditions, thus exposing them to insects and rodents as well as impurities carried in the air. Any of these could be sources of fungi inoculation. Drying should thereby be done in a controlled environment and monitored. Drying should be properly done to avoid moisture. High Microbial loads may be caused by use of unclean drying surfaces and materials such as sheets on raised platforms, so care must be taken to clean surfaces. Recommended temperatures should be; sun (30-40'c), Solar Dryer (50-60'c), Cabinet dryer (60-65'c) and Flash dryer (120-150). Drying cassava under the sun should be done during dry seasons only. Granules or chips should be properly spread per square meter of drying surface and not loaded so much to allow for air circulation. Platforms for drying should be raised to prevent contamination such as dust, animals, and pests. Batches of granules not adequately dried should be spread out in a ventilated room till the product is dried. Drying surfaces and materials should be clean.

5.5 Milling

39. This process involves milling the dried granules or chips to fine flour of about particle size: 250 microns to 500 microns). Care should be taken to ensure the mill is not overloaded. The environment should be monitored to prevent cross contamination from dust). The dried flour should be stored in a clean moisture-proof container.

5.6 Sieving

40. The sieve to be used in further processing steps should be stored properly and cleaned with potable water before use.

5.7 Frying

41. Frying of garri among other fermented cassava products should be done at high temperatures and monitored. This further discouraging fungi proliferation.

6. STORAGE

42. Storage facilities should be cleaned before materials are brought in, to remove dust, fungal spores, crop residues, animal and insect excreta, soil, insects, foreign material such as stones, metal and broken glass, and other sources of contamination. Sheds, silos, bins and other building materials intended for cassava and cassava-based products storage should be dried and well ventilated. Provide protection from ground water, moisture condensation, rain, entry of rodents, and insects whose activity makes the commodities more susceptible to mould infection. Ideally, storage areas should be able to prevent wide temperature fluctuations. Temperature and humidity can be monitored and controlled where possible

43. For bagged cassava products, ensure that bags are clean, dry, non-toxic and stacked on pallets or incorporate a water impermeable layer between the bags and the floor. The bags should facilitate aeration and be made of non-toxic food-grade materials that do not attract insects or rodents and are sufficiently strong to resist storage for longer periods as indicated in the *Code of practice for the reduction of mycotoxin contamination in cereals* (CXC 51-2003).

44. Determine moisture content of the lot, and if necessary, dry the product to the suitable moisture content recommended prior to storage. Fungal growth is closely related with water activity (a_w), commonly defined in foods as the water that is not bound to food molecules that can support the growth of bacteria, yeasts, and fungi. Although the appropriate moisture content for fungal growth on various crops is different, the maximum a_w to avoid fungal growth is basically the same. It is recognized that fungal growth is inhibited at a_w of less than 0.70. In addition, safe storage guidance may be provided to reflect the environmental situation in each region.

7. PACKAGING

45. Cassava-based products mainly in form of flour or granules may be stored in sacks, sealed prior distribution and sales in the market. Packaging materials should be made of materials which should not easily absorb moisture when packed and sealed.

8. TRANSPORTATION

46. Transport containers, vehicles such as trucks and railway vessels (boats and ships) should be dry and free of old crop dust, visible fungal growth, musty odour, insects and any contaminated material that could contribute to mycotoxin levels in lots and cargoes of cassava and cassava-based products. As necessary, transport containers should be cleaned and disinfected with appropriate substances (which should not cause off-odours, flavour or contaminate the cassava and cassava-based products) before use and re-use and be suitable for the intended cargo. The use of registered fumigants or insecticides may be useful. At unloading, the transport container should be emptied of all cargo and cleaned as appropriate.

47. Shipments of cassava and cassava-based products should be protected from additional moisture by using covered or airtight containers or tarpaulins. Minimise temperature fluctuations and measures that may cause condensation to form on the cassava and cassava-based products, which could lead to local moisture build-up and consequent fungal growth and mycotoxin formation.

48. Avoid insect, bird and rodent infestation during transport by the use of insect-and rodent proof containers or insect and rodent repellent chemical treatments if they are approved for the intended end use of the cassava and cassava-based products.

9. PERSONNEL HYGIENE

49. The competence and hygiene of agricutural workers, hired workers and farmers on adequate measures from planting, harvesting, packing and storage techniques should be to ensure quality cassava and cassava based products. Training and re- training should be done to ensure adherence with best practices. Keep a record of training dates. Processors should provide required training on employee hygiene. Personal protective clothing should be providede for the staff. Measures to monitor staff hygiene practices and health. status should be put in place. Keep records to track serious illnesses to avoid cross contamination. Make washrooms and hand washing facilities available and easily accessible. Separate eating areas,smoking, coffee and all forms drinking from processing and packaging areas to avoid any contamination.

10. INSTRUCTION FOR STORAGE AND PRODUCT USE

50. Specific storage instructions for the cassava products should be provided on the packaging so as to ensure protection from unfavourable conditions which may promote fungal growth and contamination. The instructions for storage and when opened should be in clear language and legible to maintain the product in a cool, dry, well-ventilated area. Educators should create awareness on product stacking in storage areas to avoid increased humidity and temperature which encourages fungi growth.

APPENDIX II

List of Participants

Chair Nigeria
Dr Abimbola Opeyemi Adegboye
National Agency for Food and Drug Administration and Control
NAFDAC Nigeria

Co Chair Ghana
Mr Ebenezer Kofi Essel
Food and Drugs Authority (FDA)

AUSTRALIA

Dr Matthew O Mullane
Section Manager Standards & Surveilance
Food Standards Australian New Zealand
Australia

BRAZIL

Ligia Lindner Schreiner
Health Regulation Specialist
Brazilian Health Regulatory Agency

Carolina Araújo Viera
Health Regulation Specialist
Brazilian Health Regulatory Agency

Ana Claudia Marquim Firmo de Araújo
Specialist on Regulation and Health Surveillance
Brazilian Health Regulatory Agency

EUROPEAN UNION

Mr Frans VERSTRAETE
European Commission

INDONESIA

Mrs Yusra Egayanti
Deputy Director Certain Food Standardization
Indonesia Food and Drug Authority

JAMAICA

Dr. Linnette Peters
Director, Ministry of Health
Veterinary Associate Professor Public Health

KENYA

Dr. George Ooko Abong'
Senior Lecturer/Consultant
Department of Food Science, Nutrition and
Technology University of Nairobi

KOREA (REPUBLIC OF)

Codex Contact Point
Ministry of Food and Drug Safety (MFDS)
Republic of Korea

Yeji Seong
Codex researcher
Food Standard Division,
Ministry of Food and Drug Safety(MFDS),

Miok Eom
Senior Scientific Officer
Residues and Contaminants Standard Division,
Ministry of Food and Drug Safety(MFDS),

NIGERIA

Professor Hussain Makun
Head of Africa Centre of Excellence in Mycotoxin and
Food Safety
Federal University of Technology

Dr. Obadina Adewale Olusegun
Head of Department (Food Science and Technology),
Federal University of Agriculture Abeokuta

Dr. Daniel Ojochenemi Apeh
Department of Biochemistry
Federal University of Technology

Dr. Maimuna Abdulahi Habib
Director Projects Coordination
FMARD Abuja

Mrs Zainab Ojochenemi Towobola
Deputy Director (Nutrition & Food Safety)
Federal Min of Agriculture and Rural Development
FMARD

Mrs Amalachukwu Ufondu
Chief Regulatory Officer NAFDAC

Mrs Victoria Iyabode Oye
Senior Scientific Officer
Quality Assurance and Development
FCCPC Abuja

Codex Contact Point
SON Nigeria National Codex Committee Secretariat
SON Abuja

Mrs. Mopelola Olubunmi Akeju
Director FCCPC, Abuja Nigeria
Quality Assurance & Development

PARAGUAY

Ing. Agr. Mónica Gavilán Giménez
Specialist in Public Health Nutrition and Food Safety - Post-harvest Specialist
Facultad de Ciencias Agronómica de la Universidad Nacional de Asunción

Ing. Agr. Dionisia Carballo
Research Professor
Department of Research and Toxicology
Faculty of Agronomic Sciences
National University of Asunción

PERU

Javier Aguilar Zapata
Agrifood Safety Specialist /
Lead Coordinator of the Food Contaminants Committee SENASA

Jorge Pastor Miranda
Agrifood Safety Specialist /
Alternate Coordinator of the Food Contaminants Committee
SENASA

Juan Carlos Huiza Trujillo
Dirección General de Salud Ambiental DIGESA
Minsa / Perú

POLAND

Codex Contact Point for Poland
Main Inspectorate
International Cooperation Department
Poland

THAILAND

Chutiwan Jatupornpong
Standards officer
Office of Standard Development
National Bureau of Agricultural Commodity and Food Standards

Ms. Korwadee Phonkliang
Standards officer
Office of Standard Development
National Bureau of Agricultural Commodity and Food Standards

UNITED STATES OF AMERICA

Henry Kim
Center for Food Safety and Applied Nutrition
Food and Drug Administration

Anthony Adeuya
Center for Food Safety and Applied Nutrition
Food and Drug Administration