CODEX ALIMENTARIUS COMMISSION E

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Agenda Item 10 **CX/CF 16/10/11**
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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

Tenth Session
Rotterdam, The Netherlands, 4 – 8 April 2016

PROPOSED DRAFT ANNEXES TO THE CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF MYCOTOXIN CONTAMINATION IN CEREALS (CAC/RCP 51-2003)

(Prepared by the Electronic Working Group chaired by Brazil and co-chaired by Canada and the United States of America)

Codex Members and Observers wishing to submit comments at Step 3 on the proposed draft Annexes to the Code of practice for the prevention and reduction of mycotoxin contamination in cereals (CAC/RCP 51-2003), including possible implications for their economic interests, should do so in conformity with the *Uniform Procedure for the Elaboration of Codex Standards and Related Texts* (Codex Alimentarius Commission Procedural Manual) before **15 March 2016**. Comments should be directed:

to:	with a copy to:
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BACKGROUND

1. The 9th Session of the Committee on Contaminants in Foods (March 2015) agreed to forward the main text of the proposed draft revision of the Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals (CAC/RCP 51-2003) to the 38th Session of the Codex Alimentarius Commission (July 2015) for adoption at Step 5. The Committee also decided to return the annexes of the Code to Step 2/3 for further consideration by an Electronic Working Group, chaired by Brazil and co-chaired by Canada and the United States of America, for circulation to comments at Step 3 and further consideration by the next session of the Committee at Step 4.[1]

2. Comments were received from Canada, Sudan, China, Costa Rica, Germany and India.

3. The list of participants is given in Appendix II.

4. Specific points in the annexes were revised aimed at harmonising concepts and improve the structure of the text. The various Annexes are provided in Appendix I. References to the General Code of Practice in the Annexes refer to the document as contained in REP15/CF, Appendix VII.

[1] REP15/CF, paras 101 - 104

APPENDIX I

PROPOSED DRAFT ANNEXES TO THE CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF MYCOTOXIN CONTAMINATION IN CEREALS (CAC/RCP 51-2003)

ANNEX 1

PREVENTION AND REDUCTION OF CONTAMINATION BY ZEARALENONE IN CEREAL GRAINS

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce *Fusarium*infection (mainly *F. graminearum* and *F. culmorum*) and zearalenone(ZEN) production in cereals during the crop growth and development, harvest, storage, transport and processing. However, ZEN occurs primarily due to pre-harvest infestation of maize, wheat and barley with the *Fusarium* species.

Planting

2. Refer to paragraphs 11-16 in the General Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals.

Pre-harvest

3. Refer to paragraphs 17-22 in the General Code of Practice.

4. The establishment of *Fusarium* infection in cereal heads during flowering may need to be monitored before harvest by inspection, sampling and determination of infection by standard microbiological methods. Also, mycotoxin content in representative pre-harvest samples may need to be determined. Utilisation of the crop should be based on prevalence of infection and mycotoxin content of the grain.

5. ZEN risk in wheat increases with pre-harvest rainfall especially if harvest is then delayed. Predictive modelling for risk of *Fusarium* infection may be useful to plan to harvest grain before wet weather conditions prevail.

Harvest

6. Refer to paragraphs 23-26 in the General Code of Practice.

Drying and cleaning

7. Refer to paragraphs 27-32in the General Code of Practice.

Storage after Drying and Cleaning

8. Refer to paragraphs 33-42 in the General Code of Practice.

Transport from storage

9. Refer to paragraphs 43-45 in the General Code of Practice.

Processing

10. Refer to paragraphs 46-53 in the General Code of Practice.

11. Wet milling of wheat and corn can result in significant reduction of ZEN levels in starch fractions intended for food use. However, the ZEN is in effect redistributed to the by-products of starch, gluten and sweetener production that are typically used for animal feed.

ANNEX 2

PREVENTION AND REDUCTION OF CONTAMINATION BY FUMONISINS IN CEREAL GRAINS

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce *Fusarium* infection (mainly *F. verticillioides* and *F. proliferatum*)and fumonisin contamination of cereals during the crop growth and development, harvest, storage, transport and processing.

Planting

2. Refer to paragraphs 11-16 in the General Code of Practice.

Pre-harvest

3. Refer to paragraphs 17-22in the General Code of Practice.

Harvest

4. Refer to paragraphs 23-26 in the General Code of Practice.

5. The time of harvest for maize should be carefully planned. It has been shown that maize grown and harvested during warm months may have fumonisin levels significantly higher than maize grown and harvested during cooler months of the year. Predictive models developed for the risk of *Fusarium* infection may be used for planning the best harvest time.

Drying and Cleaning

6. Refer to paragraphs 27-32 in the General Code of Practice.

Storage after Drying and Cleaning

7. Refer to paragraphs 33-42 in the General Code of Practice.

Transport from storage

8. Refer to paragraphs 43-45 in the General Code of Practice.

Processing

9. Refer to paragraphs 46-53 in the General Code of Practice.

10. Nixtamalization is a process that involves boiling and soaking maize in a solution of calcium hydroxide to remove the hull. This process may reduce fumonisin levels in the treated maize as well as in the masa flour used in making corn tortillas, tamales, pupusas and other masa derived products.

11. Extrusion of maize may decrease fumonisin levels, however part of it is bound to proteins, sugars or other compounds in food matrices.

ANNEX 3

PREVENTION AND REDUCTION OF CONTAMINATION BY OCHRATOXIN A IN CEREAL GRAINS

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce *Aspergillus* (mainly *A. ochraceus* and related species, *A. carbonar*ius and *A. niger*) and *Penicillium* (mainly *P. verrucosum*) infection and ochratoxin A (OTA) contamination of cereals during crop growth and development, harvest, storage, transport and processing.

Planting

2. Refer to paragraphs 11-16 in the General Code of Practice.

3. Do not grow cereals close to cocoa trees, coffee bean plants or grape vines as these crops are highly susceptible to ochratoxigenic fungi and OTA contamination and can represent a source of inoculum tothe soil.

Pre-harvest

4. Refer to paragraphs 17-22 in the General Code of Practice.

5. Although OTA is associated with post-harvest fungal growth in stored grains, frost damage, presence of competitive fungi, excessive rainfall and drought stress arepre-harvest factors that may affect levels of OTA in harvested grains. Crop lodging on the field can also result in the production of OTA in humid conditions.

Harvest

6. Refer to paragraphs 23-26 in the General Code of Practice.

Drying and cleaning

7. Refer to paragraphs 27-32 in the General Code of Practice.

8. OTA is produced in cereals due to poor drying or storage conditions. Grain should be allowed to dry as much as possible before harvest consistent with local environment and crop conditions. If it is necessary to harvest the grain before its water activity becomes lower than 0.70, dry the grain to a moisture content corresponding to a water activity of less than 0.70. In a temperate climate region, when intermediate or buffer storage is necessary because of low drying capacity, make sure that the moisture content is lower than 15%, the buffer storage time is less than 10 days, and the grain temperature is lower than 20°C, in general. Appropriate conditions for intermediate or buffer storage may be determined on the basis of cereal variety, kernel size, grain quality and outside air temperature.

Storage after Drying and Cleaning

9. Refer to paragraphs 33-42 in the General Code of Practice.

Transport from storage

10. Refer to paragraphs 43-45 in the General Code of Practice.

Processing

11. OTA is highly stable and does not degrade in primary processing (e.g. milling into flour) or further processing (e.g. baking into bread). Its distribution in unprocessed grain is heterogeneous, as the toxin is typically present in high concentrations in a very small number of grain kernels (“hot spots”). As grain is processed, the OTA is redistributed among milled grain fractions, yielding lower levels in endosperm flour fractions and higher levels in bran fractions relative to those found in the unprocessed grain.

12. Refer to paragraphs 46-53 in the General Code of Practice.

ANNEX 4

PREVENTION AND REDUCTION OF CONTAMINATION BY TRICHOTHECENES IN CEREAL GRAINS

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce *Fusarium* infection and trichothecene contamination of cereals during crop growth and development, harvest, storage, transport and processing. The more common trichothecenes are deoxynivalenol (DON), T-2 toxin, HT-2 toxin, diacetoxyscirpenol (DAS) and nivalenol (NIV).

Planting

2. Refer to paragraphs 11-16 in the General Code of Practice.

Pre-harvest

3. Refer to paragraphs 17-22 in the General Code of Practice.

4. Use predictive models developed for risk of *Fusarium* infection of wheat and other small grains, which may assist producers in decisions on the necessity and timing of fungicide application. The establishment of *Fusarium* infection in cereal heads during flowering may need to be monitored before harvest by sampling and determination of infection by standard microbiological methods. Also, mycotoxin content in representative pre-harvest samples may need to be determined. Utilisation of the crop as food or animal feed should be based on prevalence of infection and mycotoxin content of the grain.

Harvest

5. Refer to paragraphs 23-26 in the General Code of Practice.

6. Do not permit mature grains to remain in the field for extended periods of time, particularly in cold, wet weather to avoidT-2 and HT-2 toxins formation.

Drying and Cleaning

7. Refer to paragraphs 27-32 in the General Code of Practice.

Storage after Drying and Cleaning

8. Refer to paragraphs 33-42 in the General Code of Practice.

Transport from storage

9. Refer to paragraphs 43-45 in the General Code of Practice.

Processing

10. Refer to paragraphs 46-53 in the General Code of Practice.

11. Extrusion of cereal may reduce trichothecene levels in processed products, especially of DON.

12. Separated hulls and seed coat (bran layers) fractions from processed grains to be used in foods may contain unacceptably high levels of DON and must be examined for DON levels before they are processed into consumable products.

ANNEX 5

PREVENTION AND REDUCTION OF CONTAMINATION BY AFLATOXINS IN CEREAL GRAINS

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce *Aspergillus* infection (mainly *A. flavus, A. parasiticus* and *A. nomius*) and aflatoxin production in cereals during the crop growth and development, harvest, storage, transport and processing.

Planting

2. Refer to paragraphs 11-16 in the General Code of Practice.

3. If available and cost effective, extension officers should assist the farmers in procuring and releasing non aflatoxigenic*A. flavus* and *A. parasiticus* into the agricultural environment to suppress the natural occurrence of the aflatoxigenic fungi following the instructions of the manufacturer.

Pre-harvest

4. Refer to paragraphs 17-22 in the General Code of Practice.

5. Biological control can be used for aflatoxins, but the applied product must be approved by relevant authorities, safe, and cost-effective towards the targeted plant pathogen.

Harvest

6. Refer to paragraphs 23-26 in the General Code of Practice.

Drying and Cleaning

7. Refer to paragraphs 27-32 in the General Code of Practice.

8. Aflatoxins occur in maize before harvest due to growth of toxigenic fungi as the result of insect infestation, bird and other animal damage, drought stress, hail damage or a combination of these factors. Aflatoxins rarely occur in small grains, except as the result of poor storage practices. Grain should be allowed to be as dry as possible before harvest in a way consistent with the local environmental and crop conditions. If it is necessary to harvest the grain before water activity becomes lower than 0.70, the grain is to be dried to a moisture content corresponding to a water activity of less than 0.70 immediately after the harvest and as soon as possible. In temperate climate region, when intermediate or buffer storage is necessary because of low drying capacity, ensure that the moisture content is less than 15%, the buffer storage time is less than 10 days, and the grain temperature is lower than 20°C, in general. Appropriate conditions for intermediate or buffer storage may be determined on the basis of cereal variety, kernel size, grain quality and outside air temperature.

Storage after drying and cleaning

9. Refer to paragraphs 33-42 in the General Code of Practice.

10. The formation of aflatoxins in cereals should be prevented during storage by minimizing the time between harvest and drying for storage and transport and maintaining the moisture content at a safe level.

Transport from storage

11. Refer to paragraphs 43-45 in the General Code of Practice.

Processing

12. Refer to paragraphs 46-53 in the General Code of Practice.

13. Nixtamalization is a process that involves boiling and soaking maize in a solution of calcium hydroxide to remove the hull. This process may reduce aflatoxin levels in the treated maize as well as in the masa flour used in making corn tortillas, tamales, pupusas and other masa derived products.

APPENDIX II

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