ANALYSIS OF AGENDA ITEMS IN PREPARATION FOR THE 16th SESSION OF THE CODEX COMMITTEE ON CONTAMINANTS IN FOOD (CCCF16)

18 to 21 April 2023 (physical plenary meeting)

26 April 2023 (virtual report adoption)

AGENDA ITEM 7: SAMPLING PLANS FOR TOTAL AFLATOXINS IN CERTAIN CEREALS AND CEREAL-BASED PRODUCTS INCLUDING FOODS FOR INFANTS AND YOUNG CHILDREN (At Step 4)

OBJECTIVES

This document offers a review and analysis of the agenda items planned for discussion at the 16th session of the **Codex Committee on contaminants in Foods (CCCF16)**, scheduled to take place face to face from 18 to 21 April 2023 (physical plenary meeting) and 26 April 2023 (virtual report adoption). This document is intended for possible use by the Codex communities of practice, promoted by GFoRSS and PARERA, as part of their contribution to enhancing awareness and supporting effective participation in international food standard setting meetings (Codex meetings) by representatives from members and observers.

The analysis provided in this document offers a factual review of agenda items, their background and a discussion of some considerations. This analysis is indicative in nature and does not represent an official position of the organizations mentioned above (PARERA and GFoRSS), their membership or their management. It provides a synthesis and analysis of the work currently under discussion by the CCCF, which may be useful for delegations from Arab countries to prepare their positions considering the needs and specificity of the region and the potential impact of the proposed food standards.

This analysis is prepared as part of the **Codex Initiative for the Arab Region: Arab Codex Initiative**, implemented by PARERA and GFoRSS, hosted and coordinated by the Arab Industrial Development, Standardization and Mining Organization (AIDSMO) and funded by the US Codex Office, US Department of Agriculture.

**It is important to note that experts – members of the Expert Working Group (EWG) – do not represent the organizations and / or jurisdictions to which they are affiliated. The selection and participation in the EWG proceedings is based on each expert's own credentials and experience which should not be misconstrued as the country's / delegation's / organization's position to which they belong.*

Agenda item 7: Sampling plans for total aflatoxins in certain cereals and cereal-based products including foods for infants and young children (at Step 4)

Document

- CX/CF 23/16/7

Background

- At CCCF14, an approach to estimate aflatoxins ratio in samples submitted to the GEMS/Food was presented, using only the data in which it was possible to have the individual values of occurrence of aflatoxins. However, the values presented were not well accepted by the Committee at that time as they did not cover all the cereals and cereal products under discussion and that the proportion may vary among commodities
- At the CCCF15 (2022), the committee agreed on maximum levels (MLs) for total aflatoxins in maize grain, destined for further processing; flour meal, semolina and flakes derived from maize; husked rice; polished rice; sorghum grain, destined for further processing and cereal-based food for infants and young children.
- CCCF15 (2022) also decided to re-establish an Electronic Working Group (EWG), chaired by Brazil and co-chaired by India, to further develop the sampling plan taking into account the possibility to harmonize the sampling plans for maize grain; flour, meal, semolina and flakes with the sampling plan for deoxynivalenol (DON) and fumonisins; and the sampling plan for cereal-based foods for infants and young children with the sampling plan for DON.

Analysis

- EWG members were invited to consider if it was feasible to assume the sampling plans to DON and Fumonisins in maize flour and maize meal could apply to AF contamination on maize flour, meal, semolina, and flakes derived from maize, sorghum, husked and polished rice.
- The proposed sampling plan was elaborated considering the information received in response to circular letter CL 2022/46-CF on the ratios of aflatoxin AFB1, AFB2, AFG1 and AFG2 in maize grain, maize products, husked rice, polished rice, sorghum grain and cereal-based foods for infant and young children, as well as complementary information obtained through the FAO Mycotoxin Sampling Tool.
- Brazil, Canada, Chile, European Union (EU), Iran, Japan, Republic of Korea, Saudi Arabia and the United States of America (USA) provided information in response to CL 2022/46-CF on sampling plans for total aflatoxins for cereals and cereal-based foods, including foods for infants and young children.
- The FAO Mycotoxin Sampling Tool does not have data for mycotoxins in sorghum, husked rice, or polished rice, so the Tool cannot be used to simulate variance or OC curves for different sampling scenarios for these grains and provides information on sampling variation, preparation, and analysis only for maize grain.
- Assuming the sampling plans for DON and fumonisins on maize flour and maize meal could apply to AF contamination in maize flour, meal, semolina, and flakes derived from maize, sorghum, husked and polished rice.

  <u>For Maize flour, meal, semolina, and flakes derived from maize and cereal-base foods for infants and young children:</u> Given that comminution of grain will occur during processing of flour meal, semolina, flakes derived from maize and cereal based food for infants and young children, this will reduce the heterogeneity of the materials with respect to AFs. This fact supports the alignment of sampling plans for DON and fumonisins in maize flour and maize meal and cereal-based foods for infant and young children with the sampling plans for aflatoxins in the same commodities.
- Sorghum husked and polished rice: the FAO Mycotoxin Sampling Tool does not have data for mycotoxins in sorghum, husked rice, or polished rice, so the Tool cannot be used to simulate variance or OC curves for different sampling scenarios for these grains. Additionally, considering: i) the impact of sample weight and test portion size on the total variance in the scenarios modelled for each aflatoxin, DON and fumonisins in maize grain, and; ii) that sorghum, husked and polished rice are not comminuted during processing (comminution reduces heterogeneity), the alignment of the sampling plan for DON and fumonisins in maize flour and meal was

not supported by one country and, therefore, a more conservative approach was proposed to align the sampling plan with the one being proposed for aflatoxins in maize grain.

- Given that sorghum, husked rice, and polished rice are not comminuted during processing (comminution reduces heterogeneity), it was considered not appropriate to align the sampling plan for aflatoxins in these cereals with those for DON and fumonisins in maize flour and maize meal. As maize grain is larger than sorghum and rice and that it is expected that increasing the cereal grain would generate more heterogeneity, it is expected that the proposed sampling plan for aflatoxin in maize grain may also be applicable to sorghum and rice. Therefore, it is proposed to align the sampling plans for aflatoxins in sorghum, husked rice, and polished rice with the proposed sampling plan for aflatoxins in maize grain.
- Comminution of grain will occur during processing of flour meal, semolina, flakes derived from maize and cerealbased food for infants and young children, this will therefore reduce the heterogeneity of the materials with respect to AFs. This fact supports the alignment of sampling plans for aflatoxins in maize flour and maize meal and cerealbased foods for infant and young children with the sampling plans for DON and fumonisins in maize, flour, and maize meal and for DON in cereal-based food for infant and young children.
- Most countries submitted only the total aflatoxins (sum of AFB1, AFB2, AFG1 and AFG2) or individual values for aflatoxin B1. All countries reported the frequency of AFB1 being higher than 50% of total AF as presented in following table (Table1), but not all of them submitted data to support different scenarios of (50:50;80:20; 90:10 ratio).

Table 1: Percentage of samples with AFB1 concentrations higher that 50%, 80% and 90% of AFB1:AFB1+AFB2+AFG1+AFG2 (AFB1 concentration > % total AFs)

Country Commodity (n)	AFB1 concentration > 50% total AFs % Samples (n)	AFB1 concentration > 80% total AFs % Samples (n)	AFB1 concentration > 90% total AFs % Samples (n)
Japan			
Maize grain (33)	90.9 (30)	60.6 (20)	3.0 (1)
Maize meal/flour (7)	100 (7)	71.4 (5)	14.3 (1)
Brazil			
Polished rice (72)	95.8 (69)	88.9 (64)	56.9 (41)
Husked rice (4)	100 (4)	100 (4)	75.0 (3)
Maize grain (276)	96.4 (266)	83.7 (231)	68.5 (189)
Maize products (1)	100 (1)	100 (1)	100 (1)
USA			
Maize grain and maize products (10)	100 (10)	100 (10)	*(*)
Maize grain (155)	100 (155)	100 (155)	*(*)
Saudi Arabia			
Maize grain (*)	100 (*)	*(*)	*(*)
Maize products (*)	100 (*)	*(*)	*(*)
Rice, polished / husked (*)	100 (*)	*(*)	*(*)
Republic of Korea			
Polished rice (*)	100 (*)	*(*)	*(*)
Husked rice (*)	100 (*)	*(*)	*(*)
Maize (*)	100 (*)	*(*)	*(*)
EU			
Maize grain (19)	63 (12)	*(*)	*(*)
Maize flour/meal (45)	100 (45)	*(*)	*(*)
Rice, polish /husked (213)	97 (206)	*(*)	*(*)
Sorghum (1)	100 (1)	*(*)	*(*)

(*) not informed

- Data informed by several delegations showed that AFB1 is the most prevalent aflatoxin in cereal and cereal-based products. Different scenarios of AFB1 ratio occurrence were presented in order to find the best way to propose the performance criteria of the methods, considering that the maximum limits were established for total aflatoxins. For example, if the scenario of 90:10 ratio was selected for a ML of 15 µg/kg, the performance criteria of the method should achieve a LOQ of ≤ 5.4 µg/kg for AFB1. On the other hand, if the scenario 50:50 was adopted for the same ML, a LOQ of ≤ 3.0 µg/kg the method should be achieved for AFB1. Considering this information and also bearing in mind the highest toxicity of AFB1, it seems reasonable to adopt lower proportions of AFB1 ratio to the sum of total AFs. Additionally, a lower proportion rate, such as 50:50, would make the methods of analysis feasible, since they would not push the LOQs of AFB2, AFG1 and AFG2 to a level that will not be achievable for most countries.
- CCCF16 is invited to consider: (i) the adoption of 5 kg as laboratory sample size and 25g as test portion size for maize grain, destined for further processing. (ii) the alignment of the sampling plans for sorghum, husked rice, and polished rice with the proposed sampling plan for aflatoxins in maize grain. (iii) the alignment of the sampling plans for flour meal, semolina and flakes derived from maize and cereal-based foods for infant and young children with DON and fumonisins sampling plans.

	Alignment with sampling plans for aflatoxins in maize grain				Alignment with DON and fumonisins sampling plans	
	maize grain, destined for further processing	husked rice	polished rice	sorghum	flour meal, semolina and flakes derived from maize	cereal-based food for infants and young children
ML (AFB1 + AFB2 + AFG1 + AFG2)	15 µg/kg	20 µg/kg	5 µg/kg	10 µg/kg	10 µg/kg	5 µg/kg
Increments	Increments of 100g, depending on the lot size (>0.5 tons)				10 x 100 g	10 x 100 g
Sample preparation	dry grind with a suitable mill (particles smaller than 0.85 mm – 20 mesh), if necessary for coarse samples.					
Laboratory sample size	5kg				1Kg	
Number of laboratory samples	1					
Test portion	25g					
Method	Selected according to the established performance criteria					
Decision rule	If the sum of test results of AFB1, AFB2, AFG1 and AFG2 for the laboratory sample is ≤ML, accept the lot. Otherwise, reject the lot.					

Comments and Considerations

- Saudi Arabia reported that the percentage of AFB1 in maize grain was 50%, in semolina and flakes derived from maize was 60%, and in husked and polished rice 65.4%. The AFB2 percentages were 50%, 40% and 35%, respectively. The total percentages of G1 and G2 were zero.
- One country questioned whether it would not be possible to use data from GEMS/Food to obtain the ratio of aflatoxins (AFB1: AFB2+AFG1+AFG2) present in each type of sample considered in this document. For aflatoxins, data submitted to GEMS/Food included information on individual aflatoxins (AFB1, AFB2, AFG1, AFG2), the sum of AFB1 plus AFB2 and total aflatoxins, which could generate up to 6 entries per sample.
- Some countries did not agree to align the sampling plan for AFT in maize grain with those of DON and fumonisins

as there is a greater heterogenicity as shown by the FAO mycotoxin tool.

- A country reported that, as per their experience, using a higher laboratory sample weight and a higher portion size would result in a lower probability of misclassifying a lot of maize.
- There was general support of considering 5 kg as laboratory sample weight and 25g as test portion size.

Conclusion and Recommendations

- Arab Codex delegations may consider supporting all following EWG recommendation:

(1) The adoption of 5 kg as laboratory sample size and 25g as test portion size for maize grain, destined for further processing.

(2) The alignment of the sampling plans for sorghum, husked rice, and polished rice with the proposed sampling plan for aflatoxins in maize grain.

(3) The alignment of the sampling plans for flour meal, semolina and flakes derived from maize and cereal-based foods for infant and young children with DON and fumonisins sampling plans.

- Arab Codex delegations may invite EWG to review the ML values in the “Decision rule”: to be in accordance with the actual Codex values for each product.