PROPOSED DRAFT REVISION OF MAXIMUM LEVELS FOR LEAD IN SELECTED FRUITS AND VEGETABLES (FRESH AND PROCESSED) IN THE *GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED* (CODEX STAN 193-1995)

(Prepared by the Electronic Working Group chaired by the United States of America)

BACKGROUND

1. The 6th session of the Codex Committee on Contaminants in Foods (March 2012) agreed to establish an electronic Working Group (EWG) led by the United States of America to revise the maximum levels (MLs) for lead in fruit juices, milk and milk products, infant formula, canned fruits and vegetables, fruits, and cereal grains (except buckwheat, cañihua and quinoa) in the General Standard for Contaminants and Toxins in Food and Feed (GSCTFF). The Committee also agreed to consider consolidating the MLs for canned fruit and vegetable products.[1]

2. The 7th session of the CCCF[2] (April 2013) agreed to the following:

   a. 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.

   b. To postpone consideration of the proposed draft ML of 0.01 mg/kg for infant formula to the 8th session of CCCF to allow time for interested countries to submit additional data for analysis, with the understanding that if no additional data were made available, the Committee would consider the proposed lower ML for adoption at the 8th session.

   c. To advance a proposed draft ML of 0.03 mg/kg for fruit juices and nectars, ready-to-drink (excluding juices from berries and other small fruits); a proposed draft ML of 0.1 mg/kg for canned fruits, including canned mixed fruits (excluding canned berry and other small fruits); and a 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 Codex Alimentarius Commission for adoption at Step 5/8.

3. The 36th session of the Commission (July 2013) agreed to adopt the MLs for fruit juice and canned fruits and vegetables at Step 5, with the understanding that countries that had intervened to object to adoption at Step 5/8 commit to submit data to the GEMS/Food database[3] within a year, to allow CCCF to further consider the revision of the MLs in 2015 for submission to the 38th session of the Commission.[4]

4. The 7th session of the CCCF also agreed to reestablish the EWG led by the United States of America to continue with the review of MLs for lead in fruits, vegetables, milk products and infant formula, follow-on formula and formula for special medical purposes for infants.[5]

5. The 8th session of the CCCF (March 2014) agreed to the following:[6]

   a. To forward a draft ML for lead in infant formula and formula for special medical purposes intended for infants and follow-on formula (as consumed) at 0.01 mg/kg for adoption by the 37th Session of the Commission at Step 5/8. The 37th Session of the Commission adopted the ML of 0.01 mg/kg at step 5/8.

   b. Maintain the current MLs in the GSCTFF for assorted (sub)tropical fruits, edible peel; assorted (sub)tropical fruits, inedible peel; citrus fruits; pome fruits; stone fruits; bulb vegetables; leafy vegetables; root and tuber vegetables; and secondary milk products.

   c. Postpone discussion of the proposed ML of 0.1 mg/kg for berries and other small fruits until the 9th CCCF to allow interested countries to submit new or additional data to GEMS/Food for analysis on the understanding that if no data were made available, the Committee would accept the proposed lower ML for adoption at its 9th session. The Committee noted that the proposed lower ML of 0.1 mg/kg for berries and other small fruits may be acceptable when applied to the

[1] REP12/CF, paras. 126-127
[2] REP13/CF, paras. 37, 39-42 and Appendix II
[3] Global Environment Monitoring System - Food Contamination Monitoring and Assessment Programme, http://www.who.int/foodsafety/areas_work/chemical-risks/gems-food/en
[4] REP13/CAC, para. 79
[5] REP13/CF, paras. 39-40
[6] REP14/CF, paras. 21-24

occurrence data of this group as a whole; however, when the data are split into the individual species or varieties of berries and small fruits, the proposed reduction may be problematic for some berries such as cranberries, currants, elderberries and strawberry tree.

d. Postpone discussion of the proposed MLs of 0.1 mg/kg for legume vegetables and brassica vegetables, and 0.05 mg/kg for fruiting vegetables, cucurbits, and fruiting vegetables, other than cucurbits,[7] for further consideration in the EWG and finalization by the 9th CCCF. The Committee noted several comments on the need to collect more occurrence data, in particular, better distribution of data among regions.

6. The 9th Session of CCCF (March 2015) agreed to the following:[8]

a. To forward draft MLs for fruit juices and nectars (excluding juices exclusively from berries and other small fruits and passion fruit), ready-to-drink, at 0.03 mg/kg; canned fruits (excluding berries and other small fruits) at 0.1 mg/kg; and canned vegetables (excluding canned brassica, leafy and legume vegetables) at 0.1 mg/kg to the 38th Session of the Commission for adoption at Step 8.

b. To forward draft MLs for berries and other small fruits (excluding cranberry, currant and elderberry) at 0.1 mg/kg; cranberries at 0.2 mg/kg; currant at 0.2 mg/kg; elderberry at 0.2 mg/kg; brassica vegetables at 0.1 mg/kg; legume vegetables at 0.1 mg/kg; fruiting vegetables, cucurbits at 0.05 mg/kg; and fruiting vegetables, other than cucurbits at 0.05 mg/kg (excluding fungi and mushrooms) to the 38th Session of the Commission for adoption at Step 5/8.

c. To recommend revocation of the following MLs by the 38th Session of the Commission: canned grapefruit, canned mandarin oranges, canned mangoes, canned pineapples, canned fruit cocktail, canned tropical fruit salad, canned asparagus, canned carrots, canned mature processed peas, canned mushrooms, canned palmito (palm hearts) and canned sweet corn.

7. The 38th Session of the Commission[9] (July 2015) adopted the recommendations (described in paragraph 6 above) of the 9th CCCF.

8. The 10th session of the CCCF (April 2016) agreed to the following:[10]

a. To forward the proposed draft revised MLs for fruit juices and nectars, ready-to-drink (inclusion of passion fruit) (ML = 0.03 mg/kg); canned fruits (inclusion of canned berries and other small fruits) (ML = 0.1 mg/kg); canned vegetables (inclusion of canned leafy vegetables and canned legume vegetables) (ML = 0.1 mg/kg); jams, jellies and marmalades (revised ML = 0.1 mg/kg and inclusion of marmalades); pickled cucumbers (revised ML = 0.1 mg/kg); preserved tomatoes (revised ML = 0.05 mg/kg and deletion of the note on the adjustment of the ML to take into account the concentration of the product); table olives (revised ML = 0.4 mg/kg) for adoption by the 39th Session of the Commission at Step 5/8.

b. To request revocation of the MLs for lead in the GSCTFF for the following food categories: canned raspberries, canned strawberries, canned green beans and canned wax beans; canned green peas; jams (fruit preserves) and jellies; pickled cucumbers; preserved tomatoes; and table olives.

c. To re-establish the EWG, chaired by USA, working in English only, to continue to work on outstanding issues related to the review of MLs for lead in fruits and vegetables (fresh and processed) and other selected food categories in the GSCTFF, namely review of MLs for fruit juices and nectars that are obtained exclusively from berries and other small fruits; canned brassica vegetables; canned chestnuts and canned chestnuts puree; fungi and mushrooms; mango chutney; processed tomato concentrates and to add two new food categories, i.e., fish and pulses, for consideration by CCCF11.

9. The 39th Session of the Commission (June 2016)[11] adopted the MLs at Step 5/8 as proposed by CCCF with the exception of the MLs for preserved tomatoes and jams, jellies and marmalades, which would be adopted at Step 5 only on the understanding that countries that raised concerns about practicality, number of samples, and geographical representativeness would submit relevant data in order to finalize these MLs at CCCF11 (2017).

10. The United States of America prepared the draft paper on proposed revised MLs for lead in juices and nectars from berries and other small fruits; preserved tomatoes; processed tomato

[7] Excluding fungi and mushrooms
[8] REP15/CF, paras. 48-51
[9] REP15/CAC, Appendices III, V
[10] REP16/CF, paras. 88-90
[11] REP16/CAC, para. 74

concentrates; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; canned brassica vegetables; fungi and mushrooms; pulses; and fish, with the technical assistance of the Secretariat of the Food and Agriculture Organization (FAO)/World Health Organization (WHO) Joint Expert Committee on Food Additives (JECFA). The list of countries and nongovernmental organizations (NGOs) that joined the EWG can be found in Appendix II. Comments were received from the following countries/NGOs: TBD.

INTRODUCTION

11. As a reminder, this work was undertaken in response to the new toxicological evaluation of lead in food conducted by JECFA at its 73rd meeting, at the request of CCCF. In the evaluation,[12] JECFA stated that exposure to lead is associated with a wide range of effects, including various neurodevelopmental effects, impaired renal function, hypertension, impaired fertility and adverse pregnancy outcomes. Because of the neurodevelopmental effects, foetuses, infants and children are the subgroups that are most sensitive to lead. JECFA withdrew the previously established provisional tolerable weekly intake (PTWI) of 25 µg/kg bw and concluded that it was not possible to establish a new PTWI that would be considered to be health protective. JECFA also concluded that, in populations with prolonged dietary exposures to higher levels of lead, measures should be taken to identify major contributing sources and foods and, if appropriate, to identify methods of reducing dietary exposure that are commensurate with the level of risk reduction.

12. Since no safe level of lead has been identified by JECFA, the focus of the paper was to review occurrence data to determine what percentage of samples can meet proposed new MLs. The paper did not propose MLs based on levels of exposure or on consumption. This approach is consistent with the approach presented previously,[13] as well as with an "as low as reasonably achievable approach" (ALARA) to lead in food in international trade.

WORK PROCESS

13. The United States of America and the Codex Secretariat requested that Codex countries, observers, and EWG members submit data on lead levels in juices and nectars from berries and other small fruits; preserved tomatoes; processed tomato concentrates; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; canned brassica vegetables; fungi and mushrooms; pulses; and fish, preferably from the past 10 years, to the WHO GEMS/Food database. The collection and initial categorization of data were performed by the JECFA Secretariat, in consultation with the EWG, and based on the GEMS/Food database. Analysis of results and decisions about which data were excluded, how data should be presented, and what recommendations should be included were made by the EWG.

14. For products previously discussed by CCCF (juices and nectars from berries and other small fruits; preserved tomatoes; processed tomato concentrates; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; and canned brassica vegetables), we extracted data submitted since the extraction for last year's report, and combined the new data with the dataset used in last year's report. For the three remaining product categories under consideration by CCCF (fish, pulses, and fungi and mushrooms), we extracted data from the GEMS/Food database covering approximately the last 15 years. The first step in analysis of the data was to remove data from the initial extractions that did not meet basic criteria. For example, for fungi and mushrooms, we included uncooked fungi and mushrooms, and removed canned and dried fungi. This process left us with our raw dataset.

15. The second step was to prepare a second dataset based on the limit of quantitation (LOQ) of the analytical method associated with each sample (LOQ-limited dataset). We found that many results in the raw dataset were obtained with methods with a reported LOQ higher than the Codex ML for that food. Further, some of these samples had results reported as non-detects (NDs). NDs obtained with a method with an LOQ higher than the ML may actually be higher than the ML. Furthermore, methods with an LOQ higher than the ML cannot accurately determine whether a food meets the ML. Therefore, for each food category, we prepared a second dataset excluding all results obtained with a method with an LOQ higher than the ML. We also excluded samples that were entered in the GEMS database without an LOQ, as we could not evaluate whether these samples met the LOQ criteria. Since we believe this dataset is more informative than the

[12] JECFA. Evaluation of Certain Food Additives and Contaminants. Seventy-third report of the joint FAO/WHO Expert Committee on Food Additives. WHO Technical Report Series 960.

[13] CX/CF12/6/13, CX/CF13/7/5, CX/CF14/8/5, CX/CF15/9/5, CX/CF 16/10/7

raw dataset, which includes results obtained with methods with LOQs higher than the ML, our conclusions are based primarily on the LOQ-limited dataset.

16. The final step in the analysis was to prepare tables showing the percentage of lead level results in the LOQ-limited dataset that meet the current and hypothetical lower MLs and to make recommendations based on those percentages. We attempted to choose a percentage value that would be consistent with current occurrence data and would provide some reduction in lead levels, but without having too significant an impact on international trade. There was no specific rule to identify the appropriate cut-off value, but in general, our approach has been to recommend reductions in MLs when the percentage of excluded samples was less than 5 percent.[14] In cases where the Committee had previously identified potential MLs for consideration (e.g., 0.05 mg/kg for preserved tomatoes), we considered the MLs previously identified by the Committee, rather than proposing new MLs. Likewise, in cases where the Committee had previously identified MLs for broad groupings (e.g., fruit juice), but excluded certain subsets (e.g., juice from berries and small fruits), we focused on whether data supported extending the previously identified MLs to the subsets that had been excluded by the Committee.

17. Both the raw and LOQ-limited datasets contained NDs, which were treated as zeros in the analysis. In exposure analyses, NDs may be replaced by such values as zero, or a value between zero and the limit of detection (LOD), to provide a more conservative indicator of exposure. In this project, we are not conducting an exposure analysis, but determining what percentage of samples can meet current or proposed new MLs. In this case, replacing NDs by a value between zero and the LOD would underestimate the ability of foods to meet the proposed MLs. Therefore, we replaced NDs with zeros.

ANALYSIS OF INDIVIDUAL FOODS

Products previously discussed by CCCF

18. **Juices and nectars from berries and other small fruits**. At the 10th CCCF, the Committee agreed to postpone the decision on juices and nectars from berries and other small fruits to allow submission of more data for consideration by the 11th CCCF on whether the ML of 0.03 mg/kg for fruit juices and nectars, ready-to-drink could apply or whether a higher separate ML of 0.04 mg/kg for this subset category should apply and to take a decision at the 11th CCCF. The 2017 raw dataset for juices and nectars from berries and other small fruits consisted of 1132 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2016. We included juices and nectars exclusively from berries and other small fruits that were either not concentrated or were reconstituted to the original juice concentration (ready-to-drink). We excluded 15 samples with an LOQ > the current Codex ML of 0.05 mg/kg and 146 samples with no reported LOQ to obtain the 2017 LOQ-limited set of 971 samples. Table BF-1 (in Appendix I) shows the breakdown by country of the 2017 raw and LOQ-limited datasets. Table BF-2 shows the mean and maximum lead levels associated with both datasets. Finally, Table BF-3 shows the percentage of samples of juices and nectars from berries and other small fruits meeting current and hypothetical MLs.

19. For juices and nectars from berries and other small fruits, 97 percent of the samples in the 2017 LOQ-limited dataset met the current Codex ML of 0.05 mg/kg (Table BF-3). This table also indicates that 97 percent of samples may meet a hypothetical ML of 0.04 mg/kg and 95 percent of samples may meet a hypothetical ML of 0.03 mg/kg.[15]

20. During both the 9th and 10th CCCF, the EWG addressed questions about whether certain subsets of berries and other small fruits, such as cranberries and currants, or juices and nectars made from such fruits, would have difficulty meeting proposed revised MLs, even if proposed lower MLs may be acceptable when applied to the occurrence data of these groups as a whole. Consistent with this approach, the EWG examined individual fruit juices in the juices from berries and other small fruits category and evaluated the number of samples that would meet a proposed ML of 0.04 mg/kg or 0.03 mg/kg. Table BF-4 shows the number and percent of each type of juice in the 2017 LOQ-limited dataset, as well as the number and percentage of samples ≤ 0.03 mg/kg and ≤ 0.04 mg/kg for each type of juice. The percentage of samples ≤ 0.03 mg/kg was 96 percent

[14] CX/CF12/6/13, CX/CF13/7/5, CX/CF14/8/5, CX/CF15/9/5, CX/CF 16/10/7. In addition, we note that the primary goal was not to attain identical achievability rates across all commodities.

[15] Because a large number of juice and nectar samples were excluded for not reporting an LOQ, we also considered whether retaining these samples (6 of which had results greater than 0.05 mg/kg) would change the results. Similar results (97 percent at 0.05 mg/kg, 96 percent at 0.04 mg/kg, and 94 percent at 0.03 mg/kg) were obtained with the revised sample set.

or greater for each type of fruit juice except for currant juice (92%), elderberry juice (50%), raspberry juice (94%), and strawberry juice (88%). The percentage of samples ≤ 0.04 mg/kg was 96 percent or greater for each type of fruit juice except for currant juice (94%), raspberry juice (94%), and strawberry juice (90%). With all four juices removed, 99 percent of the remaining juices could meet the 0.03 mg/kg level and 0.04 mg/kg level. Thus, for juices and nectars from berries and small fruits other than currants, elderberries, raspberries, and strawberries, lowering the ML to the proposed levels of 0.03 mg/kg or 0.04 mg/kg would eliminate 1 percent of the samples in international trade. Therefore, the EWG recommends extending the current ML of 0.03 mg/kg for juices and nectars to juices and nectars exclusively from berries and other small fruits, with the exception of juices and nectars derived exclusively from currants, elderberries, raspberries, and strawberries, which should be maintained at 0.05 mg/kg.

21. At the 10th CCCF,[16] the EWG noted that several types of fruit juice were represented by 3 or fewer samples each. Although the overall number of samples increased from 658 samples in the 2016 LOQ-limited set to 971 in the 2017 LOQ-limited set, the juice categories with 3 or fewer samples in 2016 (blackberry, chokeberry, elderberry, field berry, mulberry, and youngberry) did not change significantly. Without specific evidence that these juices cannot meet the proposed 0.03 mg/kg ML, the EWG recommends that blackberry, chokeberry, field berry, mulberry, and youngberry be included in the category of juices and nectars with an ML of 0.03 mg/kg.

22. **Preserved tomatoes**. The 2017 preserved tomatoes raw dataset consisted of 142 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2016. Consistent with CODEX STAN 13-1981, the dataset includes canned products described as tomatoes, whole tomatoes, diced tomatoes, crushed tomatoes, chopped tomatoes, strained tomatoes, etc. Samples described as tomato sauce, tomato powder, and ketchup (catsup) were excluded from analysis. In 2016, the 10th CCCF forwarded an ML for preserved tomatoes of 0.05 mg/kg to the 39th CAC for adoption at Step 5/8. Because the 39th CAC did not adopt the revised ML in 2016, we evaluated the data at the current Codex standard of 1 mg/kg. No LOQs associated with the results exceeded the ML, therefore, no further exclusions were made and there is only one dataset for preserved tomatoes. Table PT-1 (in Appendix I) shows the breakdown by country of the 2017 raw dataset. Table PT-2 shows the mean and maximum lead levels associated with the raw dataset. Table PT-3 shows the percentage of preserved tomatoes samples meeting current and hypothetical MLs.

23. For preserved tomatoes, 100 percent of the samples in the 2017 raw dataset met the current ML of 1 mg/kg (Table PT-3). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg, 99 percent of samples may meet a hypothetical ML of 0.05 mg/kg, and 96 percent of samples may meet a hypothetical ML of 0.02 mg/kg. Lowering the ML to the previously proposed level of 0.05 mg/kg would eliminate 1 percent of the samples in international trade. Therefore, the EWG again recommends lowering the ML for lead in preserved tomatoes to 0.05 mg/kg. Consistent with the decisions of the 10th CCCF, the EWG also recommends deletion of the note in the GSCTFF for preserved tomatoes on the adjustment of the ML to take into account the concentration of the product.

24. At the 39th CAC, some delegations were in favor of adopting the proposed ML of 0.05 mg/kg for preserved tomatoes at Step 5 only, for reasons including practicality, number of samples, and geographical representativeness. The CAC adopted the revised ML at Step 5 only, on the understanding that countries that expressed concern at the CAC would submit relevant data in order to finalize the ML at CCCF11 (2017). Because of these concerns, the EWG wanted to address the geographical representativeness and sample number of the new dataset. The results reported in 2016 were based on 82 samples in the raw dataset (from Australia, Canada, China, Japan, and the USA). This year's analysis consists of 142 samples in the 2017 raw dataset (from Australia, Brazil, Canada, China, Japan, New Zealand, Singapore, Thailand, the USA, and Uruguay), reflecting an increase in both sample number and geographical distribution.

25. **Processed tomato concentrates**. The 2017 processed tomato concentrates raw dataset consisted of 60 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2016. Consistent with CODEX STAN 57-1981, the dataset includes products described as tomato pastes and purees. Samples described as tomato sauce, tomato powder, and ketchup (catsup) were excluded from analysis. No LOQs associated with the results exceeded the current Codex standard of 1.5 mg/kg, therefore, no further exclusions were made and there is only one dataset for processed tomato concentrates. Table TC-1 (in Appendix I)

[16] CX/CF16/10/7

shows the breakdown by country of the 2017 raw dataset. Table TC-2 shows the mean and maximum lead levels associated with the dataset. Table TC-3 shows the percentage of processed tomato concentrates samples meeting current and hypothetical MLs.

26. For tomato concentrates, 100 percent of the samples in the 2017 dataset met the current Codex ML of 1.5 mg/kg (Table TC-3). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg, 97 percent of samples may meet a hypothetical ML of 0.05 mg/kg, and 93 percent of samples may meet a hypothetical ML of 0.03 mg/kg. Thus, lowering the ML to the hypothetical level of 0.05 mg/kg would eliminate 3 percent of the samples in international trade. Therefore, the EWG recommends lowering the ML for lead in processed tomato concentrates to 0.05 mg/kg. Consistent with the decisions of the 10th CCCF, the EWG also recommends deletion of the note in the GSCTFF for processed tomato concentrates on the adjustment of the ML to take into account the concentration of the product.

27. At the 10th CCCF, some delegations commented that the number of samples available was not sufficient to carry out a statistical analysis of the worldwide production and that an increased number of samples would give a more realistic idea of the violation rates and their impact on international trade. The Committee agreed to retain the ML of 1.5 mg/kg for processed tomato concentrates pending additional data and to take a decision at the 11th CCCF. Because of these concerns, the EWG wanted to address the geographical representativeness and sample number of the new dataset. The results reported in 2016 were based on 21 samples in the raw dataset (from Argentina, Canada, China, European Union, and Singapore). This year's analysis consists of 60 samples in the raw dataset (from Argentina, Brazil, Canada, China, European Union, Singapore, Thailand, and the USA), reflecting an increase in both sample number and geographical distribution.

28. **Jams (fruit preserves) and jellies**. The 2017 jams (fruit preserves) and jellies raw dataset consisted of 366 results from the GEMS/Food database for samples collected and/or analyzed between 2009 and 2016. Consistent with CODEX STAN 296-2009, the dataset includes products described as jams, preserves, jellies, and fruit spreads. Marmalades were included, since the Committee confirmed in 2016 that citrus and non-citrus marmalades were covered by CODEX STAN 296-2009.[17] Any reduced/low sugar products or products where sugars had been whole or partially replaced by food additive sweeteners were excluded from the dataset. In 2016, the 10th CCCF forwarded an ML for jams (fruit preserves) and jellies of 1 mg/kg to the 39th CAC for adoption at Step 5/8. Because the 39th CAC did not adopt the revised ML in 2016, we evaluated the data at the current Codex standard of 1 mg/kg. No LOQs associated with the results exceeded the ML, therefore, no further exclusions were made and there is only one dataset for jams (fruit preserves) and jellies. Table JJ-1 (in Appendix I) shows the breakdown by country of the 2017 raw dataset. Table JJ-2 shows the mean and maximum lead levels associated with the dataset. Table JJ-3 shows the percentage of jams (fruit preserves) and jellies samples meeting current and hypothetical MLs.

29. For jams (fruit preserves) and jellies, 99 percent of the 2017 raw dataset met the current Codex ML of 1 mg/kg (Table JJ-3). This table also indicates that 96 percent of samples may meet a hypothetical ML of 0.3 mg/kg or 0.2 mg/kg, and 94 percent of samples may meet a hypothetical ML of 0.1 mg/kg. Thus, lowering the ML to the proposed level of 0.1 mg/kg would eliminate 6 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.2 mg/kg would eliminate 4 percent of the samples in international trade. Based on this evaluation, the EWG recommends revising the ML for lead in jams (fruit preserves) and jellies, including marmalades, to 0.2 mg/kg.

30. At the 39th CAC, some delegations were in favor of adopting the proposed ML of 0.1 mg/kg for jams (fruit preserves) and jellies at Step 5 only, for reasons including practicality, number of samples, and geographical representativeness. The 39th CAC adopted the revised ML at Step 5 only, with the understanding that countries that expressed concern at the 39th CAC would submit relevant data in order to finalize the ML at CCCF11 (2017). Because of these concerns, the EWG wanted to address the geographical representativeness and sample number of the new dataset. The results reported in 2016 were based on 239 samples in the raw dataset (from Canada, New Zealand, and the USA). This year's analysis consists of 366 samples in the 2017 raw dataset (from Argentina, Canada, India, Indonesia, New Zealand, Thailand, and the USA), reflecting an increase in both sample number and geographical distribution. Also, although 238 of the 2017 samples are from Canada, the majority of these (172) are listed as imported in the GEMS/Food

[17] REP16/CF

database. This would suggest that the Canadian samples represent a wider geographical distribution than implied by Table JJ-1.

31. **Mango chutney**. The 2017 mango chutney raw dataset consisted of 34 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2016. The dataset includes products described as mango chutney and excluded one product described as mango jam. No LOQs associated with the results exceeded the current Codex standard of 1 mg/kg; therefore, no further exclusions were made and there is only one dataset for mango chutney. Table MC-1 (in Appendix I) shows the breakdown by country of the 2017 raw dataset. Table MC-2 shows the mean and maximum lead levels associated with the dataset. Table MC-3 shows the number and percentage of mango chutney samples meeting current and hypothetical MLs.

32. For mango chutney, 100 percent of the samples in the 2017 raw dataset met the current Codex ML of 1 mg/kg (Table MC-3). This table also indicates that 100 percent of samples may meet hypothetical MLs of 0.2 and 0.1 mg/kg, and 94 percent of samples may meet a hypothetical ML of 0.05 mg/kg. Thus, lowering the ML to the hypothetical level of 0.1 mg/kg would eliminate 0 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.05 mg/kg would eliminate 6 percent of the samples in international trade. Based on these results, the EWG could recommend maintaining the category of mango chutney and lowering the ML for lead in mango chutney to 0.1 mg/kg.

33. However, at the 10th CCCF meeting, the Committee also agreed that the EWG would consider combining mango chutney with the broad category of jams, jellies, and marmalades, if insufficient data[18] were available to consider mango chutneys as an individual category in 2017. The 2017 dataset of 34 samples represents an increase of 30 samples over the 2016 dataset, with data representing manufacture by at least 5 countries, including Canada, India, Jamaica, the United Kingdom, and the United States, based on label information. If the Committee does not agree that the mango chutney data are sufficient for evaluation, the EWG can recommend combining mango chutney with the broad category of jams, jellies, and marmalades with the ML of 0.2 mg/kg. In this case, the ML for mango chutney would be revoked and a note added to the GSCTFF addressing inclusion of mango chutney under the ML for jams (fruit preserves) and jellies.

34. **Canned chestnuts and canned chestnuts purees**. The 2017 canned chestnuts and canned chestnuts puree raw dataset consisted of 36 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2016. Consistent with CODEX STAN 145-1985, the dataset includes products described as canned chestnuts, chestnuts creams, and chestnuts purees. Dried chestnuts and chestnuts that appeared to be non-canned were excluded. No results exceeded the current Codex standard of 1 mg/kg and no LOQs associated with the results exceeded 1 mg/kg. Therefore, no further exclusions were made and there is only one dataset for canned chestnuts. Table CC-1 (in Appendix I) shows the breakdown by country of the 2017 raw dataset. Table CC-2 shows the mean and maximum lead levels associated with the dataset. Table CC-3 shows the number and percentage of canned chestnuts samples meeting current and hypothetical MLs.

35. For canned chestnuts and canned chestnuts purees, 100 percent of the samples in the 2017 dataset met the current Codex ML of 1 mg/kg (Table CC-3). This table also indicates that 100 percent of the samples would meet a hypothetical ML of 0.1 mg/kg and 0.05 mg/kg, and that 97 percent of samples would meet a hypothetical ML of 0.01 mg/kg. Thus, lowering the ML to the hypothetical level of 0.1 or 0.05 mg/kg would eliminate 0 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.01 mg/kg would eliminate 3 percent of the samples in international trade. Based on these results, the EWG could recommend maintaining the category of canned chestnuts and lowering the ML for lead in canned chestnuts to 0.05 mg/kg or lower.

36. However, at the 10th CCCF meeting, the Committee also agreed that if insufficient data were available to consider canned chestnuts and canned chestnuts puree as a stand-alone category in 2017, the EWG would consider combining canned chestnuts and canned chestnuts puree with canned fruits. The 2017 dataset of 36 samples represents an increase of 25 samples over the

[18] In response to a comment that that this food category could not be combined with that of jams, jellies and marmalades, the Committee also requested technical justification and/or a justification from the point of view of risk assessment be provided to the EWG that mango chutney could not be combined with that of jams, jellies and marmalades. The EWG has not received any technical or risk assessment information precluding combining mango chutney with jams, jellies and marmalades for the purposes of lead MLs.

2016 dataset, with new data representing manufacture by 5 additional countries, including samples produced in France, Italy, Romania, Spain, and Turkey, based on label information. If the Committee does not agree that the canned chestnuts and canned chestnuts puree data are sufficient for evaluation, the EWG can recommend combining canned chestnuts and canned chestnuts puree with canned fruits with the ML of 0.1 mg/kg. In this case, the ML for canned chestnuts and canned chestnuts puree would be revoked and a note added to the GSCTFF addressing inclusion of canned chestnuts and canned chestnuts purees under the ML for canned fruits.

37. **Canned brassica vegetables**. At the 10th CCCF, the Committee noted that current data (5 samples) were not sufficient to support extending the ML for canned vegetables (ML = 0.1 mg/kg) to the subset of canned brassica vegetables. As current canning processes no longer give rise to dramatic increases in lead content of canned products, a proposal was made to align the ML for the canned products to the ML for the corresponding fresh products. It was, however, noted that before deriving MLs for processed products from the corresponding fresh produce, it would be preferential to gather additional data for the canned product itself. Subsequently alternative ways to derive an ML for this subset food category could be explored. The Committee agreed to keep the note excluding canned brassica vegetables from the broad category of canned vegetables pending additional data and to take a decision at the 11th CCCF.

38. The 2017 canned brassica raw dataset consisted of 16 results from the GEMS/Food database for samples collected and/or analyzed between 2008 and 2016, with five samples of canned pickled cabbage, ten samples of sauerkraut and one sample of canned pachranga (turnip cauliflower mix). No samples exceeded the current Codex standard of 1 mg/kg; therefore, no further exclusions were made and there is only one dataset for canned brassica vegetables. Table CB-1 (in Appendix I) shows the breakdown by country of the 2017 raw dataset. Table CB-2 shows the mean and maximum lead levels associated with the dataset. Finally, Table CB-3 shows the percentage of canned brassica samples meeting current and hypothetical MLs.

39. For canned brassica, 100 percent of the samples in the 2017 dataset met the current Codex ML of 1 mg/kg (Table CB-3). This table also indicates that 100 percent of samples would meet a hypothetical ML of 0.6 mg/kg and 94 percent of samples would meet a hypothetical ML of 0.4 mg/kg and 0.1 mg/kg. Thus, lowering the ML to the hypothetical level of 0.6 mg/kg would eliminate 0 percent of samples in international trade and lowering the ML to the hypothetical level of 0.4 mg/kg or 0.1 mg/kg would eliminate 6 percent of the samples in international trade. Based on these results, the EWG could recommend maintaining the category of canned brassica and keeping the current Codex ML of 1 mg/kg. However, we note that this determination is based on one sample at 0.5 mg/kg (all other samples had lead levels less than 0.1 mg/kg).

40. At the 10th CCCF, the Committee agreed to consider alternative ways to derive an ML for the canned brassica subset of vegetables in 2016 if sufficient data were not available. The 2017 dataset of 16 samples represents an increase of 11 samples over the 2016 dataset, with data contributed by Japan, Thailand, and the United States. However, the dataset is still small. As all of the additional samples since 2016 were provided by one country, specifically to increase the number of samples available for this paper, the EWG cannot plan on receiving additional data on canned brassica vegetables in the near future. As noted above, with the exception of one canned cabbage sample at 0.5 mg/kg lead, all the canned brassica samples contained less than 0.1 mg/kg of lead, which is consistent with the ML for fresh brassica vegetables (0.1 mg/kg) and canned vegetables (0.1 mg/kg), as well as the ML for fresh leafy vegetables (0.3 mg/kg). Since the committee agreed to consider alternative approaches for subsets lacking sufficient data, the EWG recommends extending the current ML of 0.1 mg/kg lead for canned vegetables to canned brassica vegetables.

<u>New product categories under consideration by CCCF</u>

41. **Fungi and mushrooms**. The current version of the GSCTFF (CODEX STAN 193-1995, 2016 amendment) excludes fungi and mushrooms from the 0.05 mg/kg standard for lead in fruiting vegetables. A previous version (2011 amendment) excluded mushrooms, but not fungi. In 2014 and 2015, at the 8th and 9th sessions of CCCF, the EWG excluded all fungi and edible mushrooms from the analysis of fruiting vegetables, other than cucurbits. In 2015, at the 9th session of CCCF, the Committee noted that in view of the exclusion of fungi and mushrooms from the ML for fruiting vegetables, other than cucurbits, MLs for these commodities would be considered by the EWG. In 2016, at the 10th CCCF, the Committee agreed to consider the setting

of MLs for mushrooms and different species/group of species of fungi if appropriate and feasible at the 11th CCCF.

42. The 2017 fungi and mushroom raw dataset consisted of 2148 results from the GEMS/Food database for samples collected and/or analyzed between 1998 and 2016. Consistent with CODEX STAN 38-1981, the dataset consists of fresh edible fungi. Although the standard specifically excludes canned, cultivated *Agaricus* mushrooms, we excluded all canned fungi and mushrooms as they were considered in the analysis of canned vegetables in 2015. We also excluded "fungus products," including dried fungus, since the 9th CCCF did not specify "fungus products" when it requested evaluation of "fungi and mushrooms," and since, in general, MLs are set on primary products. We did not prepare an LOQ-limited set based on ML, since there is no existing ML for fungi and mushrooms.[19] However, we excluded 10 products with no reported LOQ to obtain the 2017 LOQ-limited dataset of 2138 samples. Table FM-1 (in Appendix I) shows the breakdown by country of the 2017 raw and LOQ-limited datasets for fresh fungi and mushrooms. Table FM-2 shows the mean and maximum lead levels associated with the datasets. Table FM-3 shows the percentage of fungi and mushroom samples meeting current and hypothetical MLs.

43. For fresh fungi and mushrooms, 98 percent of samples in the 2017 LOQ-limited dataset may meet a hypothetical ML of 1 mg/kg, 96 percent of samples may meet a hypothetical ML of 0.6 mg/kg, and 95 percent of samples may meet a hypothetical ML of 0.5 mg/kg. Thus, setting an ML at the hypothetical level of 1 mg/kg would eliminate 2 percent of the samples in international trade, setting an ML at the hypothetical level of 0.6 mg/kg would eliminate 4 percent of the samples in international trade, and setting an ML at the hypothetical level of 0.5 mg/kg would eliminate 5 percent of the samples in international trade. The EWG recommends that the Committee consider establishing an ML for lead in fresh fungi and mushrooms (excluding mushroom and fungus products) of 0.6 mg/kg.

44. The Committee also may want to consider whether it would be appropriate to establish an ML for dried fungi and mushrooms or note that countries may wish to consider use of a concentration factor.[20] A similar analysis of dried samples showed that dried fungi and mushrooms have higher lead levels, e.g., a mean of 0.33 mg/kg and a maximum of 18.48 mg/kg for dried fungi and mushrooms versus a mean of 0.14 mg/kg and a maximum of 5.20 mg/kg for fresh fungi and mushrooms. Only 89 percent of dried fungi and mushrooms had lead levels below the ML of 0.6 mg/kg proposed for fresh fungi and mushrooms.

45. **Pulses.** The 2017 pulses raw dataset consisted of 3526 results from the GEMS/Food database for samples collected and/or analyzed between 1995 and 2016. Consistent with CODEX STAN 171-1989, the dataset includes products described as dry seeds of leguminous plants that may be whole, shelled, or split. We included 740 samples (mung, kidney, cowpea, red bean, soybean, lentil, and broad bean) that appeared to have been misclassified in the GEMS database as legumes rather than pulses. We excluded products that were cooked, canned, sprouted, or combined with other components, immature seeds, and fresh legumes (legume vegetables) expressly indicated as belonging to Group 014 in the Codex Classification of Foods and Animal Feeds.[21] We excluded 52 samples with an LOQ > the current Codex standard of 0.2 mg/kg and one sample with no reported LOQ to obtain the 2017 LOQ-limited dataset of 3473 samples. Table PU-1 (in Appendix I) shows the breakdown by country of the 2017 raw and LOQ-limited datasets. Table PU-2 shows the mean and maximum lead levels associated with the datasets. Table PU-3 shows the percentage of pulse samples meeting current and hypothetical MLs.

46. For pulses, 99 percent of the samples in the 2017 LOQ-limited dataset met the current Codex ML of 0.2 mg/kg (Table PU-3). The table also indicates that 97 percent of samples may meet a hypothetical ML of 0.1 mg/kg and 91 percent of samples may meet a hypothetical ML of 0.05 mg/kg. Thus, lowering the ML to the hypothetical level of 0.1 mg/kg would eliminate 3 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.05 mg/kg

[19] CX/CF16/10/7, par. 51

[20] The GSCTFF states that: When contaminant levels are consistently different in processed products related to the primary products from which they are derived, and sufficient information is available about the contamination pattern, it may be appropriate to establish separate maximum levels for these processed products. This also applies when contamination may occur during processing. In general however, MLs should preferably be set for primary agricultural products and may be applied to processed, derived and multi-ingredient food and feed by using appropriate conversion factors. When these factors are sufficiently known, they should be mentioned in the suffix to the maximum level following the format of list of MLs as defined in Annex II.

[21] CAC/MISC 4-1989

would eliminate 9 percent of the samples in international trade. Therefore, the EWG recommends lowering the ML for lead in pulses to 0.1 mg/kg.

47. **Fish.** The 2017 fish raw dataset consisted of 6469 results from the GEMS/Food database for samples collected and/or analyzed between 1995 and 2016. The dataset includes fish from Type 8, Groups 040, 041, and 042, as defined by the Codex Classification of Foods and Animal Feeds; which are fresh water, marine, and diadromous fish, respectively. We excluded aquatic animals classified outside of these specific groups. Products that were fresh and frozen, either whole or cut into filets, were included; while smoked, dried, canned, and otherwise cooked products were excluded from the analysis. We excluded 12 samples with an LOQ > the current Codex standard of 0.3 mg/kg and 734 samples with no LOQ to obtain the 2017 LOQ-limited dataset of 5723 samples. Table FI-1 (in Appendix I) shows the breakdown by country of the 2017 raw and LOQ-limited datasets. Table FI-2 shows the mean and maximum lead levels associated with the datasets. Table FI-3 shows the percentage of fish samples meeting current and hypothetical MLs.

48. For fish, 97 percent of the samples in the 2017 LOQ-limited dataset met the current Codex ML of 0.3 mg/kg (Table FI-3). The table also indicates that 95 percent of samples may meet a hypothetical ML of 0.2 mg/kg and 89 percent of samples may meet a hypothetical ML of 0.1 mg/kg. Thus, lowering the ML to the hypothetical level of 0.2 mg/kg would eliminate 5 percent of the samples in international trade. The EWG recommends maintaining the current ML for lead in fish of 0.3 mg/kg.

ADDITIONAL TOPICS

49. TBD

SUMMARY AND RECOMMENDATIONS

50. In summary, reanalysis of selected foods supports lowering the MLs for lead for some foods and maintaining the MLs for other foods. The EWG makes the following recommendations.

51. **Juices and nectars from berries and other small fruits**: Consider lowering the ML for lead in juices and nectars exclusively from berries and small fruits from 0.05 mg/kg to 0.03 mg/kg, with the exception of juices and nectars derived exclusively from currants, elderberries, raspberries, and strawberries, which should be maintained at 0.05 mg/kg.

52. **Preserved tomatoes**: Consider confirming the proposed ML for lead in preserved tomatoes of 0.05 mg/kg (currently at Step 5).

53. **Processed tomato concentrates**: Consider lowering the ML for lead in processed tomato concentrates from 1.5 mg/kg to 0.05 mg/kg.

54. **Jams (fruit preserves) and jellies**: Consider revising the ML for lead in jams (fruit preserves) and jellies from 1 mg/kg (currently at Step 5 at 0.1 mg/kg) to 0.2 mg/kg. Include a note in the GSCTFF indicating inclusion of marmalades.

55. **Mango chutney**: Consider lowering the ML from 1 mg/kg to 0.1 mg/kg or combine with jams (fruit preserves) and jellies at 0.2 mg/kg and revoke the separate mango chutney standard.

56. **Canned chestnuts and chestnuts puree**: Consider lowering the ML for lead in canned chestnuts and chestnuts puree from 1 mg/kg to 0.05 mg/kg or combine with canned fruits at 0.1 mg/kg and revoke the separate canned chestnuts standard.

57. **Canned brassica vegetables**: Consider extending the current ML of 0.1 mg/kg lead in canned vegetables to canned brassica vegetables and revoke the separate canned brassica vegetables standard.

58. **Fungi and mushrooms**: Consider establishing an ML for lead in fungi and mushrooms of 0.6 mg/kg.

59. **Pulses**: Consider lowering the ML from 0.2 mg/kg to 0.1 mg/kg.

60. **Fish**: Maintain the current ML for lead in fish of 0.3 mg/kg.

Appendix I

Tables

Table BF-1: Juices and nectars from berries and other small fruits: Data contribution by country to 2017 raw and LOQ-limited datasets

Country	Number of Samples – raw dataset	Number of Samples – LOQ-limited dataset
Austria	45	12
Belgium	263	263
Canada	198	163
China	2	2
Denmark	2	2
European Union	8	8
France	10	6
Germany	26	2
Hungary	2	1
India	3	2
Italy	338	292
Japan	31	31
Poland	2	2
Romania	17	14
Singapore	9	0
Slovakia	2	1
Spain	1	0
Thailand	17	17
USA	156	153
Total	**1132**	**971**

Table BF-2: Juices and nectars from berries and other small fruits: Mean and maximum for 2017 datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.012	0.206
LOQ-limited dataset	0.011	0.206

Table BF-3: Percentage of juices and nectars from berries and other small fruits meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
0.05	943	97%
*0.04**	937	97%
0.03	922	95%
0.02	842	87%

*Hypothetical MLs shown in italics

Table BF-4: Juices and nectars from berries and other small fruits: Data contribution by type of fruit to 2017 LOQ-limited dataset

Juice type	Number			Percentage		
	Total	≤ 0.03 mg/kg	≤ 0.04 mg/kg	Total	≤ 0.03 mg/kg	≤ 0.04 mg/kg
Blackberry	3	3	3	0.3%	100%	100%
Blueberry	23	22	22	2.4%	96%	96%
Chokeberry	1	1	1	0.1%	100%	100%
Cranberry	40	39	39	4.1%	98%	98%
Currant	49	45	46	5.1%	92%	94%
Elderberry	2	1	2	0.2%	50%	100%
Field berry	1	1	1	0.1%	100%	100%
Grape	632	606	617	65.0%	96%	98%
Mix	66	65	65	6.8%	98%	98%
Mulberry	1	1	1	0.1%	100%	100%
Raspberry	53	50	50	5.5%	94%	94%
Strawberry	99	87	89	10.3%	88%	90%
Youngberry	1	1	1	0.1%	100%	100%
Total	**971**	**922**	**937**	**100.0%**	**95%**	**96%**

Table PT-1: Preserved tomatoes: Data contribution by country to 2017 raw dataset

Country	Number of Samples
Australia	4
Brazil	1
Canada	28
China	10
Japan	34
New Zealand	4
Singapore	2
Thailand	20
USA	33
Uruguay	6
Total	**142**

Table PT-2: Preserved tomatoes: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.005	0.080

Table PT-3: Percentage of preserved tomatoes samples meeting current and hypothetical MLs: raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1	142	100%
*0.1**	142	100%
0.05	141	99%
0.02	137	96%

*Hypothetical MLs shown in italics

Table TC-1: Processed tomato concentrates: Data contribution by country to 2017 raw dataset

Country	Number of Samples
Argentina	1
Brazil	6
Canada	4
China	1
European Union	15
Singapore	3
Thailand	4
USA	26
Total	**60**

Table TC-2: Processed tomato concentrates: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.007	0.060

Table TC-3: Percentage of processed tomato concentrates samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1.5	60	100%
*0.1**	60	100%
0.05	58	97%
0.03	56	93%

*Hypothetical MLs shown in italics

Table JJ-1: Jams (fruit preserves) and jellies: Data contribution by country to 2017 raw dataset

Country	Number of samples
Argentina	1
Canada	238
India	52
Indonesia	19
New Zealand	8
Thailand	40
USA	8
Total	**366**

Table JJ-2: Jams (fruit preserves) and jellies: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.035	1.49

Table JJ-3: Percentage of jams (fruit preserves) and jellies samples meeting current and hypothetical MLs: raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1	362	99%
*0.3**	353	96%
0.2	350	96%
0.1	345	94%

*Hypothetical MLs shown in italics

Table MC-1: Mango chutney: Data contribution by country to 2017 raw dataset

Country	Number of Samples
Canada	1
China	3
USA	30
Total	**34**

Table MC-2: Mango chutney: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.018	0.057

Table MC-3: Percentage of mango chutney samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1	34	100%
*0.2**	34	100%
0.1	34	100%
0.05	32	94%

*Hypothetical MLs shown in italics

Table CC-1: Canned chestnuts and canned chestnuts purees: Data contribution by country to 2017 raw dataset

Country	Number of Samples
Canada	1
China	7
European Union	1
Thailand	2
USA	25
Total	**36**

Table CC-2: Canned chestnuts and canned chestnuts purees: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.002	0.020

Table CC-3: Percentage of canned chestnuts and canned chestnuts purees samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1	36	100%
*0.1**	36	100%
0.05	36	100%
0.01	35	97%

*Hypothetical MLs shown in italics

Table CB-1: Canned brassica vegetables: Data contribution by country to 2017 raw dataset

Country	Number of samples
Japan	1
Thailand	3
USA	12
Total	**16**

Table CB-2: Canned brassica vegetables: Mean and maximum for 2017 dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.042	0.50

Table CB-3: Percentage of canned brassica vegetables samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
1	16	100%
*0.6**	16	100%
0.4	15	94%
0.1	15	94%

*Hypothetical MLs shown in italics

Table FM-1: Fungi and mushrooms: Data contribution by country to 2017 raw and LOQ-limited datasets

Country	Number of samples – raw dataset	Number of samples – LOQ-limited dataset
Australia	50	50
Canada	86	76
China	1586	1586
France	8	8
India	10	10
Japan	160	160
New Zealand	9	9
Singapore	82	82
Slovakia	8	8
Thailand	86	86
USA	63	63

Total	2148	2138

Table FM-2: Fungi and mushrooms: Mean and maximum for 2017 raw and LOQ-limited datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.14	5.20
LOQ-limited dataset	0.14	5.20

Table FM-3: Percentage of fungi and mushroom samples meeting hypothetical MLs: LOQ-limited dataset

Hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
*1**	2099	98%
0.6	2054	96%
0.5	2037	95%

*Hypothetical MLs shown in italics

Table PU-1: Pulses: Data contribution by country to 2017 raw and LOQ-limited datasets

Country	Number of samples – raw dataset	Number of samples – LOQ-limited dataset
Argentina	1	1
Australia	9	9
Brazil	12	12
Canada	1636	1636
China	85	85
Germany	1	1
Japan	309	309
Nigeria	1	1
Korea	983	983
Singapore	53	0
Slovakia	41	41
Thailand	389	389
USA	6	6
Total	**3526**	**3473**

Table PU-2: Pulses: Mean and maximum for 2017 raw and LOQ-limited datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.018	0.600
LOQ-limited dataset	0.017	0.600

Table PU-3: Percentage of pulses samples meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
0.2	3433	99%
*0.1**	3358	97%
0.05	3151	91%

*Hypothetical MLs shown in italics

Table FI-1: Fish: Data contribution by country to 2017 raw and LOQ-limited datasets

Country	Number of samples – raw dataset	Number of samples – LOQ-limited dataset
Canada	393	389
China	1853	1853
France	1341	612
Japan	44	44
Lithuania	2	2
New Zealand	108	108
Nigeria	1	1
Singapore	5	4
Slovakia	175	175
Thailand	1865	1862
USA	682	673
Total	**6469**	**5723**

Table FI-2: Fish: Mean and maximum for 2017 raw and LOQ-limited datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.042	10.31
LOQ-limited dataset	0.043	10.31

Table FI-3: Percentage of fish samples meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Samples ≤ MLs	
	Number	Percentage
0.3	5566	97%
*0.2**	5442	95%
0.1	5105	89%

*Hypothetical MLs shown in italics

Appendix II: List of Participants

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