CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 6 **CX/CF 16/10/7**
February 2016

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

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

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)

Codex Members and Observers wishing to submit comments at Step 3 on the proposed draft revision of maximum levels for lead in selected commodities in the GSCTFF (*refer to Summary and Recommendations, paragraph 56*), 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 6th session of the 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.

[1] REP12/CF, paras. 126-127.
[2] REP13/CF, paras. 41-21 and Appendix II.

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 up 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 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.

d. 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 in the GSCTFF, namely review of MLs for passion fruit juice; juices and nectars from berries and other small fruits; canned berries and other small fruits; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; canned brassica vegetables; canned leafy vegetables; canned legume vegetables; pickled cucumbers (cucumber pickles); preserved tomatoes; processed tomato concentrates; table olives; and fungi and mushrooms.

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[3] Global Environment Monitoring System-Food Contamination Monitoring and Assessment Programme, http://www.who.int/foodsafety/chem/gems/en

[4] REP13/CAC, para. 79.

[5] REP13/CF, paras. 39-40.

[6] REP14/CF, paras. 21-24.

[7] Excluding fungi and mushrooms.

[8] REP15/CF, paras. 48-51.

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

8. 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; passion fruit juice; canned berries and other small fruits; canned leafy vegetables; canned legume vegetables; canned brassica vegetables; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; pickled cucumbers (cucumber pickles); preserved tomatoes; processed tomato concentrates; table olives; and fungi and mushrooms, 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: Australia, Belgium, Brazil, Canada, European Union, Israel, Japan, New Zealand, FoodDrinkEurope, European Fruit Juice Association, International Council of Beverages Associations, and International Fruit and Vegetable Juice Association.

INTRODUCTION

9. 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[10], 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.

10. 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[11], as well as with an “as low as reasonably achievable approach” (ALARA) to lead in food in international trade.

WORK PROCESS

11. 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; passion fruit juice; canned berries and other small fruits; canned leafy vegetables; canned legume vegetables; canned brassica vegetables; jams (fruit preserves) and jellies; mango chutney; canned chestnuts and canned chestnuts puree; pickled cucumbers (cucumber pickles); preserved tomatoes; processed tomato concentrates; table olives; and fungi and mushrooms, 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.

12. For products previously discussed by CCCF (juices and nectars from berries and small fruits, passion fruit juice and nectars, canned berries and other small fruits, and canned brassica, leafy, and legume 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 new product categories under consideration by CCCF [jams (fruit preserves) and jellies, mango chutney, canned chestnuts and canned chestnuts puree, pickled cucumbers (cucumber pickles), preserved tomatoes, processed tomato concentrates, table olives, 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.

[9] REP15/CAC, Appendices III, V.
[10] 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.
[11] CX/CF 12/6/13, CX/CF13/7/5, CX/CF 14/8/5, CX/CF 15/9/5.

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

14. 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[12]. In cases where the Committee had previously identified potential MLs for consideration (e.g., 0.03 mg/kg for passion fruit juice), 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., canned vegetables), but excluded certain subsets (e.g., canned leafy vegetables), we focused on whether data supported extending the previously identified MLs to the subsets that had been excluded by the Committee.

15. 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.

16. For several categories considered this year, the number of samples was small. The EWG tentatively identified approximately 20 samples as a minimum number of samples for proposing a revised ML for this year's work. This issue is discussed further in the Additional Topics section.

ANALYSIS OF INDIVIDUAL FOODS

Products previously discussed by CCCF

17. **Juices and nectars from berries and other small fruits**. At the 9th CCCF, the Committee agreed to exclude juices and nectars from berries and other small fruits from the ML for juices and nectars of 0.03 mg/kg, but to review juices and nectars from berries and other small fruits for the 10th CCCF. The 2016 raw dataset for juices and nectars from berries and other small fruits consisted of 796 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2015. We excluded 138 samples with an LOQ > 0.05 mg/kg (0.05 mg/kg is the current ML) or no reported LOQ to obtain the 2016 LOQ-limited set of 658 samples. Tables BF-1 and BF-2 (in Appendix I) show the breakdown by country of the 2016 raw and LOQ-limited datasets. Table BF-3 shows the mean and maximum lead levels associated with both datasets. Finally, Table BF-4 shows the percentage of samples of juices and nectars from berries and other small fruits meeting current and hypothetical MLs.

18. For juices and nectars from berries and other small fruits, 98 percent of the samples in the 2016 LOQ-limited dataset (i.e., results obtained with a method with a reported LOQ or an LOQ ≤ 0.05 mg/kg) met the current Codex ML of 0.05 mg/kg (Table BF-4). This table also indicates that 98 percent of samples may meet a hypothetical ML of 0.04 mg/kg and 97 percent of samples may meet a hypothetical ML of 0.03 mg/kg. Because a large number of samples were excluded for not reporting an LOQ, we also considered whether retaining these samples (which all had results below 0.05 mg/kg) would change the results. Similar results (99 percent at 0.05 mg/kg, 98 percent at 0.04 mg/kg, and 96 percent at 0.03 mg/kg) were seen with the revised sample set.

[12] CX/CF 12/6/13, CX/CF13/7/5, CX/CF 14/8/5, CX/CF 15/9/5. In addition, we note that the primary goal was not to attain identical achievability rates across all commodities.

19. During the 9th CCCF, in response to concerns raised at the 8th CCCF, the EWG addressed questions about whether certain subsets of berries and other small fruits, such as cranberries and currants, would have difficulty meeting proposed revised MLs, even if proposed lower MLs may be acceptable when applied to the occurrence data of this group as a whole. Consistent with this approach, the EWG examined individual fruit juices in the juices from berries and other small fruits category. Table BF-5 shows the number and percent of each type of juice in the 2016 LOQ-limited dataset, as well as the percentage of samples ≤ 0.03 mg/kg for each type of juice. The percentage of samples ≤ 0.03 mg/kg was 95 percent or greater for each type of fruit except for blueberry juice (1 sample > 0.03 mg/kg, 94.4%) and currant juice (1 sample > 0.03 mg/kg, 94.7%). Also, several types of fruit juice were only represented by 3 or fewer samples each (blackberry, chokeberry, elderberry, field berry, mulberry, wild berry, and youngberry).

20. Again, because a large number of samples were excluded for not reporting an LOQ, we also considered whether retaining these samples (which all had results below 0.05 mg/kg) would change the conclusions about individual fruit juice types. Very similar results were seen with the revised sample set. The largest difference was for grape juice samples, where 95.6 percent were under 0.03 mg/kg versus 96.4 percent in the LOQ-limited set.

21. As noted above, 97 percent of total samples may meet a hypothetical ML of 0.03 mg/kg, and therefore the EWG considered the recommendation that the 0.03 mg/kg standard be applied to all juices and nectars from berries and other small fruits. Some commenters supported the recommendation, but others commented or provided new data indicating that certain juices in this category would not be able to meet the standard. Therefore, the EWG recommends that the final decision on juices and nectars from berries and other small fruits be postponed to 2017 to allow submission of new data. These data should be for juices that are <u>not</u> concentrated or for commodities reconstituted to the original juice concentration (ready to drink). The EWG also recommends that the Committee consider an ML of 0.04 mg/kg, in addition to 0.03 mg/kg, in 2017.

22. **Passion fruit juice and nectar**. At the 9th CCCF, the Committee agreed to exclude passion fruit juice from the 0.05 mg/kg ML for fruit juices and nectars until the Committee could review additional passion fruit juice data at the 10th CCCF[13]. The 2016 passion fruit juice and nectar raw dataset consisted of 266 results from the GEMS/Food database for samples collected and/or analyzed between 2004 and 2015. All results were obtained with methods that reported LOQs and no LOQs associated with the results exceeded 0.05 mg/kg, the current ML for lead in passion fruit juice. Therefore, no further exclusions were made and there is only one dataset for passion fruit juices and nectars. Table PF-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table PF-2 shows the mean and maximum lead levels associated with the dataset. Table PF-3 shows the percentage of passion fruit juice and nectar samples meeting current and hypothetical MLs.

23. For passion fruit juice and nectar, 95 percent of the samples in the 2016 raw dataset met the current Codex ML of 0.05 mg/kg (Table PF-3). This table also indicates that 95 percent of samples may meet a hypothetical ML of 0.04 mg/kg and 91 percent of samples may meet a hypothetical ML of 0.03 mg/kg, the current ML for other juices and nectars. Based on these data, lowering the ML to the hypothetical level of 0.04 mg/kg would eliminate 5 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.03 mg/kg would eliminate 9 percent of the samples in international trade.

24. Before making a recommendation, the EWG looked more closely at the passion fruit juice and nectar data. Almost 90 percent of the samples were reported by Brazil (Table PF-1), with about half from the source “ABIA.” Among ABIA Brazilian samples, approximately 19 percent (23 samples) cannot meet a hypothetical 0.03 mg/kg ML. Among non-ABIA Brazilian samples, approximately 2 percent (two samples) cannot meet a hypothetical 0.03 mg/kg ML. The EWG sought input from Brazil on these data. Brazil reported that the results of the monitoring program performed by the Brazilian government during the year 2015 showed that there is no difference between lead occurrence in passion fruit juice and nectar versus other fruit juices and nectars, and recommended adopting the 0.03 mg/kg ML for passion fruit juice and nectar. The International Council of Beverages Associations also reported that the 0.03 mg/kg ML for passion fruit juice is achievable and recommended removing the current exemption for passion fruit juice at 0.05 mg/kg. Therefore, the EWG recommends including passion fruit juices and nectars in the fruit juices and nectars category with an ML of 0.03 mg/kg.

[13] REP15/CF

25. **Canned berries and other small fruits**. The 2016 canned berries and other small fruits raw dataset consisted of 27 results from the GEMS/Food database for samples collected and/or analyzed between 2005 and 2012. We excluded 3 samples with no reported LOQ to obtain the 2016 LOQ-limited set of 24 samples. Tables CB-1 and CB-2 (in Appendix I) show the breakdown by country of the 2016 raw and LOQ-limited datasets. Table CB-3 shows the mean and maximum lead levels associated with both datasets. Finally, Table CB-4 shows the percentage of canned berries and other small fruits samples meeting current and hypothetical MLs.

26. For canned berries and other small fruits, 100 percent of the samples in the 2016 LOQ-limited dataset (i.e., results obtained with a method with a reported LOQ or an LOQ ≤ 1 mg/kg) met the current Codex ML of 1 mg/kg (Table CB-4). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg and 98 percent of samples may meet a hypothetical ML of 0.05 mg/kg. CCCF excluded canned berries and other small fruits from the canned fruits category in 2013, when it sent the proposed ML of 0.1 mg/kg to the Commission at Step 5/8. As noted in paragraph 14, in cases where the Committee had previously identified MLs for broad groupings but excluded certain subsets, we focused on whether new data supported extending the previously identified MLs to subsets excluded by the Committee, rather than proposing new MLs. Based on this analysis, the EWG now recommends including canned berries and other small fruits in the canned fruits category with an ML of 0.1 mg/kg.

27. **Canned leafy vegetables**. The 2016 canned leafy vegetables raw dataset consisted of 29 results from the GEMS/Food database for samples collected and/or analyzed between 2005 and 2014. The dataset includes products described as canned kale, mustard greens, spinach, grape leaves, and lettuce. We excluded 10 samples with no reported LOQ to obtain the 2016 LOQ-limited set of 19 samples. Tables LV-1 and LV-2 (in Appendix I) show the breakdown by country of the 2016 raw and LOQ-limited datasets. Table LV-3 shows the mean and maximum lead levels associated with both datasets. Finally, Table LV-4 shows the percentage of canned leafy vegetables samples meeting current and hypothetical MLs.

28. For canned leafy vegetables, 100 percent of the samples in the 2016 LOQ-limited dataset (i.e., results obtained with a method with a reported LOQ or an LOQ ≤ 1 mg/kg) met the current Codex ML of 1 mg/kg (Table LV-4). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg. Because a large number of samples (10 of 29) were excluded for not reporting an LOQ, we also considered whether retaining these samples (which all had results below 1 mg/kg) would change the results. The same results (100 percent of samples meeting hypothetical MLs of 1 and 0.1 mg/kg) were seen with the revised sample set. CCCF excluded canned leafy vegetables from the canned vegetables category in 2013, when it sent the proposed ML of 0.1 mg/kg to the Commission at Step 5/8. Based on this analysis, the EWG now recommends including canned leafy vegetables in the canned vegetables category with the ML of 0.1 mg/kg.

29. **Canned legume vegetables**. The 2016 canned legume vegetables raw dataset consisted of 104 results from the GEMS/Food database for samples collected and/or analyzed between 1998 and 2013. The dataset includes products described as canned garden peas, canned green beans, and canned green chick peas. We excluded samples that appeared to be canned dried beans or pulses. We excluded 11 samples with no reported LOQ to obtain the 2016 LOQ-limited set of 93 samples. Tables VP-1 and VP-2 (in Appendix I) show the breakdown by country of the 2016 raw and LOQ-limited datasets. Table VP-3 shows the mean and maximum lead levels associated with both datasets. Finally, Table VP-4 shows the percentage of canned legume vegetables samples meeting current and hypothetical MLs.

30. For canned legume vegetables, 100 percent of the samples in the 2016 LOQ-limited dataset (i.e., results obtained with a method with a reported LOQ or an LOQ ≤ 1 mg/kg) met the current Codex ML of 1 mg/kg (Table VP-4). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg. As with canned leafy vegetables, we also considered whether retaining the samples excluded for not reporting an LOQ (and which all had results below 1 mg/kg) would change the results. The same results (100 percent of samples meeting hypothetical MLs of 1 and 0.1 mg/kg) were seen with the revised sample set. CCCF excluded canned legume vegetables from the canned vegetables category in 2013, when it sent the proposed ML of 0.1 mg/kg to the Commission at Step 5/8. Based on this analysis, the EWG now recommends including canned legume vegetables in the canned vegetables category with the ML of 0.1 mg/kg.

31. **Canned brassica vegetables**. The 2016 canned vegetables raw dataset consisted of 5 results from the GEMS/Food database for samples collected and/or analyzed between 2008 and 2012, with four samples of canned pickled cabbage and one sample of canned pachranga (turnip cauliflower mix). The reported LOQs ranged from 0.003 to 0.05 mg/kg. Four of the samples ranged from non-detect to approximately 0.05 mg/kg, and one was 0.5 mg/kg. The EWG does not recommend changing the ML based on this limited number of samples.

New product categories under consideration by CCCF

32. **Jams (fruit preserves) and jellies**. The 2016 jams and jellies raw dataset consisted of 239 results from the GEMS/Food database for samples collected and/or analyzed between 2009 and 2013. Consistent with CODEX STAN 296-2009, the dataset includes products described as jams, preserves, jellies, and fruit spreads. Marmalades were not included, since the Committee agreed in 2014 to limit the scope of the ML for lead to jams and jellies and not to include marmalades[14]. 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 jams and jellies. Table JJ-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table JJ-2 shows the mean and maximum lead levels associated with the dataset. Table JJ-3 shows the percentage of jams and jellies samples meeting current and hypothetical MLs.

33. For jams and jellies, 100 percent of the samples in the 2016 dataset met the current Codex ML of 1 mg/kg (Table JJ-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 98 percent of samples may meet a hypothetical ML of 0.02 mg/kg. Thus, lowering the ML to the hypothetical level of 0.05 mg/kg would eliminate 1 percent of the samples in international trade and lowering the ML to 0.02 mg/kg would eliminate 3 percent of the samples in international trade.

34. CCCF recently reduced the MLs for lead in canned fruits (other than canned berries and other small fruits) from 1 mg/kg to 0.1 mg/kg. The ML for fresh fruits (other than cranberry, currant, and elderberry) was also affirmed recently at 0.1 mg/kg[15]. Given these recently established/affirmed MLs, it may be preferable to reduce the jam MLs from 1 mg/kg to 0.1 mg/kg, rather than to a lower number (e.g., 0.02 mg/kg). Also, the vast majority of samples in the jams and jellies analysis came from one country (Canada), so it would be preferable to have data on jams and jellies from more diverse regions before lowering the MLs further than corresponding MLs for fresh fruit and canned fruit (other than fruits and berries). Based on these considerations, the EWG recommends lowering the ML to 0.1 mg/kg. The EWG also recommends that CCCF should reconsider whether marmalades should be included in this category.

35. **Mango chutney**. The 2016 mango chutney raw dataset consisted of 4 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2012, with three samples from China (Hong Kong) and 1 from Europe. The reported LOQs ranged from 0.05 to 0.1 mg/kg and all of the samples were non-detects. The EWG does not recommend changing the ML based on this limited number of samples, which is below the approximately 20 sample minimum tentatively identified in paragraph 16. The EWG considered whether mango chutneys could be grouped with jams (fruit preserves) and jellies, in lieu of maintaining a separate standard for mango chutney. Commenters generally supported combining these products, on the grounds that they have similar fruit contents[16] and the fruits are likely to be the significant contributor to lead exposure, although one commenter also pointed out that there are separate commodity standards for mango chutney and jams/jellies. Therefore, the EWG recommends that the Committee postpone a decision on mango chutney to 2017, to allow time for new data on mango chutney to be submitted, but that if insufficient data are available to consider mango chutney as a unique category in 2017, that the Committee consider combining mango chutney with jams and jellies in the GSCTFF.

[14] REP14/CF, para. 90. However, inclusion of 36 marmalade samples with the jams and jellies did not change the results.
[15] CX/CF 14/8/5
[16] Mango chutney, not less than 40 percent mango fruit (CODEX STAN 160-1987); jams and jellies, not less than 45 percent fruit ingredients with the exception of certain jams and jellies, including mango jams and jellies (not less than 35 percent) (CODEX STAN 296-2009).

36. **Canned chestnuts and canned chestnuts puree**. The 2016 canned chestnuts raw dataset consisted of 11 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2012. Consistent with CODEX STAN 145-1985, the dataset includes products described as canned chestnuts, chestnut creams, and chestnut 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 chestnuts. Table CC-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table CC-2 shows the mean and maximum lead levels associated with the dataset. Table CC-3 shows the percentage of canned chestnuts samples meeting current and hypothetical MLs.

37. For canned chestnuts, 100 percent of the samples in the 2016 dataset met the current Codex ML of 1 mg/kg (Table CC-3). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg, 0.05 mg/kg, or 0.02 mg/kg.

38. The EWG notes that the chestnuts dataset contains a limited number of samples (11), below the approximately 20 sample minimum tentatively identified in paragraph 15. Based on these considerations, the EWG recommends postponing a decision on canned chestnuts to 2017 to allow time for new data on canned chestnuts to be submitted, but that if insufficient data are available to consider canned chestnuts as a unique category in 2017, that the Committee consider combining canned chestnuts with canned fruits in the GSCTFF.

39. **Pickled cucumbers (cucumber pickles)**. The 2016 pickled cucumbers raw dataset consisted of 79 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2014. Consistent with CODEX STAN 115-1981, the dataset includes products described as cucumber pickles, canned cucumber pickles (with or without dill), and gherkins. Samples that appeared to be raw, preserved, or cooked (but non-pickled) 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 pickled cucumbers. Table PC-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table PC-2 shows the mean and maximum lead levels associated with the dataset. Table PC-3 shows the percentage of pickled cucumber samples meeting current and hypothetical MLs.

40. For pickled cucumbers, 100 percent of the samples in the 2016 dataset met the current Codex ML of 1 mg/kg (Table PC-3). This table also indicates that 100 percent of samples may meet a hypothetical ML of 0.1 mg/kg, and 95 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 5 percent of the samples in international trade. Based on these results and the approach described in paragraph 14 of generally recommending reductions in MLs when the percentage of excluded samples is less than 5 percent, the EWG recommends lowering the ML for lead in pickled cucumbers to 0.1 mg/kg.

41. **Preserved tomatoes**. The 2016 preserved tomatoes raw dataset consisted of 82 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2013. 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. 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 preserved tomatoes. Table PT-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table PT-2 shows the mean and maximum lead levels associated with the dataset. Table PT-3 shows the percentage of preserved tomatoes samples meeting current and hypothetical MLs.

42. For preserved tomatoes, 100 percent of the samples in the 2016 dataset met the current Codex 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 or 0.05 mg/kg, and 99 percent of samples may meet a hypothetical ML of 0.02 mg/kg. Thus, lowering the ML to the hypothetical level of 0.02 mg/kg would eliminate 1 percent of the samples in international trade. Although a lower level than 0.05 mg/kg appears feasible, it may be preferable to reduce the ML for preserved tomatoes from 1 mg/kg to 0.05 mg/kg, given the recently established ML of 0.05 mg/kg for fruiting vegetables. The EWG recommends lowering the ML for lead in preserved tomatoes to 0.05 mg/kg.

43. The GSCTFF entry for preserved tomatoes includes a note stating that "in order to consider the concentration of the product, the determination of the maximum levels for contaminants shall take into account the natural total soluble solids, the reference value being 4.5 for fresh fruit." Therefore, when analyzing preserved tomatoes for lead, national authorities may compare the measured lead levels to an adjusted ML, i.e., [(proposed ML of 0.05 mg/kg in the GSCTFF) X ((natural total soluble solids in the concentrate/natural total soluble solids in fresh fruit (4.5))].

44. **Processed tomato concentrates**. The 2016 processed tomato concentrates raw dataset consisted of 21 results from the GEMS/Food database for samples collected and/or analyzed between 2006 and 2015. Consistent with CODEX STAN 57-1981, the dataset includes products described as tomato pastes and puree. No results exceeded the current Codex standard of 1.5 mg/kg and no LOQs associated with the results exceeded 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) shows the breakdown by country of the 2016 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 concentrate samples meeting current and hypothetical MLs.

45. For tomato concentrates, 100 percent of the samples in the 2016 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, 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. Thus, lowering the ML to the hypothetical level of 0.05 mg/kg would eliminate 1 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.02 mg/kg would eliminate 4 percent of the samples in international trade. Although a lower level than 0.05 mg/kg appears feasible, it may be preferable to reduce the ML for tomato concentrates from 1 mg/kg to 0.05 mg/kg, given the recently established ML of 0.05 mg/kg for fruiting vegetables (including tomatoes). The EWG recommends lowering the ML for lead in processed tomato concentrates to 0.05 mg/kg.

46. The GSCTFF entry for processed tomato concentrates includes a note stating that "in order to consider the concentration of the product, the determination of the maximum levels for contaminants shall take into account the natural total soluble solids, the reference value being 4.5 for fresh fruit." Therefore, when analyzing tomato concentrates for lead, national authorities may compare the measured lead levels to an adjusted ML, i.e., [(proposed ML of 0.05 mg/kg in the GSCTFF) X ((natural total soluble solids in the concentrate[17]/natural total soluble solids in fresh fruit (4.5))].

47. **Table olives**. The 2016 table olives raw dataset consisted of 82 results from the GEMS/Food database for samples collected and/or analyzed between 2000 and 2013. Consistent with CODEX STAN 66-1981, the dataset includes black olives, green olives, whole olives, cut olives, stuffed olives, etc., but excludes raw (unprocessed) olives. No LOQs associated with the results exceeded 1 mg/kg. Therefore, no further exclusions were made and there is only one dataset for table olives. Table TO-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table TO-2 shows the mean and maximum lead levels associated with the dataset. Table TO-3 shows the percentage of table olives samples meeting current and hypothetical MLs.

48. For table olives, 100 percent of the samples in the 2016 dataset met the current Codex ML of 1 mg/kg (Table TO-3). This table also indicates that 95 percent of samples may meet a hypothetical ML of 0.3 mg/kg, 93 percent of samples may meet a hypothetical ML of 0.2 mg/kg, and 90 percent of samples may meet a hypothetical ML of 0.1 mg/kg. Thus, lowering the ML to the hypothetical level of 0.4 mg/kg would eliminate 0 percent of the samples in international trade, lowering the ML to the hypothetical level of 0.3 mg/kg would eliminate 5 percent of the samples in international trade, and lowering the ML to 0.2 mg/kg would eliminate 7 percent of the samples in international trade. Based on these results and the approach described in paragraph 14 of generally recommending reductions in MLs when the percentage of excluded samples is less than 5 percent, the EWG recommends lowering the ML from 1 mg/kg to 0.4 mg/kg.

49. It seemed surprising that table olives had a recommended ML greater than the MLs established for fruit and canned fruit (0.1 mg/kg) in 2015. Therefore, we looked more closely at the table olives data. Seven of the samples were from Singapore, with reported lead values ranging from 0.19 mg/kg to 0.37 mg/kg. Of the remaining 75 samples, all were below 0.06 mg/kg, with the exception of one sample from China at 0.2 mg/kg. The EWG recommends reevaluating table olives in the future when more data are available to help determine if the Singaporean data are an anomaly and the ML should be lowered further.

[17] CODEX STAN 57-1981 states that tomato puree should contain no less than 7%, but less than 24% of natural total soluble solids, and tomato paste should contain at least 24% of natural total soluble solids.

50. **Fungi and mushrooms**. The current version of the GSCTFF (CODEX STAN 193-1995, 2015 amendment) excludes fungi and mushrooms from the 0.05 mg/kg standard for lead in fruiting vegetables. The previous version (2011 amendment) excluded mushrooms, but not fungi. In 2014-2015, 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.

51. The 2016 fungi and mushroom raw dataset consisted of 601 results from the GEMS/Food database for samples collected and/or analyzed between 1998 and 2015. 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 dataset[18] because there was no existing ML, and therefore there is only one dataset for fungi. Table FM-1 (in Appendix I) shows the breakdown by country of the 2016 raw dataset. Table FM-2 shows the mean and maximum lead levels associated with the dataset. Table FM-3 shows the percentage of fungi and mushroom samples meeting current and hypothetical MLs.

52. For fresh fungi and mushrooms, 99 percent of the samples in the 2016 dataset may meet a hypothetical ML of 0.5 mg/kg, 97 percent of samples may meet a hypothetical ML of 0.4 or 0.3 mg/kg, and 92 percent of samples may meet a hypothetical ML of 0.2 mg/kg. Thus, lowering the ML to the hypothetical level of 0.3 mg/kg would eliminate 3 percent of the samples in international trade and lowering the ML to the hypothetical level of 0.2 mg/kg would eliminate 8 percent of the samples in international trade. The EWG recommends that the Committee consider establishing an ML for lead in fungi and mushrooms (excluding dried fungi and mushroom and fungus products) of 0.3 mg/kg.

ADDITIONAL TOPICS

53. As noted above, the EWG tentatively identified approximately 20 samples as a minimum number of samples for proposing a revised ML for this year's work. The majority of commenters did not object to this approach. The EU noted that they normally use 60 samples/data point as a basis for further calculations. Japan stated that it considered 20 samples is too few to propose an ML with a high level of statistical confidence and that the number of samples to be taken may be calculated using a statistical approach on a sample by sample basis. The Committee may want to consider whether further discussion is necessary to identify an acceptable minimum number of samples for revising an ML. If the Committee does decide to discuss this issue further, the Committee should also consider that (1) the lead ML work is not establishing new MLs *de novo*, but reviewing occurrence data to propose lowering existing outdated MLs and (2) that some lead MLs in the GSCTFF are for very restricted commodity categories, for which limited data appear to be available.

54. For canned berries and other small fruits, the European Union supported the proposed approach, but pointed out that the proposed ML of 0.1 mg/kg does not align with the ML of 0.2 mg/kg for fresh cranberries, currants, and elderberries. However, we note that the recommended ML of 0.1 mg/kg does align with the standard for other canned fruits.

55. For canned berries and small fruits and for canned leafy vegetables, Japan did not object to the proposed recommendations but also noted that it would be preferable to conduct a test of statistical significance comparing canned fruits with canned berries and canned vegetables with canned leafy vegetables and to recommend additional data collection if tests show that the populations of data are significantly different.

[18] The highest reported LOQ for fresh fungi was 0.6 mg/kg.

SUMMARY AND RECOMMENDATIONS

56. In summary, reanalysis of selected foods supports lowering the MLs for lead for some foods, and postponing the decision on other foods until 2017. The EWG makes the following recommendations.

1. **Juices and nectars from berries and other small fruits**: Postpone the decision on juices and nectars from berries and other small fruits to allow submission of new data; consider MLs of 0.03 mg/kg and 0.04 mg/kg in 2017.
2. **Passion fruit juice and nectar**: Consider including in the fruit juices category with an ML of 0.03 mg/kg.
3. **Canned berries and other small fruits**: Consider including in the canned fruits category with an ML of 0.1 mg/kg. Revoke the standards in the GSCTFF for canned raspberries and canned strawberries.
4. **Canned leafy vegetables**: Consider including in the canned vegetables category with an ML of 0.1 mg/kg.
5. **Canned legume vegetables**: Consider including in the canned vegetables category with an ML of 0.1 mg/kg. Revoke the standards in the GSCTFF for canned green beans and canned wax beans and canned green peas.
6. **Canned brassica vegetables**: Maintain the note in the GSCTFF excluding canned brassica vegetables from the ML for canned vegetables, pending new data.
7. **Jams (fruit preserves) and jellies**: Consider lowering the ML from 1 mg/kg to 0.1 mg/kg. Reconsider whether marmalades should be included in this category.
8. **Mango chutney**: Maintain the current ML of 1.0 mg/kg, pending new data. If insufficient data are available to consider mango chutney as a unique category in 2017, combine mango chutney with jams and jellies in the GSCTFF.
9. **Canned chestnuts and chestnut puree**: Maintain the current ML of 1 mg/kg, pending new data. If insufficient data are available to consider canned chestnuts and chestnut puree as a unique category in 2017, combine canned chestnuts and chestnut puree with canned fruits in the GSCTFF.
10. **Pickled cucumbers (cucumber pickles)**: Consider lowering the ML from 1 mg/kg to 0.1 mg/kg.
11. **Preserved tomatoes**: Consider lowering the ML from 1 mg/kg to 0.05 mg/kg.
12. **Processed tomato concentrates**: Consider lowering the ML from 1.5 mg/kg to 0.05 mg/kg.
13. **Table olives**: Consider lowering the ML from 1 mg/kg to 0.4 mg/kg**.** Reevaluate table olives in the future when more data are available.
14. **Fresh fungi and mushrooms**: Consider establishing an ML of 0.3 mg/kg.
15. Consider whether further discussion is necessary to identify an acceptable minimum number of samples for revising an ML.

Appendix I

Tables[19]

Table BF-1: Juices and nectars from berries and other small fruits: Data contribution by country to 2016 raw dataset

Country	Number of samples
Austria	45
Belgium	4
Canada	160
China	2
Denmark	2
France	10
Germany	26
Hungary	2
India	3
Italy	338
Poland	2
Romania	17
Singapore	9
Slovakia	2
Spain	1
Thailand	17
USA	156
Grand Total	**796**

[19] Some countries submitted aggregated data corresponding to single analytical results obtained by pooling several individual samples. For the LOQ-limited/final datasets, 187 aggregated samples remained from 2184 total samples. Of the aggregated samples, 140 were in the fungus category (601 samples total). By definition, pooling samples decreases the apparent variability; however, for the current analysis it is unlikely that the pooled samples have a significant impact.

Table BF-2: Juices and nectars from berries and other small fruits: Data contribution by country to 2016 LOQ-limited dataset

Country	Number of samples
Austria	12
Belgium	4
Canada	152
China	2
Denmark	2
France	6
Germany	2
Hungary	1
India	2
Italy	292
Poland	2
Romania	10
Slovakia	1
Thailand	17
USA	153
Grand Total	**658**

Table BF-3: Juices and nectars from berries and other small fruits: Mean and maximum for all 2016 datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.010	0.206
LOQ-limited dataset	0.008	0.206

Table BF-4: Percentage of samples of juices and nectars from berries and other small fruits meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
0.05	98%
0.04*	98%
0.03	97%
0.02	88%

*Hypothetical MLs shown in italics

Table BF-5: Juices from berries and other small fruits: Data contribution by type of fruit to 2016 LOQ-limited dataset

Type of fruit	Number of samples (percent of total samples)	Percent of samples ≤ 0.03 mg/kg
Blackberry	2 (0.3%)	100%
Blueberry	18 (2.7%)	94.4%
Chokeberry	1 (0.2%)	100%
Cranberry	29 (4.4%)	100%
Currant	19 (2.9%)	94.7%
Elderberry	1 (0.2%)	100%
Fieldberry	3 (0.5%)	100%
Grape	497 (75.5%)	96.4%
Mix	69 (10.5%)	98.6%
Mulberry	1 (0.2%)	100%
Raspberry	8 (1.2%)	100%
Strawberry	6 (0.9%)	100%
Wildberry	3 (0.5%)	100%
Youngberry	1 (0.2%)	100%
Grand Total	**658**	**-----**

Table PF-1: Passion fruit juice and nectars: Data contribution by country to 2016 raw dataset

Country	Number of samples
Belgium	1
Brazil	238
Canada	15
Italy	1
Thailand	2
USA	9
Grand Total	**266**

Table PF-2: Passion fruit juice and nectars: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.013	0.375

Table PF-3: Percentage of passion fruit juice and nectars samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
0.05	95%
0.04*	95%
0.03	91%
0.02	87%

*Hypothetical MLs shown in italics

Table CB-1: Canned berries and other small fruits: Data contribution by country to 2016 raw dataset

Country	Number of samples
China	11
Italy	13
Japan	2
USA	1
Grand Total	**27**

Table CB-2: Canned berries and other small fruits: Data contribution by country to 2016 LOQ-limited dataset

Country	Number of samples
China	11
Italy	10
Japan	2
USA	1
Grand Total	**24**

Table CB-3: Canned berries and other small fruits: Mean and maximum for all 2016 datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.007	0.066
LOQ-limited dataset	0.004	0.066

Table CB-4: Percentage of canned berries and other small fruits samples meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	98%
0.02	95%

*Hypothetical MLs shown in italics

Table LV-1: Canned leafy vegetables: Data contribution by country to 2016 raw dataset

Country	Number of samples
Canada	5
Italy	17
Thailand	4
USA	3
Grand Total	**29**

Table LV-2: Canned leafy vegetables: Data contribution by country to 2016 LOQ-limited dataset

Country	Number of samples
Canada	5
Italy	7
Thailand	4
USA	3
Grand Total	**19**

Table LV-3: Canned leafy vegetables: Mean and maximum for all 2016 datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.019	0.09
LOQ-limited dataset	0.019	0.09

Table LV-4: Percentage of canned leafy vegetables samples meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	83%
0.02	75%

*Hypothetical MLs shown in italics

Table VP-1: Canned legume vegetables: Data contribution by country to 2016 raw dataset

Country	Number of samples
Australia	9
Canada	1
China	21
Japan	2
Poland	26
Thailand	4
USA	41
Grand Total	**104**

Table VP-2: Canned legume vegetables: Data contribution by country to 2016 LOQ-limited dataset

Country	Number of samples
Australia	9
Canada	1
China	21
Japan	2
Poland	15
Thailand	4
USA	41
Grand Total	**93**

Table VP-3: Canned legume vegetables: Mean and maximum for all 2016 datasets

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.002	0.05
LOQ-limited dataset	0.001	0.05

Table VP-4: Percentage of canned legume vegetables samples meeting current and hypothetical MLs: LOQ-limited dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	100%
0.02	98%

*Hypothetical MLs shown in italics

Table JJ-1: Jams and jellies: Data contribution by country to 2016 raw dataset

Country	Number of samples
Canada	223
New Zealand	8
USA	8
Grand Total	**239**

Table JJ-2: Jams and jellies: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.003	0.106

Table JJ-3: Percentage of jams and jellies samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	99%
0.02	98%
0.01	92%

*Hypothetical MLs shown in italics

Table CC-1: Canned chestnuts and canned chestnuts purees: Data contribution by country to 2016 raw dataset

Country	Number of samples
Canada	1
Europe	1
China	7
Thailand	2
Grand Total	**11**

Table CC-2: Canned chestnuts and canned chestnuts purees: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.003	0.02

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)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	100%
0.02	100%

*Hypothetical MLs shown in italics

Table PC-1: Pickled cucumbers: Data contribution by country to 2016 raw dataset

Country	Number of samples
Canada	2
China	5
Europe	20
USA	52
Grand Total	**79**

Table PC-2: Pickled cucumbers: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.016	0.09

Table PC-3: Percentage of pickled cucumber samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	95%
0.02	77%

*Hypothetical MLs shown in italics

Table PT-1: Preserved tomatoes: Data contribution by country to 2016 raw dataset

Country	Number of samples
Australia	4
Canada	21
China	10
Japan	34
USA	13
Grand Total	**82**

Table PT-2: Preserved tomatoes: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.003	0.02

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

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.1*	100%
0.05	100%
0.02	99%

*Hypothetical MLs shown in italics

Table TC-1: Tomato concentrates: Data contribution by country to 2016 raw dataset

Country	Number of samples
Argentina	1
Canada	1
China	1
Europe	15
Singapore	3
Grand Total	**21**

Table TC-2: Processed tomato concentrates: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.004	0.06

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

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1.5	100%
0.1*	100%
0.05	99%
0.02	96%

*Hypothetical MLs shown in italics

Table TO-1: Table olives: Data contribution by country to 2016 raw dataset

Country	Number of samples
Canada	10
China	9
France	3
Singapore	7
USA	53
Grand Total	**82**

Table TO-2: Table olives: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.035	0.37

Table TO-3: Percentage of table olives samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
1	100%
0.4*	100%
0.3	95%
0.2	93%
0.1	90%

*Hypothetical MLs shown in italics

Table FM-1: Fungi and mushrooms: Data contribution by country to 2016 raw dataset

Country	Number of samples
Australia	50
Canada	57
Europe	113
France	6
India	11
Japan	147
New Zealand	9
Singapore	147
Slovakia	8
Thailand	1
USA	52
Grand Total	**601**

Table FM-2: Fungi and mushrooms: Mean and maximum for 2016 raw dataset

Dataset	Mean (mg/kg)	Maximum (mg/kg)
Raw dataset	0.057	4.07

Table FM-3: Percentage of fungi and mushroom samples meeting current and hypothetical MLs: Raw dataset

Current and hypothetical MLs (mg/kg)	Percentage of samples ≤ MLs
0.5*	99%
0.4	97%
0.3	97%
0.2	92%
0.1	86%

*Hypothetical MLs shown in italics

Appendix II

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