CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - Fax: (+39) 06 5705 4593 - E-mail: codex@fao.org - www.codexalimentarius.net

Agenda Item 9(b)

CX/CF 12/6/13
December 2011

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

Sixth Session
Maastricht, The Netherlands, 26 – 30 March 2012

DISCUSSION PAPER ON MAXIMUM LEVELS FOR LEAD IN VARIOUS FOODS IN THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED AND THE RELATED CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF LEAD CONTAMINATION IN FOODS AND THE CODE OF PRACTICE FOR SOURCE DIRECTED MEASURES TO REDUCE CONTAMINATION OF FOODS WITH CHEMICALS

BACKGROUND

1. The 5th Session of the Codex Committee on Contaminants in Foods, held in The Hague, the Netherlands, from March 21 to March 25, 2011, agreed to establish an electronic Working Group (WG) led by the United States to consider maximum levels for lead in various foods in the General Standard for Contaminants and Toxins in Food and Feed and the related Code of Practice for the Prevention and Reduction of Lead Contamination in Foods and the Code of Practice for Source Directed Measures to Reduce Contamination of Foods with Chemicals. The WG was asked to (i) reconsider existing maximum levels (MLs) for lead with a focus on foods important for infants and children and also on canned fruits and vegetables and (ii) reconsider if other existing maximum levels should be addressed.

2. The United States prepared the draft, with comments from Argentina, Australia, Austria, Brazil, China, the European Union, the Food and Agriculture Organization of the United Nations, the International Council of Beverages Associations, the International Organisation of Vine and Wine (OIV), New Zealand, and the United Kingdom. A list of countries and NGOs that joined the EWG can be found in Appendix 1.

JECFA EVALUATION

3. At its 73rd meeting, at the request of CCCF, the Joint FAO/WHO Expert Committee on Food Additives (JECFA) conducted a new toxicological evaluation of lead in food. In the evaluation[1], 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, fetuses, infants and children are the subgroups that are most sensitive to lead.

4. JECFA estimated that the previously established provisional tolerable weekly intake (PTWI) of 25 µg/kg bw is associated with a decrease of at least 3 intelligence quotient (IQ) points in children and an increase in systolic blood pressure of approximately 3 mmHg (0.4 kPa) in adults. The Committee therefore concluded that this PTWI could no longer be considered health protective, and it was withdrawn. Because dose–response analyses do not indicate a threshold for neurodevelopmental and blood pressure effects, JECFA concluded that it was not possible to establish a new PTWI that would be considered to be health protective.

5. 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.

6. Given JECFA's conclusions, CCCF agreed to consider MLs for lead in various foods in the GSCTFF and the related Code of Practice for the Prevention and Reduction of Lead Contamination in Foods and the Code of Practice for Source Directed Measures to Reduce Contamination of Foods with Chemicals.

---

1 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.

INTRODUCTION

7. The aim of this document is to provide recommendations on which of the existing Codex MLs for lead should be reevaluated. Recommendation of revised ML values or new MLs is outside the terms of reference of this document.

8. The MLs for lead in the GSCTFF are reproduced in Table 1 (Annex 1). Table 2 (Annex 1) contains lead occurrence data from the JECFA evaluation.

9. The WG evaluated the MLs, in part, by comparing them with lead occurrence data from JECFA. For convenience, this information is summarized in Table 3 (Annex 1). Rather than evaluating each individual ML, the WG considered groups of similar foods with similar MLs (e.g., canned foods). In some cases, the WG also compared MLs to non-JECFA data, such as data from the U.S. Total Diet Study (TDS)[2] or from the Australia Total Diet Survey (TDS). Individual country data were used only as one factor to help identify MLs suitable for reevaluation. The WG acknowledges that more global data will be needed to determine whether lower MLs are appropriate and achievable.

10. In most cases, the WG recommended reevaluating MLs when the JECFA mean or range of means fell below the Codex MLs. The WG also considered whether children were high consumers of the food or had significant lead exposure from the food, since lead is of particular concern for children.

11. For historical purposes, the WG notes that a series of papers[3] reviewing maximum levels for lead have been considered previously by CCFAC/CCCF.

COMPARISON OF MAXIMUM LEVELS FOR LEAD IN THE GSCTFF WITH OCCURRENCE DATA ON LEAD IN FOOD

12. Fruit (Table 3, line A). The JECFA weighted mean lead concentration for fruits is lower than the Codex MLs of 0.1 to 0.2 mg/kg for assorted raw fruits, but the JECFA range of national mean concentrations overlaps the Codex MLs. However, it is worth noting that for corresponding foods from U.S. TDS and Australian TDS data[4], the means were much lower, suggesting lower levels are achievable for at least some countries. Where the range of means overlaps Codex MLs, the WG has mostly recommended against reevaluating MLs. However, a number of WG members recommended reevaluating the MLs for fruit, in spite of overlap, for the following reasons:

    a. At least some fruits covered by the standard are used to make fruit juice, which is also recommended for reevaluation [see paragraph 17].

    b. Fruit was a major contributor to lead dietary exposure in children in the latest Australian TDS,

    c. Children are high consumers of fruit.

13. Vegetables other than roots and tubers (Table 3, line B). The JECFA weighted mean and range of national means for "vegetables including juices" overlap the Codex MLs of 0.1 to 0.3 mg/kg for vegetables other than roots and tubers. Therefore, the WG recommends against reevaluating the MLs for vegetables other than roots and tubers. However, it is worth noting that for corresponding foods from the U.S. TDS and Australian TDS[5], the means were much lower, suggesting lower levels are achievable.

Pulses (Table 3, line C). The JECFA weighted mean, range of national means, and maximum value for "pulses and legumes" are well below the Codex ML of 0.2 mg/kg for pulses. Therefore, the WG recommends reevaluation of the ML for pulses.

14. Root and tuber vegetables (Table 3, line D). The JECFA weighted mean and range of national means for "roots and tubers" are well below the Codex ML of 0.1 mg/kg for root and tuber vegetables. Therefore, the WG recommends reevaluation of the ML for root and tuber vegetables.

---

2 U.S. TDS data in this paper comprise three years of monitoring, from 2006 to 2008, with 12 total samples for each food item (such as apples). There may be more than one TDS food item for each Codex category (e.g., Codex pome fruits corresponds to TDS apples and pears). These data represent a subset of the U.S. TDS data, covering 1999-2008, that were submitted to JECFA.

3 CX/FAC 00/24, CX/FAC 99/19, CX/FAC 95/18, CX/FAC 96/23.

4 From U.S. TDS data, for raw fruit categories that map to GSCTFF categories, the mean is 0.0008 mg/kg and the maximum is 0.019 mg/kg. The TDS raw fruit category is comprised of banana, avocado (assorted subtropical fruits, inedible peel); strawberries, grapes (berries and other small fruits); orange, grapefruit (citrus fruit); apple, pear (pome fruits); and peach (stone fruits). From the Australia TDS, the mean for "fruit" overall (i.e., not mapped to GSCTFF categories) is 0.0015 mg/kg and the maximum is 0.007 mg/kg. The Australian TDS data are from food and beverage samples sampled during January/February and June/July 2008 and reported in November 2011.

5 Brassica vegetables, 48 samples, ND (LOQ = 0.03 mg/kg); bulb vegetables, 12 samples, 0.014 mg/kg maximum; fruiting vegetables, Cucurbits (raw), 36 samples, 0.01 mg/kg maximum; fruiting vegetables, other than Cucurbits (raw), 36 samples, 0.007 mg/kg; leafy vegetables (raw), 24 samples, 0.014; and legume vegetables (cooked), 72 samples, ND (LOQ ≤ 0.04 mg/kg). From the Australia TDS, the mean for vegetables other than roots and tubers is 0.003 mg/kg and the maximum is 0.031 mg/kg (see footnote 4 for more information on the Australia TDS).

15. Canned fruits, canned vegetables, canned chestnuts and chestnut puree, and jams, jellies, mango chutney, table olives, and pickled cucumbers (Table 3, line E). The Codex ML for this group of products, primarily canned products, is 1.0 mg/kg, with the exception of canned tomato concentrates, for which the ML is 1.5 mg/kg. Most of these standards were adopted in 1981, with the exception of the standards for canned palmito and canned mango/mango chutney, which were adopted in 1985 and 1987, respectively. The early 1980s were a period of transition from the use of lead solder in cans. The higher MLs for these products than for noncanned fruits and vegetables presumably reflect the potential use of lead-soldered cans. Considering when these MLs were established and subsequent efforts to reduce use of lead soldered cans, the WG strongly recommends reevaluation of these MLs. Furthermore, the WG recommends that CCCF consider establishing one ML or a more limited number of MLs for canned fruits and vegetable products.

16. Fruit juices (Table 3, line F). The JECFA weighted mean and range of national means for fruit juices overlap the Codex ML of 0.05 mg/kg for fruit juices, suggesting that the ML should not be reevaluated. However, data from the U.S. TDS suggest lower levels are achievable; e.g., for the 119 fruit juice samples analyzed from 2006-2008, the mean and maximum lead levels were 0.0035 mg/kg and 0.029 mg/kg, respectively. Also, children are high consumers of fruit juices, and are among the populations most sensitive to the effects of lead. Therefore, the WG considered whether lowering the ML for lead in fruit juice would be more protective of children. Lead exposure from fruit juice was modeled using dietary intake data from the U.S. NHANES survey and either lead data from the U.S. TDS or the Codex ML as the basis for the lead exposure estimate[6]. Based on U.S. TDS data, the estimated mean and 90th percentile exposures to lead from fruit juice for children aged 1-4 years were 0.60 and 1.48 µg/person/day. Based on the Codex ML, the estimated mean and 90th percentile exposures were 12.0 and 24.9 µg/person/day. Thus, an exposure model based on the Codex ML allows for a mean exposure 20 times higher than a model based on current occurrence data. Given the achievability of lower levels and the potential effects of lead on children, the WG strongly recommends reexamination of the Codex ML for lead in fruit juice.

17. Cereal grains except buckwheat, cañihua and quinoa (Table 3, line G). The JECFA weighted mean and range of national means for "cereals/grains not included elsewhere and mixed grains" are well below the Codex ML of 0.2 mg/kg for cereal grains. Therefore, the WG recommends reevaluating the ML for cereal grains.

18. Meat of cattle, pigs, sheep, and poultry (Table 3, line H). The JECFA weighted means and ranges of national means for muscle meat excluding poultry, muscle poultry, muscle meat and poultry combined, and meat not included elsewhere range from twofold less to more than the Codex MLs for meat of cattle, pigs, sheep, and poultry of 0.1 mg/kg. Therefore, the WG recommends against reevaluating the MLs for meats.

19. Edible offal of cattle, pig, and poultry (Table 3, line I). The JECFA weighted means and ranges of national means for organ meats except kidney, for kidney, and for offal are lower than the Codex MLs of 0.5 mg/kg for edible offal of cattle, pigs, and poultry. Therefore, the WG recommends reevaluating the MLs for edible offal.

20. Fats, oils, and spreads (Table 3, line J). The JECFA weighted means and ranges of national means for animal fats and for vegetable oils and fats are below the Codex MLs of 0.1 mg/kg for assorted fats, oils, and spreads. Therefore, the WG concludes that the MLs for fats, oils, and spreads be reevaluated.

21. Fish (Table 3, line K). The JECFA weighted means and ranges of national means for the categories of all seafood (EFSA only), finfish, and shellfish are below the Codex ML of 0.3 mg/kg for fish. Therefore, the WG concludes that the ML for fish be reevaluated.

22. Milks and secondary milk products (Table 3, line L). The JECFA weighted mean and range of national means for "dairy products" are below the Codex MLs of 0.02 mg/kg for milk and secondary milk products, suggesting that lower MLs for milks and milk products are feasible. The ML for milk of 0.02 mg/kg was set based on detection limits for available methods of analysis, despite the achievability of lower lead levels[7]. However, current methods using inductively coupled plasma mass spectrometry (ICP-MS) can achieve limits of quantitation for lead of 0.003 to 0.01 mg/kg in milk. Because children are often high consumers of milk, the WG considered whether a lower ML for lead in milk would be more protective of children. Lead exposure from milk was modeled using dietary intake data from the U.S. NHANES survey and either lead measurements from the U.S. TDS or the Codex ML as the basis for the lead exposure estimate[8]. Based on U.S. TDS data, the estimated mean and 90th percentile exposures to lead from milk for children aged 1-4 years were 0.15 and 0.43 µg/person/day. Based on the Codex ML, the estimated mean and 90th percentile exposures were 8.9 and 16.4 µg/person/day. Thus, an exposure model based on the Codex ML allows for a mean exposure almost 60 times higher than a model based on current occurrence data. Given the apparent achievability of lower lead levels in milk, the availability of analytical methods with lower detection limits, and the potential effects of lead on children, the WG strongly recommends reevaluation of the Codex ML for lead in milk, as well as reevaluation of the related ML for secondary milk products.

---

6 Estimates of lead intake based on results from the 2003-08 U.S. NHANES (distribution of consumption for eaters only reported over 2 days) and either mean lead levels (ND=0) from the 2006-08 TDS or the current Codex ML.

7 CX/FAC 03/27 (comment of Denmark).

8 Estimates of lead intake based on results from the 2003-08 U.S. NHANES (distribution of consumption for eaters only reported over 2 days) and either mean lead levels (ND=0) from the 2006-08 TDS or the current Codex ML.

23. Natural mineral water (Table 3, line M). JECFA did not include mean or maximum values for lead in natural mineral water in its evaluation. Natural mineral water is included in the category "Miscellaneous," which also includes beverages, food supplements, infant formula, tap water and other foods for special dietary purposes. However, JECFA noted that within the "Miscellaneous" category, the highest reported concentrations generally were for foods for special dietary uses and not for beverages. The Codex ML for lead in natural mineral water of 0.010 mg/kg is consistent with the 0.010 mg/kg provisional guideline value for drinking water in the WHO Guidelines for Drinking-water Quality, 4th Ed. Therefore, the WG recommends against reevaluating the ML for natural mineral waters.

24. Infant formula (Table 3, line N). JECFA did not include mean or maximum values for lead in infant formula in its evaluation. (Infant formula is included in the category "Miscellaneous.") The Codex ML for ready to use formula is 0.02 mg/kg. The ML was adopted in 2001, and maintained when the Codex Standard for Infant Formula and Formulas for Special Medical Purposes Intended for Infants (CODEX STAN 72-1981) was revised in 2007. Because JECFA data were not available, the WG considered U.S. TDS data on infant formulas. The mean for infant formula (ready to use) was 0.0004 mg/kg and the maximum value was 0.01 mg/kg[9], suggesting that lower MLs would be achievable. As with milk, it appears that current methods using inductively coupled plasma mass spectrometry (ICP-MS) can achieve limits of quantitation for lead of 0.003 to 0.01 mg/kg in ready to use infant formula. Because infant formula (or breast milk) is the main source of nutrition for infants in their first year of life, the WG considered whether a lower ML for lead in infant formula would be more protective of children. Lead exposure from infant formula was modeled using dietary intake data from the U.S. NHANES survey and either lead measurements from the U.S. TDS or the Codex ML as the basis for the lead exposure estimate[10]. Based on U.S. TDS data, the estimated mean and 90th percentile exposures to lead from milk for children aged 1-4 years were 0.12 and 0.49 µg/person/day. Based on the Codex ML, the estimated mean and 90th percentile exposures were 15.1 and 23.4 µg/person/day. Thus, an exposure model based on the Codex ML allows for a mean exposure 125 times higher than a model based on current occurrence data. Given the apparent achievability of lower lead levels in infant formula, the availability of analytical methods with lower detection limits, and the potential effects of lead on children, the WG strongly recommends reevaluation of the Codex ML for lead in infant formula.

25. Salt, food grade (Table 3, line O). JECFA did not include mean or maximum values for salt in its evaluation (Table 2). The Codex ML for salt is 2 mg/kg. There are at least some food products for which salt containing 2 mg/kg lead will result in unacceptably high lead levels in finished products. For example, certain Mexican-style, salt-based candy products consumed by children have been found to have finished lead levels above 0.5 mg/kg, due to high lead levels (up to 1.5 mg/kg) in the salt component[11]. The U.S. FDA recommends a maximum of 0.1 mg/kg lead in candy likely to be consumed frequently by small children. Because the 2 mg/kg level does not appear to be protective, at least in some food products, the WG recommends reevaluating the ML for lead in food grade salt.

26. Wine (Table 3, line P). JECFA did not identify exposure levels specifically from wine in its evaluation (Table 2). For the category "alcoholic beverages," the JECFA weighted mean and range of means are comparable to the Codex ML of 0.2 mg/kg for wine. More specific information on wine alone was obtained from the U.S. Alcohol and Tobacco Tax and Trade Bureau. For 321 wines produced worldwide and sampled from 2010-2011, the mean lead level was 0.025 mg/kg and the range of detectable values was 0.020 to 0.040 mg/kg (method LOD = 0.020 mg/kg). These data suggest that a lower ML for lead in wine may be achievable. In addition, the OIV has suggested that the Codex ML for lead in wine be lowered to 0.150 mg/kg, consistent with the OIV standard adopted in 2006. Therefore, the WG recommends reevaluating the ML for wine.

CODES OF PRACTICE

27. The WG did not identify any specific changes or corrections that would improve the Code of Practice for the Prevention and Reduction of Lead Contamination in Foods (CAC/RCP 56-2004) or the Code of Practice for Source Directed Measures to Reduce Contamination of Foods with Chemicals (CAC/RCP 49-2001). Therefore, the WG concluded that, at this time, there are no grounds for reevaluating the codes of practice.

OTHER FOODS

28. Several members of the WG also suggested consideration of new work on MLs for food supplements, game meat, and sugar. Proposal of new work is outside the terms of reference of this document, but the recommendations are noted here for the Committee's consideration.

---

9 2006-2008 data, 34 samples of ready to use formula. Lead was detected in two samples (0.004 mg/kg, 0.01 mg/kg), using a method with an LOD of 0.004 mg/kg (soy-based) or 0.005 mg/kg (milk-based) and an LOQ of 0.02 mg/kg. To calculate the mean, samples below the LOD were set to 0.

10 Estimates of lead intake based on results from the 2003-08 U.S. NHANES (distribution of consumption for eaters only reported over 2 days) and either mean lead levels (ND=0) from the 2006-08 TDS or the current Codex ML.

11 http://www.fda.gov/Food/FoodSafety/FoodContaminantsAdulteration/Metals/Lead/ucm172050.htm

SUMMARY AND RECOMMENDATIONS

29. In summary, the WG has considered the lead MLs in the GSCTFF. The WG makes the following recommendations:

    a. Do not reeevaluate the following MLs: vegetables other than roots and tubers; meat of cattle, pigs, sheep, and poultry; and natural mineral water.

    b. Reevaluate the following MLs: fruit, pulses, root and tuber vegetables, canned fruit and vegetable products; fruit juices; cereal grains except buckwheat, and cañihua and quinoa; edible offal of cattle, pigs, and poultry; assorted fats, oils, and spreads; fish; milk and secondary milk products; infant formula; wine; and food grade salt.

    c. Consolidate the MLs for canned fruit and vegetable products (Table 3, line E).

ANNEX 1

Table 1: Lead MLs from the GSCTFF, Codex Standard 193-1995

#	Commodity/ Product Code	Name	Level mg/kg	Reference	Notes/remarks
1	FT 0026	Assorted (sub)tropical fruits, edible peel	0.1		
2	FI 0030	Assorted (sub)tropical fruits, inedible peel	0.1		
3	FB 0018	Berries and other small fruits	0.2		
4	FC 0001	Citrus fruits	0.1		
5	FP 0009	Pome fruits	0.1		
6	FS 0012	Stone fruits	0.1		
7	VB 0040	Brassica vegetables	0.3		Excluding kale
8	VA 0035	Bulb vegetables	0.1		
9	VC 0045	Fruiting vegetables, Cucurbits	0.1		
10	VO 0050	Fruiting vegetables, other than Cucurbits	0.1		Excluding mushrooms
11	VL 0053	Leafy vegetables	0.3		Including Brassica leafy vegetables but excluding spinach.
12	VP 0060	Legume vegetables	0.2		
13	VD 0070	Pulses	0.2		
14	VR 0075	Root and tuber vegetables	0.1		Including peeled potatoes
15		Canned fruit cocktail	1	CS 78-1981	
16		Canned grapefruit	1	CS 15-1981	
17		Canned mandarin oranges	1	CS 68-1981	
18		Canned mangoes	1	CS 159-1987	
19		Canned pineapple	1	CS 42-1981	
20		Canned raspberries	1	CS 60-1981	
21		Canned strawberries	1	CS 62-1981	
22		Canned tropical fruit salad	1	CS 99-1981	
23		Jams (fruit preserves) and jellies	1	CS 79-1981	

#	Commodity/ Product Code	Name	Level mg/kg	Reference	Notes/remarks
24		Mango chutney	1	CS 160-1987	
25		Table olives	1	CS 66-1981	
26		Canned asparagus	1	CS 56-1981	
27		Canned carrots	1	CS 116-1981	
28		Canned green beans and canned wax beans	1	CS 16-1981	
29		Canned green peas	1	CS 58-1981	
30		Canned mature processed peas	1	CS 81-1981	
31		Canned mushrooms	1	CS 55-1981	
32		Canned palmito	1	CS 144-1985	
33		Canned sweet corn	1	CS 18-1981	
34		Canned tomatoes	1	CS 13-1981	
35		Pickled cucumbers	1	CS 115-1981	
36		Processed tomato concentrates	1.5	CS 57-1981	
37	JF 0175	Fruit juices	0.05		Including nectars; Ready to drink
38	GC 0081	Cereal grains, except buckwheat, cañihua and quinoa	0.2		
39		Canned chestnuts and canned chestnuts puree	1	CS 145-1985	
40	MM 0097	Meat of cattle, pigs and sheep	0.1		Also applies to the fat from meat
41	PM 0110	Poultry meat	0.1		
42	MO 0812	Cattle, Edible offal of	0.5		
43	MO 0818	Pig, Edible offal of	0.5		
44	PO 0111	Poultry, Edible offal of	0.5		
45		Edible fats and oils	0.1	CS 19-1981	Edible fats and oils not covered by individual standards
46		Fish	0.3		

#	Commodity/ Product Code	Name	Level mg/kg	Reference	Notes/remarks
47		Margarine	0.1	CS 32-1981	
48		Minarine	0.1	CS 135-1981	
49		Named animal fats	0.1	CS 211-1999	Lard, rendered pork fat, premier jus and edible tallow.
50	OR 0305	Olive oil, refined	0.1	CS 33-1981	
51	OC 0305	Olive oil, virgin	0.1	CS 33-1981	
52	OR 5330	Olive, residue oil	0.1	CS 33-1981	Olive pomace oil
53	PF 0111	Poultry fats	0.1		
54	OC 0172	Vegetable oils, Crude	0.1	CS 210-1999	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, saflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein and other oils but excluding cocoa butter.
55	OR 0172	Vegetable oils, Edible	0.1	CS 210-1999	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, saflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein and other oils but excluding cocoa butter.
56	ML 0106	Milks	0.02		
57	LS	Secondary milk products	0.02		
58		Natural mineral waters	0.01	CS 108-1981	
59		Infant formula	0.02		Ready to use
60		Salt, food grade	2	CS 150-1985	
61		Wine	0.2		

Table 2. Lead occurrence data from 73rd JECFA report

Food category	N	Weighted mean lead concentration (mg/kg)[a]	Range of national mean concentrations (mg/kg)[b]	Maximum lead concentration (mg/kg)
Cereals/grains not included elsewhere and mixed grains	5,027	0.009	<LOD-0.029	7.12
Wheat (including breads)	506	0.005	<LOD–0.009	0.040
Rice	85	0.002	<LOD–0.004	0.021
Baked goods including “fancy breads”	203	0.047	0.001–0.23	16.5
Oats	63	0.001	<LOD–0.003	0.050
Roots and tubers	1,255	0.007	0.001–0.065	1.32
Pulses + legumes	326	0.004	<LOD–0.060	0.063
Fruits	7,480	0.030	<LOD–0.13	28.9
Dried fruit	282	0.086	0.006–0.34	1.34
Fruit juices	4,426	0.058	<LOD–0.35	74
Vegetables including juices	13,402	0.101	<LOD–0.40	27.6
Eggs	785	0.008	<LOD–0.039	0.21
All seafood (EFSA only)	11,453	0.054	—	4.06
Snails	11	0.069	0.065–0.074	0.19
Finfish	656	0.040	<LOD–0.22	0.45
Shellfish	765	0.070	0.010–0.19	11.80
Aquatic animals (China only)	12	0.015	—	—
Dairy foods	3,833	0.006	0.001–0.013	4.55
Nuts and oilseeds	184	0.005	<LOD–0.024	0.30
Animal fats	102	0.001	<LOD–0.002	0.029
Vegetable oils and fats	832	0.007	<LOD–0.039	7.30
Stimulants (coffee, tea, cocoas)[c]	764	0.211	<LOD–1.03	6.21

Food category	N	Weighted mean lead concentration (mg/kg)[a]	Range of national mean concentrations (mg/kg)[b]	Maximum lead concentration (mg/kg)
Sugar and honey	1,962	0.032	<LOD–0.082	4.10
Spices	86	0.027	<LOD–0.11	0.44
Alcoholic beverages	2,304	0.070	<LOD–0.38	5.80
Cocoa & chocolate products[c]	206	0.692	<LOD–0.69	45.4
Cocoa butter	34	<LOD	<LOD	<LOD
Muscle meat excluding poultry	1,817	0.047	0.0001–0.013	1.36
Meat not included elsewhere	131	0.420	0.22–0.25	10.10
Organ meats except kidney	102	0.140	0.10–0.18	1.44
Muscle meat and poultry combined	40,313	0.134	0.004–0.25	867
Muscle minced	69	0.001	0.001	0.078
Kidney	537	0.067	0.013–0.14	1.24
Muscle poultry	1,589	0.098	0.003–0.021	0.075
Offal	73	0.018	0.006–0.042	0.008
Miscellaneous	9,224	0.035	<LOD–0.20	155
Total	110,899	---	---	---

[a] The means were weighted to adjust for different numbers of samples for foods within a category.

[b] Range includes means from the 2007 Chinese TDS and the 20th Australian TDS; maximum lead values were not available from the Chinese TDS and the 20th Australian TDS.

[c] In some cases, cocoas were included in a stimulants category, and in others, they were separately categorized.

Table 3. Codex MLs compared with JECFA lead occurrence data

	Codex GSCTFF			JECFA			
	Standard	Lines in Table 1	ML (mg/kg)	Category	Weighted mean lead concentration (mg/kg)	Range of national mean concentrations (mg/kg)	Maximum lead concentration (mg/kg)
A	Fruit	1-6	0.1 - 0.2	Fruits	0.030	< LOD - 0.13	28.9
B	Vegetables (other than root and tuber)	7-11	0.1 – 0.3	Vegetables including juices	0.101	< LOD - 0.40	27.6
C	Pulses	13	0.2	Pulses + legumes	0.004	< LOD - 0.060	0.063
D	Root and tuber vegetables	14		Roots and tubers	0.007	0.001 - 0.065	1.32
E	Canned fruits, vegetables, chestnuts, and chestnut puree; jams, jellies, mango chutney, cucumber pickles	15-36, 39	1.0 – 1.5	---	---	---	---
F	Fruit juices	37	0.05	Fruit juices	0.058	< LOD - 0.35	74
G	Cereal grains except buckwheat, cañihua and quinoa	38	0.2	Cereals/grains not included elsewhere and mixed grains	0.009	< LOD - 0.029	7.12
H	Meat of cattle, pigs, sheep, and poultry	40-41	0.1	Muscle meat excluding poultry	0.047	0.0001-0.013	1.36
				Muscle poultry	0.098	0.003-0.021	0.075
				Muscle meat and poultry combined	0.134	0.004-0.25	867
				Meat not included elsewhere	0.420	0.22-0.25	10.10
I	Edible offal of cattle, pig, and poultry	42-44	0.5	Organ meats except kidney	0.140	0.10-0.18	1.44
				Kidney	0.067	0.013-0.14	1.24
				Offal	0.018	0.006-0.042	0.008
J	Fats, oils, spreads	45, 47-55	0.1	Animal fats	0.001	<LOD - 0.002	0.029
				Vegetable oils and fats	0.007	<LOD - 0.039	7.30

	Codex GSCTFF			JECFA			
	Standard	Lines in Table 1	ML (mg/kg)	Category	Weighted mean lead concentration (mg/kg)	Range of national mean concentrations (mg/kg)	Maximum lead concentration (mg/kg)
K	Fish	46	0.3	All seafood (EFSA only)	0.054	---	4.06
				Finfish	0.040	<LOD - 0.22	0.45
				Shellfish	0.070	0.010–0.19	11.80
L	Milks and secondary milk products	56-57	0.02	Dairy products	0.006	0.001 - 0.013	4.55
M	Natural mineral water	58	0.010	---	---	---	---
N	Infant formula	59	0.02	---	---	---	---
O	Salt, food grade	60	2	---	---	---	---
P	Wine	61	0.2	Alcoholic beverages	0.070	<LOD - 0.38	5.80

APPENDIX 1: List of Participants

Chair

United States

Lauren Posnick Robin
Review Chemist
Office of Food Safety
U.S. Food and Drug Administration
HFS-317
5100 Paint Branch Parkway
College Park, MD 20740
240-402-1639 (Phone)
lauren.robin@fda.hhs.gov

Participants by Country

Argentina

codex@minagri.gob.ar

Australia

Lynne Waterson
Food Standards Australia New Zealand
E-mail: Lynne.Waterson@foodstandards.gov.au

Austria

Ms. Angelika Nester
Austrian Agency for Health and Food Safety
Division for Data, Statistics and Risk Assessment
Spargelfeldstr. 191
1220 Vienna, Austria
Tel.: +43 50555 25707
E-mail: angelika.nester@ages.at

Belgium

Isabel De Boosere
Federal Public Service Health, Food Chain Safety and Environment
DG Animal, Plant and Food
Service Foodstuffs, Feed and Other Products
Place Victor Hortaplein 40 box 10
1060 Brussels
Tel.: + 32 2 524 73 84
Fax: + 32 2 524 73 99
E-mail: Isabel.deboosere@health.belgium.be

Brazil

Ms. Lígia Lindner Schreiner
Expert on Regulation
Brazilian Health Surveillance Agency
General Office of Foods
Tel.: +55 61 3462 5399
E-mail: ligia.schreiner@anvisa.gov.br

China

Yongning WU, Ph D, MD
Professor and Director
China CDC Key Lab of Chemical Safety and Health &
WHO Collaborating Center for Food Contamination Monitoring (China)
National Institute of Nutrition and Food Safety
Chinese Center for Diesease Control and Prevention
29 Nanwei Raod, Beijing 10050
Tel.: 86-10-83132933 67776790
Fax: 86-10-67776790
E-mail: china_cdc@yahoo.cn, wuyncdc@yahoo.com.cn

Ghana

John Oppong-Otoo
Codex Ghana
E-mail: codex@gsb.gov.gh

Dr. Kafui Kpodo
Head of Chemistry Division
Food Research Institute
Council for Scientific and Industrial Research
Accra
Tel.: +233 244 650 635
E-mail: kpodofri@ghana.com, kafuikpodo@gmail.com, kafui@kpodo.net

Mr. Ebenezer Kofi Essel
Head, Food Inspectorate
Food Division
Food and Drugs Board
Accra
Tel.: +0233 244 655 943
E-mail: kooduntu@yahoo.co.uk

Ms. Genevieve Baah
Head, Food Laboratory
Food and Agriculture Department
Ghana Standards Board
Tel.: +233 244 662 735
E-mail: obaah@yahoo.com

European Union

Ms Almut BITTERHOF
European Commission
Health and Consumers Directorate-General
Tel.: ++32 - 2 - 298 67 58
E-mail: almut.bitterhof@ec.europa.eu, codex@ec.europa.eu

Indonesia

Tetty H Sihombing (Ms)
Director of Food Products Standardization
National Agency of Drug and Food Control
Jl Percetakan Negara 23
Jakarta Pusat, Indonesia
E-mail: subdit_spo@yahoo.com

Japan

Dr Yoshihiko OE
Assistant Director (Analysis and Brewing Technology)
Taxation Department, National Tax Agency
3-1-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8978, JAPAN
E-mail: Codex@nta.go.jp, yoshihiko.oe@nta.go.jp

Mr Wataru IIZUKA
Section Chief
Standards and Evaluation Division Department of Food Safety Ministry of Health, Labour and Welfare
1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8916, JAPAN
E-mail: codexj@mhlw.go.jp

Dr Tomoaki TSUTSUMI
Section Chief
Division of Foods
National Institute of Health Sciences
1-18-1 Kamiyoga, Setagaya-ku, Tokyo 158-8501, JAPAN
E-mail: tutumi@nihs.go.jp

New Zealand

John Reeve
Principal Advisor (Toxicology)
Science and Risk Assessment Directorate
Ministry of Agriculture & Forestry
25 The Terrace
Wellington 6011
New Zealand
Tel.: +64 4 8942533
E-mail: john.reeve@maf.govt.nz

Sweden

Codex Coordinatior Carmina Ionescu
National Food Administration
Box 622, SE-751 26 Uppsala
Sweden
Tel.: +46 709 24 56 01
E-mail. carmina.ionescu@slv.se

Thailand

Mr. Pisan Pongsapitch
Director, Office of Commodity and System Standard,
National Bureau of Agricultural Commodity and Food Standards,
50 Phaholyothin Road, Ladyao, Chatuchak,
Bangkok 10900 Thailand
Tel.: (+662) 561 2277
Fax: (+662) 561 3357, (+662) 561 3373
E-mail: codex@acfs.go.th

United Kingdom

Ian Smith
Environmental & Process Contaminants
Chemical Safety Unit
Food Standards Agency,
Aviation House, 125 Kingsway, London, WC2B 6NH
020 7276 8375
E-mail: Ian.Smith@foodstandards.gsi.gov.uk

United States of America

Nega Beru
Director, Office of Food Safety
U.S. Food and Drug Administration
HFS-300
5100 Paint Branch Parkway
College Park, MD 20740
240-402-2021 (Phone)
E-mail: nega.beru@fda.hhs.gov

Henry Kim
Chief, Plant Products Branch
Office of Food Safety
U.S. Food and Drug Administration
HFS-317
5100 Paint Branch Parkway
College Park, MD 20740
240-402-2023 (Phone)
E-mail: henry.kim@fda.hhs.gov

Vietnam

Nguyen Thi Minh Ha
Deputy Director
Vietnam Codex Office-Vietnam Food Administration
E-mail: codexvn@vfa.gov.vn;
nguyen_thi_minh_ha@yahoo.com

Nguyen Le Hoang
Deputy head
Quality Assurance Department- VEGETEXCO
Mob: 0904218974
E-mail: hoangnguyendeu@yahoo.com;

Tran Đang Ninh
Head
Laboratory Department-NAFIQAD; Ministry of Agriculture and Rural Development
E-mail: dangninh.nafi@mard.gov.vn

Đao To Quyen
Deputy Head
Food Safety Division – Institute for Nutrition
E-mail: quyendaoto@gmail.com

CEFIC

Marc Vermeulen
Cefic Director Food & Protective Applications
Tel.: 32 2 676 74 46
Fax: 32 2 676 73 59
E-mail: mve@cefic.be

FAO JECFA

Dr. Annika Wennberg
Senior officer, FAO JECFA Secretary
Nutrition and Consumer Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome, Italy
Tel.: + 39 06 5705 3283
Fax: + 39 06 5705 4593
E-mail: Annika.Wennberg@fao.org

WHO JECFA

Dr Angelika Tritscher
WHO Joint Secretary to JECFA and JMPR
Department of Food Safety and Zoonoses
World Health Organization
20, Avenue Appia, CH-1211 Geneva 27
Switzerland
Tel. direct: +41 22 791 3569
Fax direct: +41 22 791 4807
Mobile: +41 79 633 9995
E-mail: tritschera@who.int
Website: http://http://www.who.int/ipcs/food/en/

IADSA

David Pineda Ereño
Director, Regulatory Affairs
IADSA - International Alliance of
Dietary/Food Supplement Associations
50, rue de l'Association
1000 Brussels
Belgium
Tel.: +32 22 09 11 55
Fax: +32 22 23 30 64
E-mail: davidpineda@iadsa.be
www.iadsa.org

IBFAN

Maryse Arendt
Chargée de direction
Initiativ Liewensufank
20 rue de Contern
L-5955 Itzig
Luxembourg
Tel.: 00 352 36 05 97-13
Fax 00 352 36 61 34
www.liewensufank.lu

ICBA

Ms. Päivi Julkunen
Chair, ICBA Committee for Codex
ICBA c/o American Beverage Association
1106 16th St NW
Washington DC 20036
USA
Tel. +1 404 676 2677
E-mail: pjulkunen@na.ko.com

IFT

James R. Coughlin, Ph.D.
President, Coughlin & Associates:
Consultants in Food/Nutritional/Chemical Toxicology and Safety
8 Camillo

Aliso Viejo, CA 92656 USA
Head of the CCCF Delegation for the Institute of Food Technologists (IFT)
Tel.: 949-916-6217
Fax: 949-916-6218
E-mail: jrcoughlin@cox.net

ISDI

Mr. Xavier Lavigne
International Special Dietary Foods Industries (ISDI)
rue de l' Association 50, 1000 Brussels – Belgium
E-mail: xavierlavigne@isdi.org

OIV

Dr Jean- Claude RUF
OIV
Coordinator for the Scientific and Technical Department
18, rue d'Aguesseau
F-75008 Paris - France
Tel.: +33 (0) 1 44 94 80 94
Fax: +33 (0) 1 42 66 90 63
Mobile: +33 674 663 451
E-mail: jruf@oiv.int