

**WORKSHOP**

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| **Training Worksheet** | **Maximum Limits (MLs) as a Risk Management Tool: Management of Lead (Pb) Exposure through Spices and Herbs** |
| **Organized by** | **AIDSMO and GFoRSS, under the Arab Codex Initiative** |
| **Location** | **Muscat, Oman** |
| **Dates** | **30 – 31 July 2025** |

*This exercise is based on an excerpt of Codex document – CX/CF 25/18/05 developed in May 2025 and related to the analysis of the occurrence data in spices and herbs.*

*The entire document is provided for your reference.*

**OBJECTIVE**

This workshop is designed to help participants apply the principles of **risk assessment**, with a particular focus on **dietary exposure assessment**, to evaluate the impact of **lead contamination** in food products such as **dried bark** and **culinary herbs**. Following a stepwise approach consistent with **Codex Alimentarius methodology**, the exercise demonstrates how applying different **Maximum Limits (MLs)** for lead affects:

* The **estimated dietary intake** of lead,
* The **percentage reduction** in exposure,
* The **sample rejection rate**, i.e., the share of products exceeding the ML and thus excluded from the market.

The workshop exercise supports the application of the **ALARA principle** (As Low As Reasonably Achievable), helping participants understand how **MLs can be used as practical risk management tools** to minimize consumer exposure while considering **technological feasibility and local food availability**. It also emphasizes the need for **context-specific standard setting**, grounded in **local consumption patterns and monitoring data**.

Beyond the technical skills, this exercise also supports the broader objective of **enhancing national capacities** to ensure **food safety at the local level**, by enabling regulators and technical experts to:

* Assess whether proposed standards (e.g., MLs) are protective of public health,
* **Adapt international guidance** to local food consumption patterns and contaminant occurrence,
* Support the development of **science-based food safety standards** that reflect **local environmental and dietary realities**, while aligning with **Codex principles**.

Ultimately, applying this approach will reinforce the ability of Codex Contact Points and risk assessors in Arab countries to **actively contribute to international standard-setting**, while also ensuring that **national standards remain relevant, feasible, and protective of their populations**.

**SCENARIO BACKGROUND**

**Objective**

Apply the Codex stepwise approach to evaluate how different MLs for lead in dried bark and culinary herbs affect dietary exposure.

**STEP 1: DATA EXTRACTION**

**From the reference document provided**

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| --- | --- | --- |
| Item | Dried Bark | Culinary Herbs |
| Baseline Mean Lead Level (UB) |  |  |
| Consumption Value (g/day) |  |  |
| Body Weight Assumption |  |  |
| MLs to Apply (mg/kg) |  |  |
| Adjusted Mean Level at ML = 3.0 |  |  |
| Adjusted Mean Level at ML = 2.5 |  |  |
| Adjusted Mean Level at ML = 2.0 |  |  |
| Adjusted Mean Level at ML = 1.5 |  |  |
| Adjusted Mean Level at ML = 1.0 |  |  |

 **STEP 2: CALCULATE BASELINE INTAKE**

**Use the formula:**

**Intake (µg/kg bw/day) = (Mean concentration × Consumption × 1000) / Body weight**

**Question:**What is the estimated intake before applying any ML (dried bark and culinary herbs)?
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**STEP 3: INTAKE AFTER ML APPLICATION**

**Question:
What is the estimated intake after applying an ML of 2.0 mg/kg** (dried bark and culinary herbs)**?
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 **STEP 4: INTAKE REDUCTION (%)**

**Formula:**

**% Reduction = [1 –( New intake / Baseline intake)] × 100**

**Question:**How much is the intake reduced after applying the ML? **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**STEP 5: Rejection Rate**

**Formula:**

**% Rejection Rate = (Number of non-compliant samples / Total number of samples) × 100**

**Question:**

**What proportion of the commodity would be rejected when a specific Maximum Limit (ML) is applied in a trade context? Explain what this means for trade and public health.**

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**STEP 6: FINAL EXERCISE TABLE – CALCULATE FOR ALL MLS (DRIED BARK)**

**Use the formula:**

**Intake (µg/kg bw/day) = (Mean Level × 0.4 × 1000) / 70
% Reduction = (1 − Intake at ML / Intake at No ML) × 100**

**% Rejection Rate = (Number of non-compliant samples / Total number of samples) × 100**

**DRIED BARK**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ML (mg/kg) | Mean Lead Level (mg/kg) | Estimated Intake (µg/kg bw/day) | % Intake Reduction | % Rejection Rate |
| No ML | **0.68** |  | **0%**  | **0%** |
| 3.0 | **0.60** |  |  |  |
| 2.5 | **0.57** |  |  |  |
| 2.0 | **0.49** |  |  |  |
| 1.5 | **0.40** |  |  |  |
| 1.0 | **0.31** |  |  |  |

**CULINARY HERBS** (USE G09 DIET: 8.89 G/DAY)

**Intake = (Mean Level × 8.89 × 1000) / 70**

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| --- | --- | --- | --- | --- |
| ML (mg/kg) | Mean Lead Level (mg/kg) | Estimated Intake (µg/kg bw/day) | % Intake Reduction | % Rejection Rate |
| No ML | **0.41** |  | **0%** | **0%** |
| 3.0 | **0.38** |  |  |  |
| 2.5 | **0.37** |  |  |  |
| 2.0 | **0.36** |  |  |  |
| 1.5 | **0.34** |  |  |  |
| 1.0 | **0.29** |  |  |  |

**STEP 7: DISCUSSION**

**Question:
Why does applying a lower ML reduce the mean level and dietary exposure?
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**STEP 8: FINAL REFLECTION & DECISION QUESTION**

**Based on your calculations and the observed reduction in dietary exposure across different ML levels:**

**Which ML level would you recommend for lead in dried bark (or culinary herbs), and why?
Please justify your answer using:**

* The % intake reduction achieved,
* The exposure compared to the Toxicological Reference Value (TRV),
* The balance between health protection and market impact (e.g., rejection rate, feasibility),
* Risk management considerations and Codex principles (e.g., ALARA – As Low As Reasonably Achievable).

**Your Recommendation:**

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| ***Remember:**** **A lower ML provides greater public health protection,**
* **But too strict ML may unnecessarily reject compliant products or impact trade.**
* **Codex encourages a balanced, science-based decision informed by dietary exposure and actual risk.**
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