Pear

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Abstract

Pear in the HMI library has 266 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, As, Ba and Tl from 25 sources. WHO gems/food submissions reported lead in pear as sold from 2,379 results in 4 reporting regions, with subgroup medians from 14.8 to 180 µg/kg. In the US Total Diet Study, pear as sold had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Pear overview

Across 4 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 5.2 µg/kg (Lee et al. 2023) to 78.1 µg/kg (Bora et al. 2022).[3,6] For cadmium, 5 studies on an as-sold or fresh-weight basis reported means and medians from 0.8 µg/kg (Rusin et al. 2021) to 16.8 µg/kg (Bora et al. 2022).[3,7] Higher results came from contaminated or exposed settings rather than ordinary supply. Pear as sold from fresh product, Poland retail/official control had cadmium higher at 4 µg/kg, against 0.8 µg/kg for processed product, Poland retail/official control in the same study.[7]

For a buyer the practical points are the form bought, the basis a result is reported on, where the pear came from and the laboratory's reporting limit. Testing finds contamination but does not remove it.

2 | What counts as pear

This page covers pear in 3 forms kept separate in every comparison: pear as sold (233 results), canned pear (27 results) dried and pear (6 results).[1,2,3,4,5,6] Foods made from pear that have their own pages, such as pear juice, are covered there.

Results stay on the basis each source reports: as sold or fresh weight, dry weight, or unstated. Dry-weight, as-sold and unstated results are never pooled, and no moisture conversion is applied.

3 | How metals reach pear

The evidence on how metals reach pear comes from studies that compared exposed and ordinary settings. Pear as sold from fresh product, Poland retail/official control had cadmium higher at 4 µg/kg, against 0.8 µg/kg for processed product, Poland retail/official control in the same study.[7]

These are observational comparisons from single studies; the size of the difference depends on the site, metal and distance.

4 | Which forms and regions measured lower

The hmi reference for lead in pear as sold pools 151 subgroup units from 5 sampling families, with a median of below 4 µg/kg and a middle half spanning below 1.2 (lower quartile) and between 1.2 and 4 µg/kg (upper quartile).[1,2,4,9,10] dried for lead in pear, the reference median was between 8 and 24.5 µg/kg, with a middle half from below 20 to between 20 and 50 µg/kg across 6 units.[1] for cadmium in pear as sold, the reference median was between 1.2 and 1.5 µg/kg, with a middle half from below 1.1 to 2.4 µg/kg across 139 units.[1,2,4,10]

Among GEMS/Food reporting regions, pear as sold had the lowest lead subgroup median in PAHO (14.8 µg/kg) and the highest in SEARO (180 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (2 µg/kg) and the highest in EMRO (7.55 µg/kg).[1]

Targeted pear as sold samples in WPRO had lead higher at 40 µg/kg, against 35.5 µg/kg for WPRO in the same study.[1] In another study, targeted pear as sold samples in EURO had nickel higher at 81.3 µg/kg, against 76.5 µg/kg for EURO in the same study.[1]

In one study, lead across 6 groups of pear ranged from 81 µg/kg (Montreal 1988) to 241 µg/kg (Vancouver 1987); the lowest is the lowest observed in that study, not an established sourcing preference.[11] In another study, lead across 4 groups of pear ranged from 64 µg/kg (amateur farmers; washed with 5% acetic acid vinegar) to 74.9 µg/kg (vegetable and fruit market; washed with 5% acetic acid vinegar); the lowest is the lowest observed in that study, not an established sourcing preference.[3]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed pear in the same study and group. Canned pear (5 city composites) had lead higher at 116 µg/kg, against 9.8 µg/kg for the unprocessed form in the same group (pear as sold).[11]

Forms differ in water content, so a per-kilogram difference is not by itself a measured removal or gain of metal.

6 | Mitigation for pear

Lot testing against the applicable limit is the check that can be verified.

7 | Trade-offs and limits of controls

Avoiding exposed growing areas lowered the metal measured in the studies available, but no study measured the cost or supply effect of doing so.[7] Metals do not move together, so a lot that passes a lead limit says little about cadmium, arsenic or nickel unless those are tested as well.

8 | Testing pear for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 3,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for cadmium ranged from 0.1 µg/kg (Nie et al. 2016) to 1,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,12] Reporting limits for total arsenic ranged from 0.4 µg/kg (Liang et al. 2019) to 300 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,8]

A useful lot result names the form, the basis and a quantification limit well below the limit that applies.

9 | Buying and verifying pear

No maximum level for metals in pear was verified from primary text for this page; buyers should confirm the limit that applies in the destination market.

10 | Exposure from pear

No source in the library converted pear concentrations into a verified estimate of intake for a defined population. Concentrations describe the food, not individual risk.

11 | Evidence review and remaining gaps

Every source record that names pear was decided on its content: 25 occurrence extracted, 25 records in all. The occurrence table renders every extracted result; held values remain visible with their reason.

References identify the sources used in these answers. The Sources index preserves additional discovery links; inclusion there does not mean a source has been reviewed for this assessment. Corrections, completed searches, new direct evidence and changes in requirements should reopen the relevant answer.

12 | Pear FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, As, Ba and Tl in pear, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in pear as sold from 2,379 results in 4 reporting regions, with subgroup medians from 14.8 to 180 µg/kg.[1]

In the studies available, pear from contaminated or exposed settings carried more metal than pear from the same study's control.[7] pear as sold from processed product, Poland retail/official control had lead higher at 24.5 µg/kg, against 8 µg/kg for fresh product, Poland retail/official control in the same study.[7]

Among GEMS/Food reporting regions, pear as sold had the lowest lead subgroup median in PAHO (14.8 µg/kg) and the highest in SEARO (180 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (2 µg/kg) and the highest in EMRO (7.55 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same pear.[11] canned pear (5 city composites) had lead higher at 116 µg/kg, against 9.8 µg/kg for the unprocessed form in the same group (pear as sold).[11]

Inorganic arsenic, the more toxic form, was measured in 9 results from 4 sources, far fewer than total arsenic.-[1,13,14,15] European Food Safety Authority (EFSA) 2014 reported inorganic arsenic at 14.5 µg/kg (mean) dried in pear from European dietary-survey occurrence data.[15]

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STATUS AND LICENCE

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COMPETING INTERESTS

The Heavy Metal Index reports what the peer-reviewed and regulatory literature supports. It is operated separately from any certification program, does not evaluate or endorse brands, and does not use certification thresholds as evidence for the statements made here.

DATA AVAILABILITY

Every source behind this ingredient profile is listed with its own source record at https://heavymetalindex.com/ingredients/pear#sources.

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