Apple juice

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Abstract

Apple juice in the HMI library has 1,339 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, uranium, Co, Cu, Fe, Mn, Zn, AsIII, AsV, Cr(III) and CrVI from 27 sources. WHO GEMS/Food submissions reported lead in apple juice from 350 results in 4 reporting regions, with a subgroup median of 18 µg/kg. In the US Total Diet Study, apple juice had a median lead result of 1.5 µg/kg across 3 composites from 2018-2020.

1 | Apple juice overview

Across 2 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 1.6 µg/kg (Spungen et al. 2024) to 6 µg/kg (Alzagtat et al. 2016).[3,7] For cadmium, 2 studies with the basis not stated reported means and medians from 0.79 µg/kg (Dabeka et al. 1995) to 2.2 µg/kg (Dabeka et al. 1995).[8]

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

2 | What counts as apple juice

This page covers apple juice in 2 forms kept separate in every comparison: apple juice (1,338 results) and apple juice as sold (1 result).[1,2,3,4,5,6]

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 apple juice

No study in the library compared apple juice from contaminated and ordinary settings, so the routes by which metals reach it are not measured here.

4 | Which forms and regions measured lower

The HMI reference for lead in apple juice pools 396 subgroup units from 3 sampling families, with a median of between 1.4 and 2.4 µg/kg and a middle half spanning below 1.1 (lower quartile) and between 2.7 and 4.1 µg/kg (upper quartile).[1,2,10] for cadmium in apple juice, the reference median was below 1 µg/kg, with a middle half from below 1 to below 1 µg/kg across 46 units.[1,2,7] for total arsenic in apple juice, the reference median was between 3.4 and 4.74 µg/kg, with a middle half from between 0.5 and 3.1 to between 5.4 and 8 µg/kg across 148 units.[1,2,11,9]

In one study, lead across 333 groups of apple juice ranged from 0.1 µg/kg (FY2011) to 67 µg/kg (FY2014); the lowest is the lowest observed in that study, not an established sourcing preference.[10] In another study, lead across 7 groups of apple juice ranged from 2 µg/kg (imported nectar, producer code N (sample 23)) to 6 µg/kg (imported nectar, producer code E (sample 20)); the lowest is the lowest observed in that study, not an established sourcing preference.[3]

5 | Processing, cooking and preparation

No processing study for metals in this food is in the library yet.

6 | Mitigation for apple juice

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

7 | Trade-offs and limits of controls

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 apple juice for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 5,200 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for cadmium ranged from 1 µg/kg (WHO GEMS/Food) to 40 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for total arsenic ranged from 1 µg/kg (FDA Total Diet Study) to 50 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,2]

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

9 | Buying and verifying apple juice

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

10 | Exposure from apple juice

No source in the library converted apple juice 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 apple juice was decided on its content: 27 occurrence extracted, 27 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 | Apple juice FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, uranium, Co, Cu, Fe, Mn, Zn, AsIII, AsV, Cr(III) and CrVI in apple juice, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in apple juice from 350 results in 4 reporting regions, with a subgroup median of 18 µg/kg.[1]

In one study, lead across 333 groups of apple juice ranged from 0.1 µg/kg (FY2011) to 67 µg/kg (FY2014); the lowest is the lowest observed in that study, not an established sourcing preference.[10] In another study, lead across 7 groups of apple juice ranged from 2 µg/kg (imported nectar, producer code N (sample 23)) to 6 µg/kg (imported nectar, producer code E (sample 20)); the lowest is the lowest observed in that study, not an established sourcing preference.[3]

Inorganic arsenic, the more toxic form, was measured in 151 results from 6 sources, far fewer than total arsenic.[1,12,11,9,13,14] Across 2 other studies of ordinary farms and markets, reported inorganic arsenic means and medians on an as-sold or fresh-weight basis ranged from 2.4 µg/kg (Zealand 2012) to 20.6 µg/kg (FDA CFSAN 2023).[12,9]

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STATUS AND LICENCE

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COMPETING INTERESTS

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DATA AVAILABILITY

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

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