Pineapple

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HEAVY METAL INDEX · INGREDIENT PROFILE October 2026

DOI 10.83376/hmi.ingredient.pineapple

CITE AS

Pendergrass, K. (2026). Pineapple. Heavy Metal Index. https://doi.org/10.83376/hmi.ingredient.pineapple

CORRESPONDENCE

Corrections are logged publicly on the article page, each with its date, the affected value, and the source that resolved it.

KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-10-22.

Abstract

Pineapple in the HMI library has 312 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, As, Ba and Hg from 24 sources. WHO gems/food submissions reported lead in pineapple as sold from 1,184 results in 5 reporting regions, with subgroup medians from 1.1 to 250 µg/kg. In the US Total Diet Study, frozen pineapple had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Pineapple overview

Across 3 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 1.36 µg/kg (Youssao et al. 2018) to 570 µg/kg (Guerra et al. 2012).[4,7] For cadmium, 2 studies on an as-sold or fresh-weight basis reported means and medians from 0.47 µg/kg (Youssao et al. 2018) to 30 µg/kg (Guerra et al. 2012).[4,7]

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

2 | What counts as pineapple

This page covers pineapple in 5 forms kept separate in every comparison: pineapple as sold (252 results), canned pineapple (46 results), frozen pineapple (7 results), peeled or flesh pineapple (6 results) dried and pineapple (1 result).[1,2,3,4,5,6] Foods made from pineapple that have their own pages, such as pineapple 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 pineapple

No study in the library compared pineapple 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 pineapple as sold pools 107 subgroup units from 2 sampling families, with a median of between 21,000 and 22,300 µg/kg and a middle half spanning between 3.5 and 11 (lower quartile) and 41,500 µg/kg (upper quartile).[1,5] frozen for lead in pineapple, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 27 units.[2] for cadmium in pineapple as sold, the reference median was between 18,500 and 19,000 µg/kg, with a middle half from below 2.95 to 36,900 µg/kg across 91 units.[1,5]

Among GEMS/Food reporting regions, pineapple as sold had the lowest lead subgroup median in PAHO (1.1 µg/kg) and the highest in PAHO (250 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (3.7 µg/kg) and the highest in EURO (67.9 µg/kg).[1] For total arsenic, the lowest regional median was in EURO (1.4 µg/kg) and the highest in WPRO (2 µg/kg).[1]

Targeted pineapple as sold samples in WPRO had tin higher at 51,000 µg/kg, against 41,500 µg/kg for WPRO in the same study.[1]

In one study, lead across 6 groups of pineapple ranged from 12.6 µg/kg (Winnipeg 1987) to 34.7 µg/kg (Toronto 1988); the lowest is the lowest observed in that study, not an established sourcing preference.[9] In another study, lead across 5 groups of pineapple ranged from 60 µg/kg (Oyingbo market (Lagos Mainland)) to 160 µg/kg (Iyana-Ipaja market (Alimosho)); the lowest is the lowest observed in that study, not an established sourcing preference.[10]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed pineapple in the same study and group. Canned pineapple (5 city composites) had lead higher at 27.7 µg/kg, against 12.1 µg/kg for the unprocessed form in the same group (pineapple as sold).[9] In another study, dried pineapple (PAHO) had lead higher at 10 µg/kg, against 1.1 µg/kg for the unprocessed form in the same group (pineapple as sold).[1]

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

6 | Mitigation for pineapple

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 pineapple 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 0.3 µg/kg (WHO GEMS/Food) to 1,000 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 0.03 µg/kg (WHO GEMS/Food) to 500 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1]

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

9 | Buying and verifying pineapple

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

10 | Exposure from pineapple

No source in the library converted pineapple 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 pineapple was decided on its content: 24 occurrence extracted, 24 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 | Pineapple FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, As, Ba and Hg in pineapple, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in pineapple as sold from 1,184 results in 5 reporting regions, with subgroup medians from 1.1 to 250 µg/kg.[1]

Among GEMS/Food reporting regions, pineapple as sold had the lowest lead subgroup median in PAHO (1.1 µg/kg) and the highest in PAHO (250 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (3.7 µg/kg) and the highest in EURO (67.9 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same pineapple.[9] canned pineapple (5 city composites) had lead higher at 27.7 µg/kg, against 12.1 µg/kg for the unprocessed form in the same group (pineapple as sold).[9]

Inorganic arsenic, the more toxic form, was measured in 8 results from 2 sources, far fewer than total arsenic.[1,11] Centre for Food Safety FEHD HKSAR 2012 reported inorganic arsenic at 2 µg/kg (mean) in pineapple as sold from all samples (4 sampling occasions, composites).[11]

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GOVERNMENT

STATUS AND LICENCE

Editorially reviewed in-house; no external peer review has been completed on this ingredient profile. Published as an institutional technical report with its review state tracked on the article page. Released under CC BY 4.0.

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/pineapple#sources.

PUBLICATION HISTORY

This revision 2026-10-22. The full dated record is maintained at https://heavymetalindex.com/ingredients/pineapple.