Protein powder

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Abstract

Protein powder in the HMI library has 1,445 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, V, Se, Au, Ba, Be, Bi, Cs, Li, Mo, Pt, Rb, Ti and Tl from 14 sources. WHO GEMS/Food submissions reported lead in protein powder as sold from 1 result in 1 reporting region, with a subgroup median of 66 µg/kg. In the US Total Diet Study, protein powder had a median lead result of 6.4 µg/kg across 3 composites from 2018-2020.

1 | Protein powder 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 6.7 µg/kg (Spungen et al. 2024) to 2,880 µg/kg (Bavatharani et al. 2026).[3,7] For cadmium, 4 studies on an as-sold or fresh-weight basis reported means and medians from 1.4 µg/kg (Spungen et al. 2024) to 480 µg/kg (Bavatharani et al. 2026).[3,7]

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

2 | What counts as protein powder

This page covers protein powder in 2 forms kept separate in every comparison: protein powder (1,312 results) and protein powder as sold (133 results).[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 protein powder

No study in the library compared protein powder 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 protein powder pools 67 subgroup units from 4 sampling families, with a median of 7.75 µg/kg and a middle half spanning between 0.4 and 2 (lower quartile) and 39 µg/kg (upper quartile).[2,5,9,10] for lead in protein powder as sold, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 4 units.[2,7] for cadmium in protein powder, the reference median was 12.4 µg/kg, with a middle half from below 0.405 to 26 µg/kg across 50 units.[2,5,9,10]

In one study, lead across 36 groups of protein powder ranged from 0.8 µg/kg (retail product 31th percentile) to 88.4 µg/kg (retail product 28th percentile); the lowest is the lowest observed in that study, not an established sourcing preference.[9] In another study, lead across 27 groups of protein powder ranged from 28 µg/kg (retail protein product 11 (blinded code 11)) to 320 µg/kg (retail protein product 27 (blinded code 27)); 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 protein powder in the same study and group. Protein powder (1 collection regions) had cadmium higher at 11 µg/kg, against 1.3 µg/kg for the unprocessed form in the same group (protein powder as sold).[2] In another study, protein powder (all samples) had cadmium higher at 14 µg/kg, against 1.4 µg/kg for the unprocessed form in the same group (protein powder as sold).[7] A third study found that protein powder (Beverages: Protein Beverages) had total arsenic higher at 260 µg/kg, against 130 µg/kg for the unprocessed form in the same group (protein powder 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 protein powder

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 protein powder for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 25 µg/kg (Philips et al. 2024), so a non-detect from a less sensitive method says much less.[1,10] Reporting limits for cadmium ranged from 0.2 µg/kg (Mustatea et al. 2021) to 25 µg/kg (Philips et al. 2024), so a non-detect from a less sensitive method says much less.[5,10] Reporting limits for total arsenic ranged from 3 µg/kg (FDA Total Diet Study) to 25 µg/kg (Philips et al. 2024), so a non-detect from a less sensitive method says much less.[2,10]

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

9 | Buying and verifying protein powder

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

10 | Exposure from protein powder

No source in the library converted protein powder 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 protein powder was decided on its content: 14 occurrence extracted, 14 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 | Protein powder FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, V, Se, Au, Ba, Be, Bi, Cs, Li, Mo, Pt, Rb, Ti and Tl in protein powder, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in protein powder as sold from 1 result in 1 reporting region, with a subgroup median of 66 µg/kg.[1]

In one study, lead across 36 groups of protein powder ranged from 0.8 µg/kg (retail product 31th percentile) to 88.4 µg/kg (retail product 28th percentile); the lowest is the lowest observed in that study, not an established sourcing preference.[9] In another study, lead across 27 groups of protein powder ranged from 28 µg/kg (retail protein product 11 (blinded code 11)) to 320 µg/kg (retail protein product 27 (blinded code 27)); the lowest is the lowest observed in that study, not an established sourcing preference.[10]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same protein powder.[2] protein powder (1 collection regions) had cadmium higher at 11 µg/kg, against 1.3 µg/kg for the unprocessed form in the same group (protein powder as sold).[2]

Inorganic arsenic, the more toxic form, was measured in 45 results from 3 sources, far fewer than total arsenic.[1,12,11] US Food and Drug Administration 2016 reported inorganic arsenic at 58 µg/kg (mean) in protein powder from all samples (FDA 2013).[12]

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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/protein-powder#sources.

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