

Method

Summary Statistics



Statistical reports have been updated to a new organizational format.

Statistical analysis remains the same. The Minerals scheme now includes method reports like the other schemes in our PT program. Report types are shown below.

Results from all labs...

- ...sorted by analyte (Analyte All Labs PT Report)

- ...sorted by method (Method All Labs PT Report)

Summary statistics...

- ...for each analyte (Analyte Summary Statistics)

- ...for each method (**Method Summary Statistics**)

Report cards evaluating individual lab performance...

- ...for an analyte regardless of method (Analyte Laboratory Report Card)

- ...for a specific method (Method Laboratory Report Card).

Detailed description on the content of the **Method Summary Statistics** is provided in the Appendix



METHOD Summary Statistics

202651 (Beef Feed medicated)

Issue Date: 4/30/2026

Code	Analyte / Method	¹ Trueness (Lab Value)					³ Precision (range)		
		Robust Mean	n used	Robust Uncert.	ffp StDev	ffp %RSD	² Robust %RSD	Robust Mean	n used
015.43	Aluminum/ICP, Microwave (ppm)	845.9	7	66.12	49.07	5.8	16.5	5.986	7
015.53	Aluminum/ICP-MS, Microwave (ppm)	1038	4	82.36	58.39	5.62	12.7	30.67	4
015.42	Aluminum/ICP, Open vessel (ppm)	1003	2					16	2
015.52	Aluminum/ICP-MS, Open vessel (ppm)	927.2	1					12.04	1
015.41	Aluminum/ICP, Dry ash (ppm)	858.4	1					16.8615	1
017.43	Boron/ICP, Microwave (ppm)	68.72	5	4.837	5.816	8.46	12.6	2.208	5
017.53	Boron/ICP-MS, Microwave (ppm)	71.27	2					5.61455	2
017.42	Boron/ICP, Open vessel (ppm)	68.35	1					1.3	1
017.41	Boron/ICP, Dry ash (ppm)	62.18	1					0.3639	1
021.43	Cobalt/ICP, Microwave (ppm)	14.26	10	0.6443	1.529	10.7	11.4	0.9012	10
021.53	Cobalt/ICP-MS, Microwave (ppm)	14.9	9	0.3871	1.587	10.7	6.23	0.5914	9
021.42	Cobalt/ICP, Open vessel (ppm)	13.27	3	1.197	1.439	10.8	12.5		
021.31	Cobalt/AAS, Dry ash (ppm)	13.83	1					0.4175	1

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		Robust Mean	n used	Robust Uncert.	ffp StDev	ffp %RSD	² Robust %RSD	Robust Mean	n used
021.41	Cobalt/ICP, Dry ash (ppm)	12.16	1					0.0123	1
021.52	Cobalt/ICP-MS, Open vessel (ppm)	15.14	1					0.07	1
022.43	Copper/ICP, Microwave (ppm)	224.2	15	7.612	15.88	7.08	10.5	5.753	13
022.53	Copper/ICP-MS, Microwave (ppm)	220.7	5	12.38	15.67	7.1	10	10.86	5
022.52	Copper/ICP-MS, Open vessel (ppm)	218.6	2					5.915	2
022.42	Copper/ICP, Open vessel (ppm)	237.8	2					8.9	2
022.31	Copper/AAS, Dry ash (ppm)	126.7	2					7.515	2
022.41	Copper/ICP, Dry ash (ppm)	154.4	1					2.7282	1
023.01	Fluorine/Ion Sel Elect (ppm)	36.33	1					0.34	1
024.52	Iodine/ICP-MS, Open vessel (ppm)	380.9	2					32.625	2
034.53	Selenium/ICP-MS, Microwave (ppm)	1.418	12	0.0896	0.2152	15.2	17.5	0.0979	12
034.43	Selenium/ICP, Microwave (ppm)	1.186	4	0.2121	0.1849	15.6	28.6	0.0714	3
034.52	Selenium/ICP-MS, Open vessel (ppm)	1.29	2					0.02	2
034.42	Selenium/ICP, Open vessel (ppm)	1.28	2					0.069	1
034.04	Selenium/AA, Hydride (ppm)	1.101	1					0.0018	1
036.43	Sulfur/ICP, Microwave (%)	0.4997	7	0.0191	0.0222	4.44	8.08	0.017	7
036.42	Sulfur/ICP, Open vessel (%)	0.4966	3	0.0088	0.0221	4.44	2.45	0.0464	3
036.53	Sulfur/ICP-MS, Microwave (%)	0.4097	3	0.1075	0.0187	4.57	36.4		
036.52	Sulfur/ICP-MS, Open vessel (%)	0.4766	1					0.0043	1

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		Robust Mean	n used	Robust Uncert.	ffp StDev	ffp %RSD	² Robust %RSD	Robust Mean	n used
038.53	Molybdenum/ICP-MS, Microwave (ppm)	3.046	9	0.2694	0.4121	13.5	21.2	0.1836	8
038.43	Molybdenum/ICP, Microwave (ppm)	2.86	6	0.7365	0.3905	13.7	50.5	0.2274	6
038.42	Molybdenum/ICP, Open vessel (ppm)	2.762	3	0.3232	0.3791	13.7	16.2	0.37	3
038.41	Molybdenum/ICP, Dry ash (ppm)	2.398	1					0.0419	1
038.52	Molybdenum/ICP-MS, Open vessel (ppm)	3.23	1					0.24	1
041.43	Vanadium/ICP, Microwave (46ppm)	37.59	3	4.939	3.484	9.27	18.2	1.422	3
041.53	Vanadium/ICP-MS, Microwave (46ppm)	40.45	3	0.1227	3.708	9.17	0.42	1.106	3
041.34	Vanadium/AAS, Graphite furnace (46ppm)	35	1					0.3	1
041.42	Vanadium/ICP, Open vessel (46ppm)	37.3	1					1	1
516.53	Arsenic, Total/ICP-MS, Microwave (ppm)	9.133	13	0.214	1.047	11.5	6.76	0.2633	13
516.43	Arsenic, Total/ICP, Microwave (ppm)	8.061	9	0.5357	0.9419	11.7	15.9	0.2039	6
516.52	Arsenic, Total/ICP-MS, Open vessel (ppm)	7.408	2					0.115	2
516.00	Arsenic, Total/AA, Hydride (ppm)	9.773	1					0.598	1
518.53	Cadmium/ICP-MS, Microwave (ppm)	9.984	11	0.2507	1.13	11.3	6.66	0.1419	8
518.43	Cadmium/ICP, Microwave (ppm)	9.074	10	0.4191	1.042	11.5	11.7	0.1313	8
518.42	Cadmium/ICP, Open vessel (ppm)	9.453	3	0.5049	1.078	11.4	7.4	0.2163	3
518.52	Cadmium/ICP-MS, Open vessel (ppm)	9.21	2					0.45	2
518.31	Cadmium/AAS, Dry ash (ppm)	5.29	1					0.2109	1
518.41	Cadmium/ICP, Dry ash (ppm)	4.38	1					0.3603	1

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		Robust Mean	n used	Robust Uncert.	ffp StDev	ffp %RSD	² Robust %RSD	Robust Mean	n used
520.43	Chromium/ICP, Microwave (ppm)	30.64	12	1.776	2.929	9.56	16.1	2.304	10
520.53	Chromium/ICP-MS, Microwave (ppm)	29.95	9	2.075	2.873	9.59	16.6	3.629	9
520.42	Chromium/ICP, Open vessel (ppm)	18.56	2					0.175	2
520.41	Chromium/ICP, Dry ash (ppm)	16.35	1					3.8494	1
520.52	Chromium/ICP-MS, Open vessel (ppm)	32.9	1					1.19	1
526.53	Lead/ICP-MS, Microwave (ppm)	3.624	12	0.0766	0.4776	13.2	5.86	0.1503	12
526.43	Lead/ICP, Microwave (ppm)	3.231	7	0.2028	0.4332	13.4	13.3	0.0935	6
526.42	Lead/ICP, Open vessel (ppm)	5.134	2					0.451	2
526.52	Lead/ICP-MS, Open vessel (ppm)	3.538	2					0.095	2
526.31	Lead/AAS, Dry ash (ppm)	0.8648	1					0.0175	1
526.41	Lead/ICP, Dry ash (ppm)	1.219	1					0.0171	1
529.99	Mercury/Miscellaneous (ppb)	776.9	15	24.07	129.1	16.6	9.6	33.89	15
529.00	Mercury/Cold vapor (ppb)	632.5	2					60	2
539.43	Nickel/ICP, Microwave (ppm)	15.04	7	1.629	1.6	10.6	22.9	2.374	6
539.53	Nickel/ICP-MS, Microwave (ppm)	15.98	6	0.8946	1.684	10.5	11	2.547	5
539.42	Nickel/ICP, Open vessel (ppm)	12.33	3	4.954	1.351	11	55.7		
539.52	Nickel/ICP-MS, Open vessel (ppm)	17.23	1					0.6	1
539.41	Nickel/ICP, Dry ash (ppm)	11.93	1					0.0685	1

1. Trueness Parameters: Statistical parameters defining the distribution of lab values which are used to evaluate how close a Lab Value is to the mean. Parameters are shown for number of observations used (n used). Method All Labs report identifies data not used. Robust statistics was employed to determine mean if number of observations used (n used) ≥ 6 (blue background). Classical statistics was employed if number of observations used (n used) < 6 (no color background). The fit for purpose standard deviation (ffp StDev) used in calculating Z values was from the Thompson-Horwitz standard deviation equation based on analysis of PT data (Thompson, DOI: 10.1039/b000282h). ffp %RSD is the fit for purpose relative standard deviation with respect to the mean (ffp StDev/Mean x 100). Uncertainty (Uncert.) is a measure of where the true population mean lies.

2. Robust %RSD: The observed relative standard deviation (StDev/Mean x 100) of Lab Values where StDev and Mean were determined by Robust statistics (n used ≥ 6) or classical statistics (n used = 3, 4, or 5).

3. Precision Parameters: Lab's precision is estimated by the difference in 2 results reported by a lab (range). Mean of ranges are shown for number of observations used (n used). Method All Tests report identifies data not used. Robust statistics was employed to determine mean if number of observations used (n used) ≥ 6 (green background). Classical statistics was employed if number of observations used (n used) < 6 (no color background).

Appendix

Content Description of METHOD Summary Statistics Report

The Method Summary Statistics Report provides trueness and precision parameters from determination of analytes by specific methods. Determination of summary statistics followed protocols in ISO 13528:2015(E) using Algorithm A robust analysis (Statistical methods for use in proficiency testing by interlaboratory comparison). Robust statistics was used to determine statistical parameters for sets with 6 or more observations. Classical statistics was used for sets with 3, 4, or 5 observations. Robust statistics has an advantage of removing undesired influence of outlying data on the mean and standard deviation without removing data from the statistical analysis.

For trueness, the mean is presented for the number of observations (n used). The uncertainty (Uncert.) is a measure of where the “real” value for the concentration lies around the mean with a 68% certainty (Mean \pm Uncert.). As the number of observations (n used) increases, uncertainty decreases. The fit-for-purpose standard deviation (ffp StDev) was used to calculate Z values and is a Revised Horwitz standard deviation based on historical data for mycotoxins in this PT program ($0.21 \times C^{-0.0271} \times \text{Mean}$ where C is massless concentration). The relative Revised Horwitz standard deviation with respect to the mean is also shown (ffp %RSD = Revised Horwitz standard deviation / Mean \times 100). The Robust relative standard deviation (Robust %RSD) is a percentage of the observed standard deviation based on robust or classical statistics divided by the mean. The Thompson-Horwitz %RSD is a standard benchmark on variability developed by Thompson and Horwitz (Thompson, DOI: 10.1039/b000282h).

Precision in the data populations is estimated by the range of duplicate results reported. The robust or classical mean is presented along with the number of observations. Any duplicate results that are exactly the same are removed in the determination of the mean to remove undue influence of entries that may be from labs reporting one result twice.