TRILOGY

Trilogy Analytical Laboratory

WHITE PAPER

Celebrating World Metrology Day 2023

Understanding Metrological Traceability

The theme for World Metrology Day 2023 is “Measurements supporting the global food system.” In this white paper we’ll examine how Trilogy establishes metrological traceability in an analytical setting.

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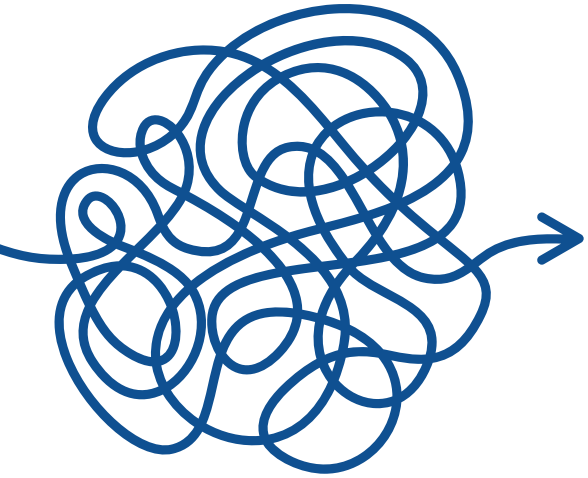
Celebrating World Metrology Day 2023

Measurements Supporting the Global Food System

World Metrology Day is celebrated annually on May 20 in honor of the signing of the Metre Convention in 1875, which established the International System of Units (SI) and the International Bureau of Weights and Measures (BIPM) with the goal to maintain worldwide uniformity in measurements. *(1)* Each year, World Metrology Day has a specific theme, chosen by the BIPM and the International Organization of Legal Metrology (OIML). The theme for World Metrology Day 2023 is "Measurements supporting the global food system," which spotlights the increasing challenges of climate change, and global distribution of food in a world whose population reached 8 billion at the end of 2022. *(2)*

Climate change is seen firsthand at Trilogy through the extensive work on mycotoxin analysis and the changing landscape with which contamination is seen. Changes in temperature and precipitation patterns can affect the growth and distribution of the occurring field fungi, as well as the conditions under which they produce mycotoxins. As a result, mycotoxins that were once uncommon in certain regions may become more prevalent, while others may appear in new areas altogether. (3) In addition, changes in agricultural practices, such as planting crops in new areas or using different irrigation methods, can also impact the occurrence of mycotoxins. It's a fitting topic linking the importance of metrology to analytical mycotoxin analysis, and recognizing the implications for human and animal health which intensifies the need to trust an analytical result. In order to accurately detect and quantify mycotoxins, researchers and analysts must use methods that are traceable to a standard reference material or measurement system. This ensures that the results are consistent and comparable across different laboratories and testing methods.

Understanding exactly how metrological traceability is established can seem a little like unwinding a knot, the process can be complex, but the basic key involves following a chain of comparisons and calibrations to reference standards. To be able to claim that metrological traceability has been established, means that the chain or trail must be unbroken and that each step in the measurement process has been properly documented and validated.



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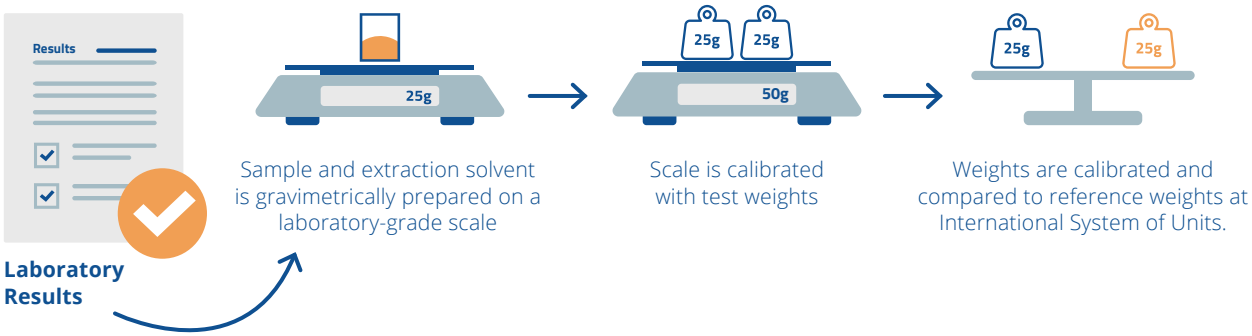
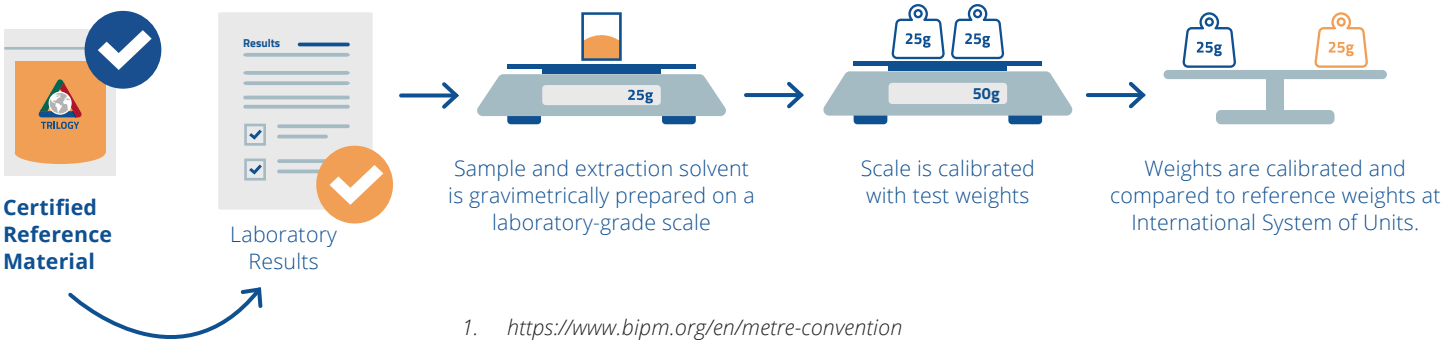
Establishing metrological traceability through analytical analysis:
Start the trail working backwards from the laboratory result which comes from the sample submitted to the laboratory. The laboratory does a sample preparatory process to extract the analyte of interest by quantitatively preparing the solution. The solution is extracted on a laboratory balance that is calibrated against a stainless steel Type 1 test weight (single-piece cylindrical test weight individually serialized). The test weight used to calibrate the laboratory scale the samples are gravimetrically prepared on, is calibrated against a reference mass standard through a third-party accredited testing laboratory. The reference mass standard is traceable to international measurement standards such as the International System of Units (SI).



Establishing metrological traceability through Certified Reference Material production:
Start the trail working backwards from the certified value of the CRM. The raw materials used in the production of a CRM go through the production process and a sample is submitted to a testing laboratory. The laboratory does a sample preparatory process to extract the analyte of interest by quantitatively preparing the solution. The solution is extracted on a laboratory balance that is calibrated against a stainless steel Type 1 test weight (single-piece cylindrical test weight individually serialized). The test weight used to calibrate the laboratory scale the samples are gravimetrically prepared on, is calibrated against a reference mass standard through a third-party accredited testing laboratory. The reference mass standard is traceable to international measurement standards such as the International System of Units (SI).



1. *https://www.bipm.org/en/metre-convention*
2. *https://www.worldmetrologyday.org/*
3. *Gomez, K.S., Castañeda Roldán, E., Ávila Sosa, R., Munguía-Pérez, R. (2022). Mycotoxins and Climate Change. In: Frías-De-León, M.G., Brunner-Mendoza, C., Reyes-Montes, M.d.R., Duarte-Escalante, E. (eds) The Impact of Climate Change on Fungal Diseases. Fungal Biology. Springer, Cham. https://doi.org/10.1007/978-3-030-89664-5_14*