

The Role of Metrology in Ensuring Competence for International Trade Through Proficiency Testing

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INTRODUCTION

Proficiency Testing (PT) in metrology plays a crucial role in ensuring the competence of testing and calibration laboratories, thereby supporting international trade.

As Uruguay's National Metrology Institute (NMI), LATU maintains over 130 Calibration and Measurement Capabilities (CMCs) listed in the Key Comparison Database (KCDB), ensuring measurement reliability. Since 2011, LATU's Department of Chemical Metrology has provided proficiency testing services. Accredited under ISO/IEC 17043 since 2013—first by UKAS (UK Accreditation Service) and later by OUA (Uruguayan Accreditation Body)—LATU ensures compliance with international standards. As the NMI, LATU emphasizes measurement traceability in all proficiency testing programs, regardless of their format.

Uruguay is internationally recognized for its role as a major producer and exporter of food products including beef, dairy, and cereals. Given the importance of these sectors, significant national efforts are directed at maintaining and improving the safety and quality of these products throughout the entire production chain. To support this, LATU organizes various proficiency testing programs aimed at laboratories in diverse fields. LATU's proficiency testing covers three key areas:

- Microbiological Testing** – For food production companies, analytical labs, and certifiers, covering microbial counts and pathogen detection.
- Physicochemical analysis** – For food manufacturers, mills, and producers, assessing moisture, physical defects, protein, and fat content, all critical for trade.
- Calibration Laboratories** – Ensuring traceable measurements in mass, temperature, pressure, volume, length, and humidity.

RESULTS AND DISCUSSIONS

Microbiological Proficiency Tests

The need for microbiological proficiency testing (MPT) was first identified by the Ministry of Livestock, Agriculture, and Fisheries (MGAP) in March 2011 as a form of technical support for laboratory authorization.

The first rounds were conducted in 2012, focusing on the detection of *Salmonella spp.* and *Listeria spp./Listeria monocytogenes* in meat matrices. Microbiological count rounds began in 2015, starting with dairy matrices. The following table illustrates the growth in the number and types of rounds, as well as the number of participants, over the years.

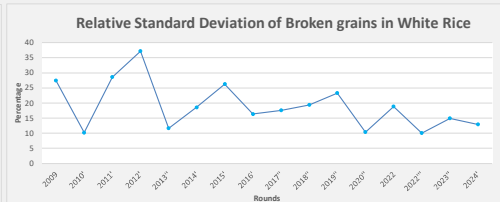
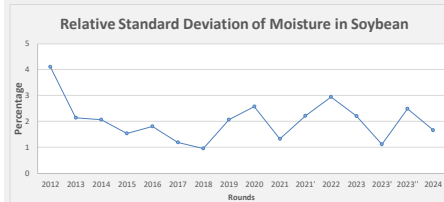
		Year			
Scope		2013	2018	2021	2024
Search	Number of rounds	3	3	3	4
	Number of participants	17	45	57	94
Count	Number of rounds	---	2	3	5
	Number of participants	---	42	88	119
Total	Number of rounds	3	5	6	9
	Number of participants	17	87	145	213



Physicochemical Proficiency Tests

LATU organizes annual, and in some cases more frequent, proficiency testing rounds to help laboratories improve both their individual and collective performance. Feedback sessions are conducted within production chains, such as those for rice and soy, to enhance result comparability among participants. These efforts contribute to harmonizing export conditions in some cases and improving payment conditions for producers in others.

Additionally, LATU has collaborated with regulatory bodies to support the certification of food processing and export plants. As an example, the following table presents the work conducted from 2012 to 2024 within the framework of moisture proficiency tests on soybean grains and broken grains in rice.



In both cases, we are dealing with method-dependent parameters, whose traceability is linked to the internationally defined reference method.

Calibration Proficiency Tests

These tests began in 2012 in the areas of Mass and Temperature and were later extended to Volume, Pressure, Length, and Humidity. Their implementation was essential for enabling the accreditation of secondary calibration laboratories, fostering a network of such laboratories in Uruguay.

Metrological traceability in these cases is ensured through LATU as the NMI, with CMCs published for these quantities. Over the years, the needs of secondary laboratories have been addressed by adjusting the scope of PTs in line with improvements in their accreditation.



The variation in scope is shown for the magnitudes of Mass and Temperature.

Year	Scope	
	Mass	Temperature
2012	EA.MAS.01: calibration of class M1 weights, for the following weights: 1g, 100 g, 1 kg y 20 kg.	EA.TEM.01: Pt100 sensor calibration from -40 °C to 140 °C
2022	EA.MAS.05: Calibration of class F2 weights, for the following weights: 10 mg, 1 g, 100 g, and 1 kg; and Calibration of a 10 kg class M1 weight	EA.TEM.07: Pt100 sensor calibration from -50 °C to 300 °C
2024	EA.MAS.06: Calibration of class F1 weights, for the following weights: 5 g, 200 g and 1 kg	EA.TEM.08: Characterization of an oven at 100 °C

CONCLUSION

The following table illustrates the increase in the number of rounds for all proposed scopes. It highlights LATU's efforts to efficiently support the national quality infrastructure—both by fulfilling its role as an NMI and by providing accreditation support as a proficiency testing provider—working alongside regulatory bodies, industry, and conformity assessors.

Year	ROUND		
	Microbiology	Physical - chemical	Calibration
2013	3	7	5
2018	5	7	5
2024	9	14	5
Total rounds	66	112	36

Moving forward, LATU aims to further enhance the comparability of results from analysis and calibration laboratories, ensuring the traceability of reference values to the SI or to appropriate international methods and standards for method-dependent parameters. Without comparability, reliable commercial transactions are not possible. The information presented here is just a sample of the impact that metrology and its applications have on trade-related measurements.

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