

Tunisian Certified Reference Materials (CRMs) for a Circular and Resilient National Economy

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INTRODUCTION

The National Laboratory of Metrology in Chemistry (LNM-C-INRAP) is pivotal in ensuring metrological traceability and supporting Tunisia's transition towards a circular and resilient economy.

LNM-C-INRAP develops Certified Reference Materials (CRMs) to enhance measurement accuracy, ensuring product safety, sustainability, and compliance with international standards.

These CRMs support quality control, food safety, and environmental monitoring, strengthening Tunisia's industrial resilience and competitiveness.

This initiative aligns with SDG 9 (Sustainable Industrial Development) by providing traceable metrological services that enhance product safety, sustainability, and compliance with international standards [1].

OBEJECTIVS

1. Strengthen Tunisia's metrology infrastructure to support sustainable industrial development.

2. Provide reliable metrological services to assess the safety, sustainability, and environmental impact of materials and products.

3. Enhance Tunisia's economic resilience by mitigating risks related to resource scarcity and pollution.

MATERIALS & METHODS

I. ISO 17034:2016 & ISO 33405:2024:

- ISO 17034: 2016 General requirements for the competence of reference material producers.
- ISO 33405:2024 Reference materials Approaches for characterization and assessment of homogeneity and stability.

II. The BIPM MLCBKT program:

- This initiative by the International Bureau of Weights and Measures strengthens mycotoxin metrology in developing economies by fostering collaboration between National Metrology Institutes.
- It provides knowledge transfer to scientists for the characterization of pure mycotoxin materials and the production of certified reference material solutions [2].

III. Gravimetric Method :

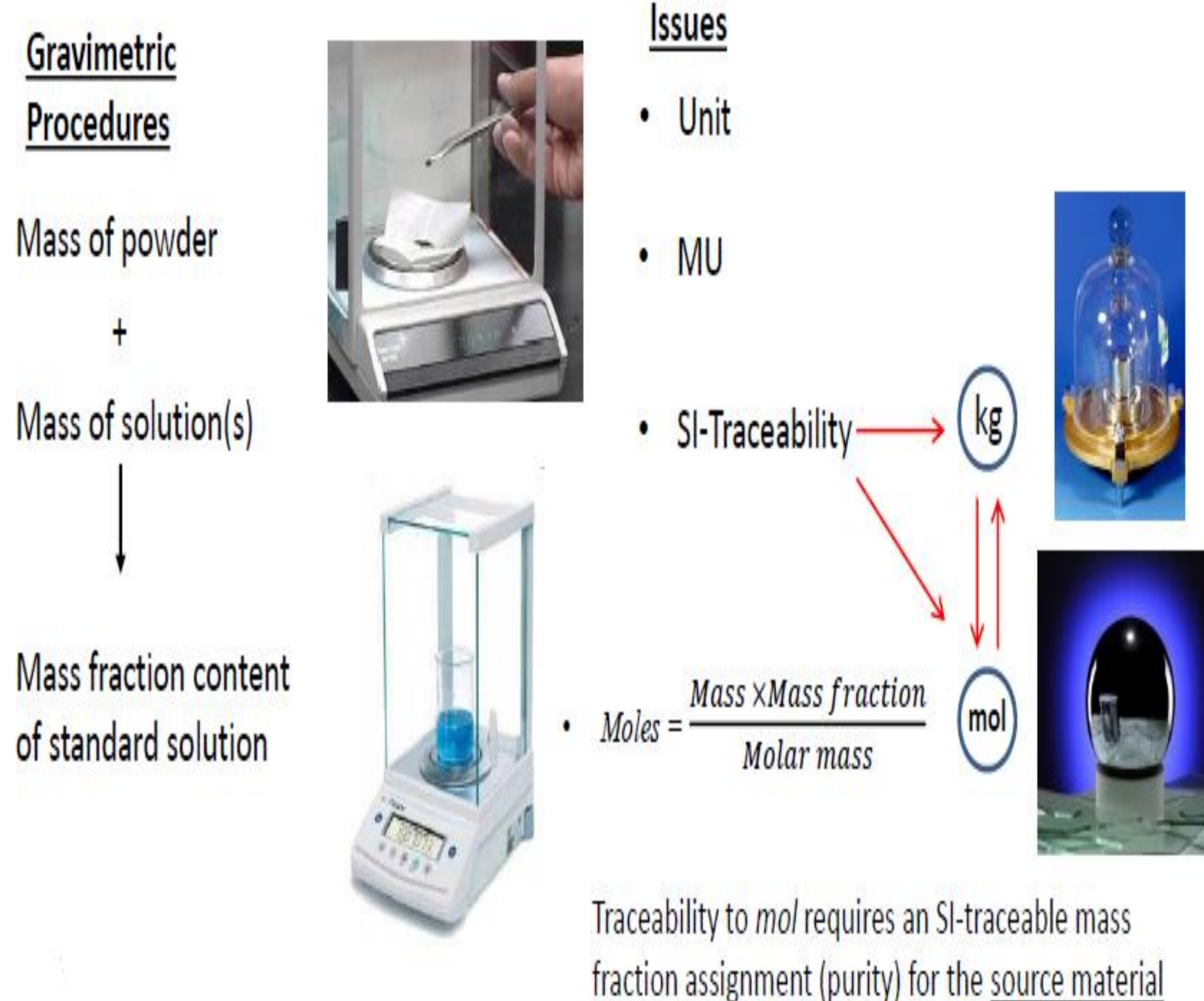


Figure1. The Gravimetric Method as a Primary Method [3].

IV. Rapid Alert System for Food and Feed (RASFF)

- A food safety tool facilitating rapid information exchange between member countries, enabling swift responses to public health risks in the food chain.[4].

RESULTS

I. The Tunisian National Strategy for Metrology in chemistry:

This Strategy aims to respond and to prioritize the national needs in metrological services mainly CRMs as a tool for quality assurance.

1) Studying the Tunisian market positioning in international trade through the RASFF food and feed safety alerts:

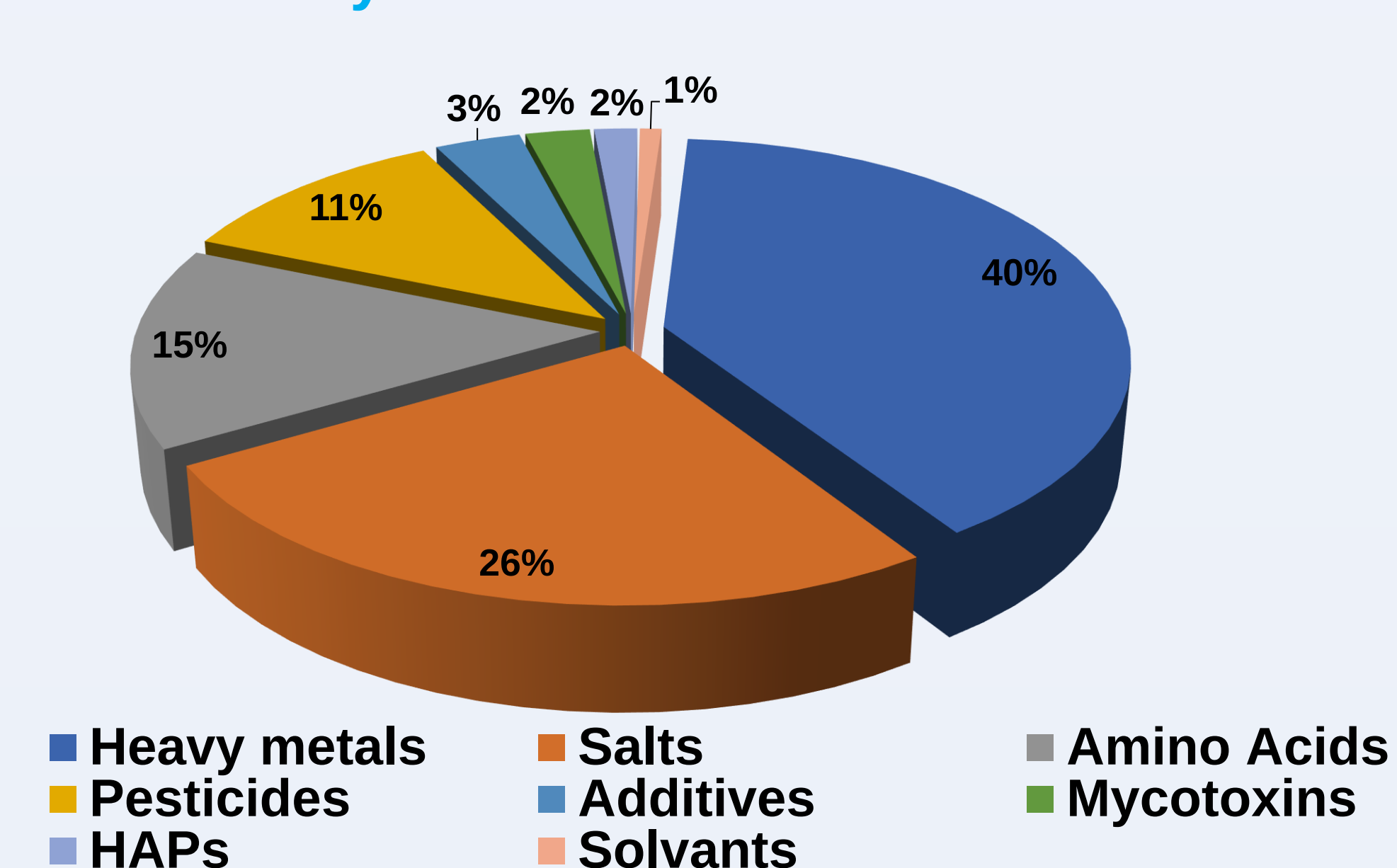


Figure 2. Tunisian export information with risks to public health detected in the food chain.

2) Studying the Tunisian Local & Import Market: The Quality Control Process

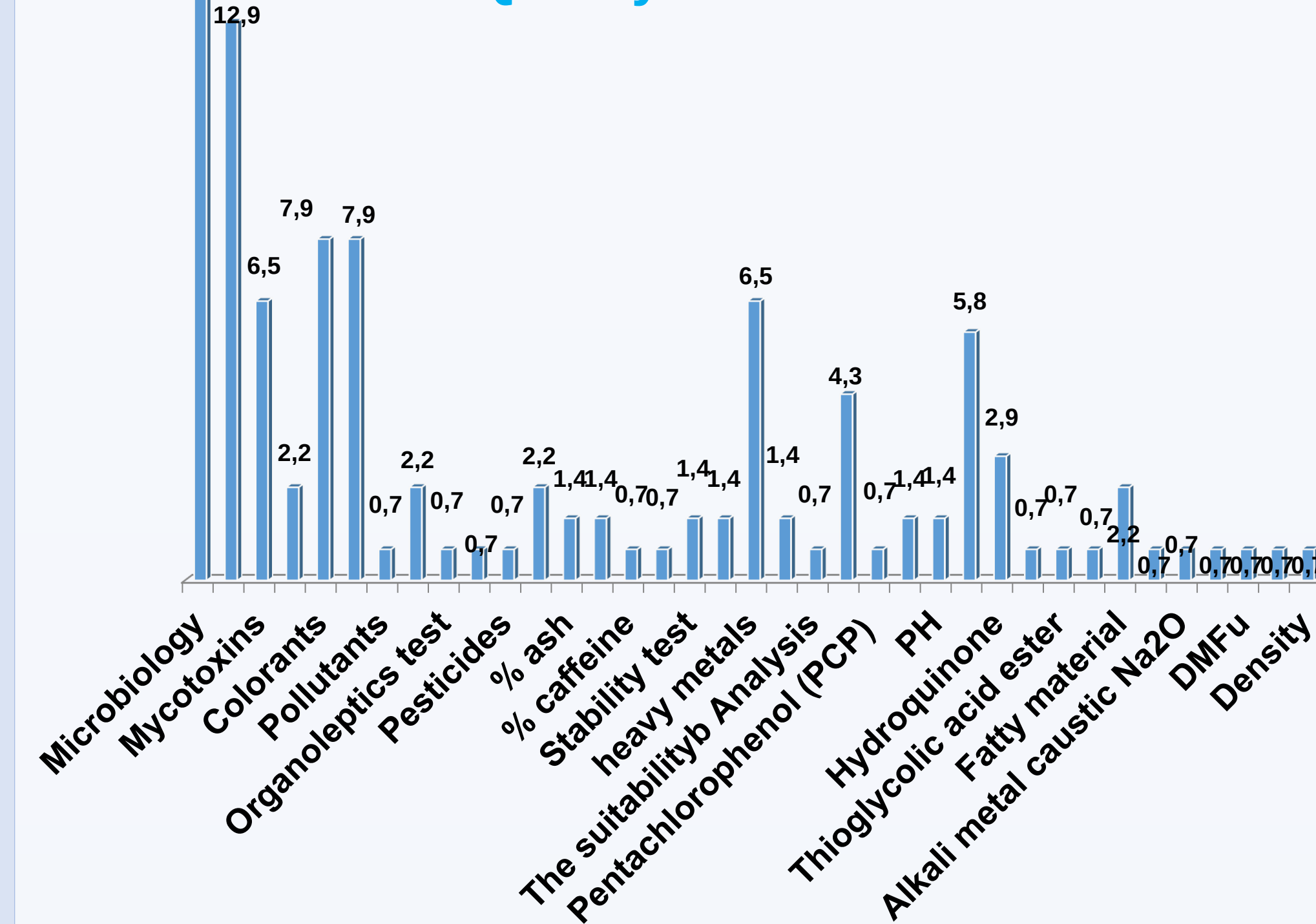


Figure 3. Studying Contaminants of the Local & Import Market (%) (Source of information the Tunisian Ministry of trade).

II. CRMs Production:

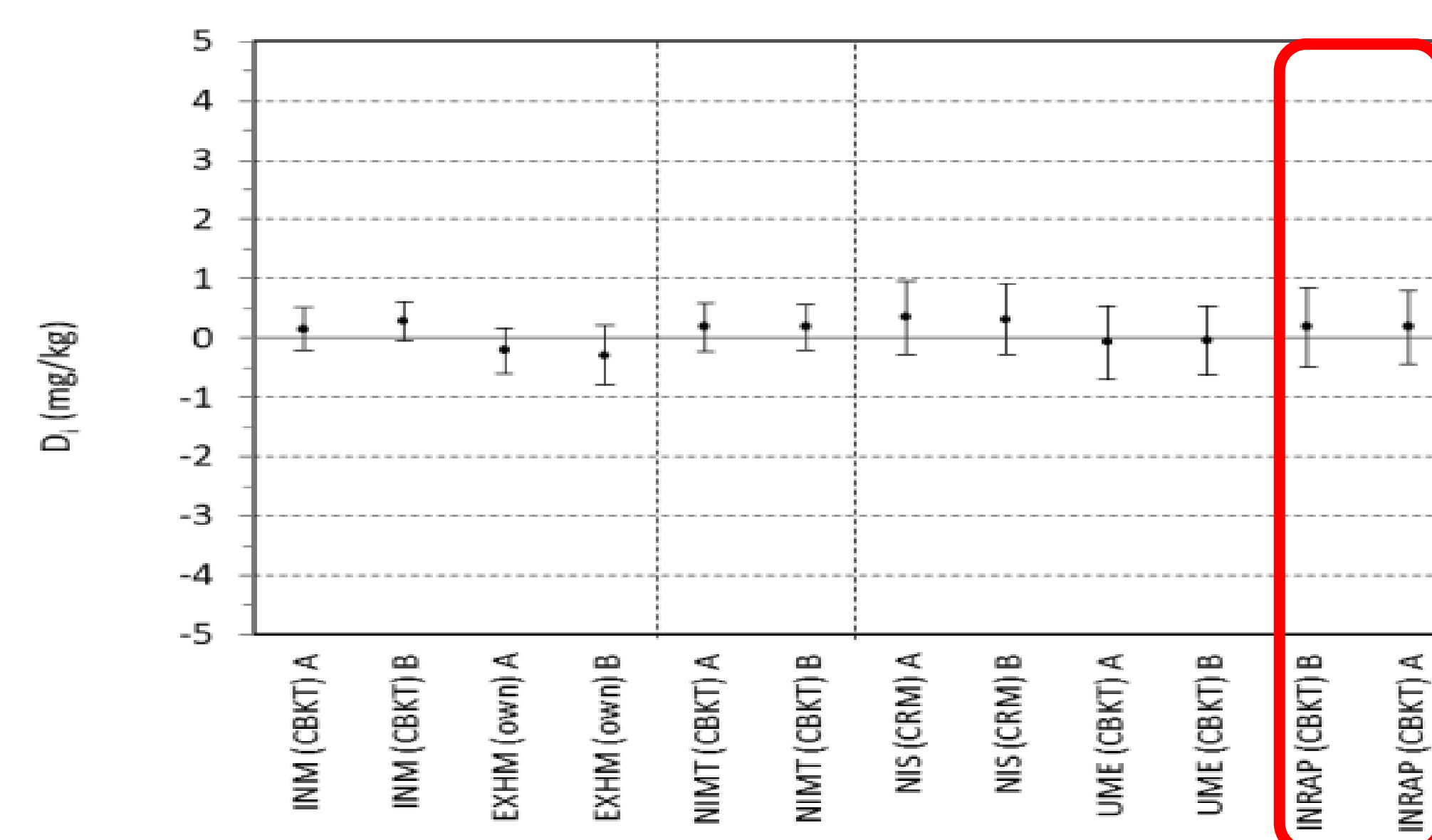


Figure 4 . INRAP Results in CCQM-K154.d for Patuline Calibration Solution Production [5]

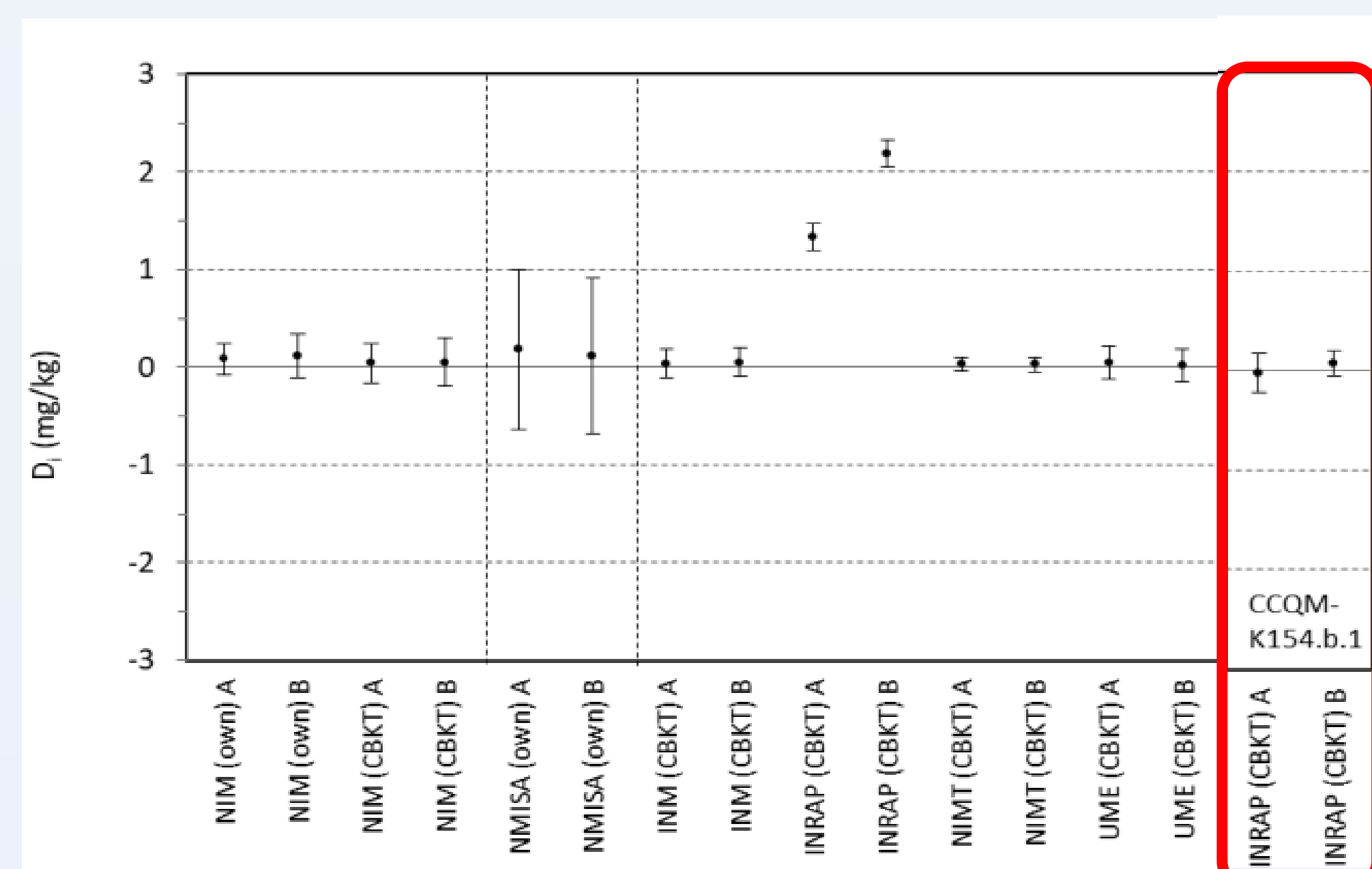


Figure 5. INRAP Results in CCQM-K154.b1 for Aflatoxine b1 Calibration Solution Production [6].

CONCLUSION

Through the development of Tunisia's National Strategy for Metrology in Chemistry, LNM-C-INRAP has successfully produced two organic calibration solutions (AFB1 and PAT) and initiated the self-production of an inorganic calibration solution for copper in collaboration with PTB. These productions launched the first gravimetric unit for CRMs production in Tunisia.

Participation in the CCQM-K154 comparison series and the MLCBKT & CBKT programs has strengthened its expertise, enabling the submission of two Calibration and Measurement Capabilities (CMCs) in 2025

These achievements reinforce Tunisia's circular economy by ensuring traceable, high-quality CRMs that enhance confidence in product safety, efficiency, durability, and reusability, aligning with international standards and market needs.

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