



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Bureau
International des
Poids et
Mesures



Veterinary Drug-residue Monitoring to Ensure Egypt's Food Safety and Support Healthy Lives

NIS has developed a new isotopic dilution mass spectrometry (IDMS) capability that will support the development of new references for the assessment of food safety, nutrition, and quality

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The Challenge

Veterinary drugs in animal products are among the most critical residues affecting human health. Excessive residues of veterinary drugs can lead to chronic toxicity, allergic reactions, and antimicrobial resistance in those who ingest the food. Thus, accurate, metrologically traceable measurements of these residues in animal products are vital to ensuring food safety and protecting the health of the populations that consume them.

On 15 November 2020, Egypt's National Food Safety Authority (NFSA) issued Decision No. 13/2020, which set new maximum residue limits (MRLs) for veterinary drugs and their residues. Compliance with Decision No. 13/2020 and CODEX CX-730 international legislation on residues of veterinary drugs in food, as well as with Egyptian standard No. 1546/2024 for food labeling, requires the standardization and validation of measurement methods. In Egypt, laboratories that perform analytical control of food-producing animals are required to have quality control procedures to ensure the validity of results and must demonstrate proficiency in applying these test methods. The use of matrix-matched certified reference materials (CRMs) is also an integral part of most food laboratories' quality systems and plays a central role in validating the accuracy of analytical methods and laboratory performance. They are a useful metrological tool for laboratory accreditation and for establishing metrological traceability to SI units.

Thus, the development of reference materials (RMs), including CRMs, for veterinary drug residues represents a critical intersection of metrology, animal science, and public health. As global livestock production intensifies, demand for food testing accelerates, and thus, the need for these reference materials will be paramount. Importantly, the need will evolve from the more straightforward calibration standards and mixtures to highly complex matrix-based RMs that accurately represent real food products and are used to validate analytical methods. Prior to this metrological intervention, Egyptian food testing laboratories lacked ready access to CRMs and other reference materials necessary to monitor veterinary drug residues.

The Solution

Currently, NIS staff are collaborating with Physikalisch-Technische Bundesanstalt (PTB) to undergo training in isotopic dilution mass spectrometry (IDMS) measurement techniques, with the aim of providing an IDMS measurement service for various contaminants in food matrices, including the production of CRMs, PT samples, and other quality control materials.

As a direct result of this collaboration, NIS has recently developed several CRMs and reference materials¹ to support the assessment of food safety, nutrition, and quality, including those for toxic elements, organochlorine pesticides, polychlorinated biphenyls (PCBs), mycotoxins, and certain bioactive substances (e.g., vitamins and provitamins). The IDMS measurement will be applied to value assignment in the production of CRMs, PT samples, and other quality control materials.

A Quantifiable Impact

Prototype food matrix reference materials (meat, milk, eggs, and honey) have been developed and initially characterized for veterinary drug residues. These CRMs and RMs are intended for use by food control laboratories across Egypt, and are anticipated to be available for customers soon. This will increase confidence in data quality, establish quality control charts to monitor the long-term reproducibility and consistency of test methods, and ensure regulatory compliance.

Acknowledgments. The NIS staff is grateful for the financial support of Physikalisch-Technische Bundesanstalt (PTB).

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¹ National Institute of Standards. <http://nis.sci.eg:345/pages/Home>