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Keeping Philippine foods, waters safe thru referencing

The food world has discovered the key to stopping and preventing massive product recalls. Some quarters, however, met the news with both skepticism and excitement. Far from the usual fanfare and fireworks, as well as massive media hype, there is, however, something quiet and reassuring about this new tool we call reference materials (RMs).

So what are reference materials? RMs and the process of referencing are means to confirm methods and to assess accuracy of measurement results. These are developed through rigorous R&D (research and development).

Generally, these materials provide measurement laboratories a range of matrix combinations to analyze, say, content of properties in foodstuffs, i.e., aflatoxin M1 in milk powder, and aflatoxins B and G in peanut butter products, among others.

However, RMs are not only useful in proving what makes up a particular food, its micronutrients, or the extent of its authenticity. What makes it valuable is how it supports results of measurement laboratories to ensure that commodities can pass stringent international trade standards on food quality and control.

This is because product recalls pose significant economic burdens. When these recalls are traced, for example, to high histamine levels (a chemical indication of food spoilage) in canned tuna fish, a public health scare can lead to epidemiological tracking of determinants of the disease conditions.

Now, this is not only scary, it is also time consuming, expensive, and damaging to the canned tuna manufacturer. When the scare happens overseas to a Philippine product, it does not only mean refused entry. It can also put the country name in the list of barred exporters of unsafe products.

Currently, most Philippine food manufacturers rely on RMs purchased overseas like the US, UK, Japan, China, and Thailand. RMs are fairly pricey; one material per food product may cost from Php15,000 to Php30,000. Further, these are updated continually.

ITDI has developed reference materials on benzoic acid (a preservative) in mango juice, benzoic acid in banana catsup, and soon pesticides in fresh mango, and other fruits and vegetables.

First RMs in PH

While use of highly characterized, authenticated control materials, such as RMs, is vital in food testing, the Philippines took time to develop these.

Dr. Benilda S. Ebarvia, Assistant Scientist and head of the Metrology in Chemistry (MiC) Laboratory of the National Metrology Laboratory at the Industrial Technology Development Institute (NML-ITDI) explains why.

Dr. Benilda S. Ebarvia, Assistant Scientist and head of the Metrology in Chemistry (MiC) Laboratory of the National Metrology Laboratory (NML-ITDI) is the first winner for the Philippines of the 2019 Developing Economies NMI (DEN) Award given annually by the Asia Pacific Metrology Programme (APMP). She bested others from Bangladesh, Cambodia, China, North Korea, Pakistan, Zimbabwe, Fiji, India, Indonesia, Mongolia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, and Vietnam.

Photo Credit: RRUDela Cruz

"Referencing is time consuming, requiring skills that need to be learned and honed through the years. Their [RMs] development has to be matched with appropriate, state of the art – that means very expensive -- equipment. Staff who will be using the equipment and devices have to be trained on how to use, maintain, and trouble-shoot the same."

Unfazed by the scope and breadth of work that remains, Dr. Ebarvia proposed repair of a standing facility at NML, which would serve as site for development of RMs.

On January 17, 2018 work began on the metrology in chemistry service facilities, located to the left of the NML building, which is in Bicutan, Taguig City. It will soon house the 1,900-m^2 MiC Laboratory.

On the other hand, the 1,600-m^2 Metrology in Biology (MiB) Laboratory will be fixed on the right side of NML. Marlon Aguinaldo, Senior Science Research Specialist at the Standards and Testing Division (STD-ITDI), heads the MiB Laboratory.

Both are three-floor structures where activities such as reference materials production, reference materials storage, and analysis will be carried out.

The Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) is monitoring upgrading of the facilities under the five-year program *"Enhancement of the Competence and Capabilities of the National Metrology Laboratory of the Philippines."*

The program consists of four projects, which include chemical metrology for organic contaminants in food and water, chemical metrology for inorganic toxic elements in food and

water, biological metrology for microorganisms in food, and strengthening the physical metrology capabilities of NML.

Dr. Ebarvia claimed, *"We are working to get there. It may take a long time still, but we will surely get there. In fact, we aim to develop, soon, the country's own Certified Reference Materials."*

Indefatigable, she began actual referencing work on water and food in 2013 and completed RMs on presence of trace heavy metals in water, such as lead, cadmium, copper, iron, manganese, nickel, zinc, cobalt, and magnesium. As well, an RM on calcium (a reactive metal) in water was developed. These metals are toxic and noted for their potential toxicity in the environment.

RMs in food include benzoic acid (a preservative) in mango juice and banana catsup and histamine in canned tuna.

When the project began in 2017, her team completed another set of RMs on trace presence of toxic metals in drinking water (manganese, nickel, cobalt, and iron), benzoic acid in banana catsup, sulfite as preservative in dried mango, and histamine in dried *salinas* fish.

With repair work on the facilities targeted to be completed this year, Ebarvia's team is complementing this with plans to complete until 2021 development of 15 RMs on pesticides in fresh mango, and other fruits and vegetables; and presence of veterinary drug residues such as salbutamol in pork meat; and 3-Amino-5-morpholinomethyl-2-oxazolidone or AMOZ in fish, among others. With these developments resulting from R&D, the local metrology expertise (in chemistry and biology) is fast gaining ground redounding to industry's benefit.

Moreover, while industry stand to cut cost on purchasing RMs abroad, most importantly, having our own RMs enable us to support results of measurement laboratories to ensure that products pass international trade standards and help avoid product recall or detention especially in the export market, a scenario that is too costly for the economy. *(AMGuevarra\\ DOST-ITDI S&T Media Service)*

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