

Helping You Keep Pace

with Food Safety Demands

PEOPLE

PRODUCTS

EXPERTISE

INFORMATION

SUPPORT

While the roles of people working in food safety may vary, they face a common concern: how to provide adequate, safe and nutritious food with increasingly limited resources. Economic challenges have led to leaner workforces and cuts in government funding. Climate change is affecting patterns of contamination. Plus, population growth is increasing consumption.

We are here to help. In this issue of *Food Safety Insider*, we describe the variety of resources that Thermo Fisher Scientific™ offers to those who are tasked with keeping food safe:

- Our people, like veteran scientist Jim Chang, Ph.D., who works closely with government agencies around the world to develop cutting-edge methods for food safety testing
- Innovative products that allow our customers to accomplish their goals more efficiently
- Specialized expertise through Centers of Excellence that offer support with specific food safety challenges
- Comprehensive information and data management for food traceability
- Complementary support via a range of educational resources, convenient services and business solutions



Dan Shine, President
Chromatography and Mass Spectrometry

We're food people, and we invite you to share your biggest challenges with us. We also invite you to join us in supporting Seeding Labs, a non-profit organization doing great work to help equip scientists and labs in developing regions (see story on page 14).

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific is the world leader in serving science. We enable our customers to make the world healthier, cleaner and safer by providing analytical instruments, equipment, reagents and consumables, software and services for research, analysis, discovery and diagnostics.

Thermo Fisher Scientific's three premier brands are the foundation of our portfolio:

Thermo SCIENTIFIC

Thermo Scientific represents our broad range of superior analytical instruments, chemistry and consumable supplies, laboratory equipment, software and services that enable integrated laboratory workflow solutions.



Fisher Scientific represents our family of global channel brands comprising a complete portfolio of laboratory equipment, chemicals, supplies and services used in healthcare, scientific research, safety and education.

Unity Lab Services

Unity Lab Services represents our comprehensive laboratory service and support, expertise and single source for laboratory services.

Helping Food Safety Agencies Implement Change

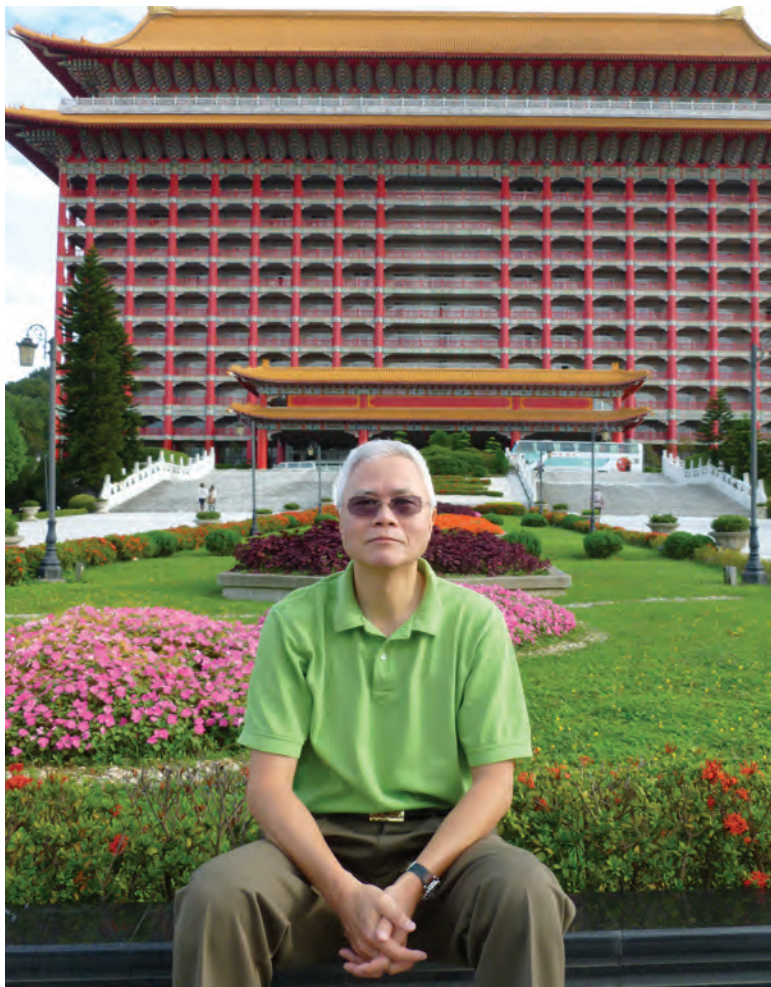
“Comfortable and confident” is how Jim Chang, Ph.D., wants his customers to feel when working with him to implement methods on high-resolution mass spectrometers. For the past 10 years, Dr. Chang has worked for Thermo Fisher Scientific as a Senior Application Specialist whose focus is to support government agencies involved in food safety. He is currently working with six different agencies in the Americas and Asia, and he believes these agencies face a unique challenge. On one hand, their responsibility to safeguard the public means that they are

always looking for better approaches. He states, “Working with them is like a big research project; it is very interesting and fun from a scientific perspective.” On the other hand, Chang points out that implementing new technology is not easy for these agencies because their actions can potentially affect public health and safety. Although the agencies may be motivated to experiment with new technologies and techniques, adopting a change involves a great deal of testing and validation to prove that a new approach is reliable.

One thing his customers can always rely upon is Dr. Chang’s analytical skill set. Chang joined Thermo Fisher with more than 30 years of experience in environmental laboratories, where he gained skills in application development using EI, CI, MS/MS, MSⁿ, LC-MS, ultrafast GC, 2D GC and HPLC. Since joining Thermo Fisher, he has also learned LC-MS/MS and high-resolution Orbitrap technology, and he prides himself on being able to operate all of this analytical instrumentation. According to Dr. Chang, the scientists he works with are true experts in their field of study, and his job is to ensure that those experts can fully utilize their knowledge to quickly develop methods on Thermo Scientific™ instrumentation. His past experience in a regulatory environment facilitates this effort, as he also has expertise in ISO 17025 and GLP programs. Technical expertise

aside, Dr. Chang feels the past experience that has helped him most in his current position is as a lab director within various organizations. Satisfying the needs of the customer was the highest priority in those jobs, and Chang has maintained that same frame of mind while helping food safety agencies.

When asked how his work contributes to customers outside of the regulatory environment and the greater challenge of food safety, Dr. Chang comments, “What I do while working closely with regulatory agencies is directly applicable to others because the methods that are being developed will be published for everyone to utilize. In fact, by utilizing these methods, contract test labs and producers can be confident in their ability to achieve reliable, defensible results that meet regulatory requirements.”



James Chang, Ph.D., in front of a hotel during a visit to Taiwan.

Transform your Food Analysis

Thermo Fisher Scientific recently set out to revolutionize mass spectrometry with our newest generation of instruments. To meet the increasing challenges food scientists face, we focused on setting new limits for sensitivity, reliability, usability, scan speed and even scan type.

Delivering Extraordinary Results

For routine analysis and quality control, we are pleased to introduce two new, state-of-the-art triple-stage quadrupole systems. These systems offer advances in robustness, scan speed and sensitivity, all of which translate to higher throughput in the food lab. Designed for unparalleled value, the Thermo Scientific™ TSQ Endura™ mass spectrometer features LODs and LOQs unrivaled in its class. The Thermo Scientific™ TSQ Quantiva™ mass spectrometer is designed to exceed the most stringent analytical requirements, and is perfect for ultra-low-level quantitation of complex samples that are common in food testing.

Our new triple quadrupole systems have many innovative features. Robustness and sensitivity have been dramatically improved by two new components—a novel, curved ion beam guide with neutral blocker and a redesigned exhaust system. The ion beam guide actively steers ions around a barrier while neutrals are removed, keeping the ion optics path clean. The new exhaust system removes more solvent vapor than ever before, keeping the instrument cleaner. This is of particular importance to food scientists, whose samples are often from dirty matrices and undergo minimal sample preparation. Since many labs are high-throughput, instrument uptime is also an important consideration.

In addition, both systems incorporate a new *active* collision cell which has an axial field down its length. This accelerates ion transmission, yielding scanning up to 500 SRMs per second with zero cross-talk. You can analyze more compounds per run or shorten existing run times. This is important for food scientists, who are often doing multi-residue analyses and screening for hundreds of compounds at a time.

Unparalleled Sensitivity

The innovations described above plus several additional unique elements combine to deliver Active Ion Management (AIM) technology, the key to the sensitivity achieved with the TSQ Quantiva MS. All components of the ion

optics path were designed and tuned in concert in order to maximize sensitivity for users that need to comply with strict regulatory requirements.

Active Ion Management Technology

- **Electrodynamic Ion Funnel**
 - Careful shaping of electric fields to capture and desolvate the ion population
- **Ion Beam Guide with Neutral Blocker**
 - Ions are actively steered around a barrier while neutrals are removed
- **Asymmetric RF Drive**
 - The RF fields on the rods are carefully designed to minimize fringe fields between the rod sets and increase transmission
- **HyperQuads**
 - The world's most precise Quadrupolar rods. Designed for high resolution isolation with amazing transmission
- **Active Collision Cell**
 - Axial fields down the length of the rods are designed to accelerate ions into Q3 allowing 500 SRMs/sec

Interrogate Your Samples with Incredible Depth

For food researchers, we've introduced a powerful new system that incorporates three mass analyzers in one. The Thermo Scientific™ Orbitrap Fusion™ Tribrid™ mass spectrometer can perform nearly any MS or MSⁿ experiment that scientists can imagine—achieve 500,000 resolution to resolve spectral interferences, choose from three dissociation techniques and detect with the Ion Trap or Orbitrap at any level of MSⁿ for maximum experimental flexibility. And it's all powered by the new Dynamic

Scan Management architecture that lets every user design experiments with ease and get the maximum information from every sample. The Orbitrap Fusion MS will allow scientists to explore new ways of detecting unknowns and to perform structural elucidation for both small and large molecules.

Close integration with application-specific software ensures maximum productivity on all systems. Thermo Scientific™ TraceFinder™ 3.1 software for data acquisition and processing of both triple-stage quadrupole MS and high-resolution Orbitrap data allows our customers to use one software platform irrespective of their workflow requirements.

For more information about our new suite of mass spectrometers, please visit www.thermoscientific.com/foodsafetyinsider.



Powering Productivity in Pesticide Analysis

Setting up a triple-stage quadrupole GC/MS for pesticide analysis can be challenging. Whether you are new to this type of analysis, want to expand your target list or want to combine multiple single quadrupole runs into one MRM analysis, the Thermo Scientific™ TSQ™ 8000 Pesticide Analyzer offers you a complete workflow solution. Utilizing an optimal combination of components from our portfolio, we've built an integrated system that provides unparalleled pesticide analysis capabilities.

High-capacity pesticide methods are very easily implemented with the system through the use of timed-Selected Reaction Monitoring (t-SRM). This is complemented by the fast-scanning capability of the TSQ 8000 triple quadrupole GC-MS, making the analysis of hundreds of target compounds with a total of over one thousand transitions not only possible, but easy.

The TSQ 8000 Pesticide Analyzer also has the ability to analyze full scan data at the same time as your targeted MRM analysis. This allows you to harness the power of existing EI full scan libraries to find potential high-level contaminants that targeted analysis would otherwise miss, or to monitor the matrix background for possible interference.

For more information, click on the Pesticide Analyzer link at www.thermoscientific.com/foodsafetyinsider.



Thermo Scientific TSQ 8000 Pesticide Analyzer Components

Configured TSQ 8000 Triple Quadrupole GC-MS/MS System

The TSQ 8000 Pesticide Analyzer is equipped with a TSQ 8000 mass spectrometer and Thermo Scientific™ TRACE™ 1310 GC, configured with both PTV with backflush and split/splitless injectors. Choose either a Thermo Scientific™ AS 1310 autosampler or TriPlus™ RSH autosampler to complete your analyzer.

TraceFinder Software Optimized for Environmental and Food Safety

Designed specifically for environmental and food safety testing, TraceFinder EFS software makes daily GC/MS pesticide quantitation and confirmation easy and efficient.

Pesticide Compound Database

A collection of over 600 pesticides, each with multiple transitions for quantitation and confirmation. Integrated with TraceFinder EFS software and the TSQ 8000 instrument method, the Pesticide Compound Database makes creating your target list as easy as clicking on your pesticides of interest. Automatically expand your database with new compounds and transitions using the integrated AutoSRM capability.

Optimized Instrument Method

Included with the analyzer is a TSQ 8000 instrument method optimized for pesticide analysis. Compound retention times stored in the Pesticide Compound Database were determined using this instrument method and the included GC column, minimizing the need for retention time determination when installing your analyzer—eliminating days, if not weeks, of method development.

Tailored GC Consumables

Both the GC column and a package of the injector liners used in the development of the TSQ 8000 Pesticide Analyzer are included with the system. These consumables have been determined by applications experts to give the best performance for comprehensive pesticide analysis.

AutoSRM Software Capability

AutoSRM software is designed to make the addition of unknowns to your targeted compound list fast and easy by automating many of the tedious steps in developing SRM transitions.

TSQ 8000 Pesticide Analyzer Installation Guide

The TSQ 8000 Pesticide Analyzer Installation Guide brings it all together in a step-by-step instruction booklet detailing the installation of the TSQ 8000 Pesticide Analyzer.

A Unique Approach for Feed Analysis

Sometimes, innovation in an approach is as important as innovation in a product. When scientists at Thermo Fisher Scientific faced the challenge of analyzing four types of antibiotics from dried distillers grains with solubles (DDGS), they realized some creative thinking would be needed. Penicillin G, erythromycin, and virginiamycin S₁ and M₁ are the four major antibiotics used in ethanol production. They belong to different antibiotic classes that include β -lactams, macrolides and streptogramins. Extraction and separation of these chemically diverse antibiotics has proved difficult—especially because they lack good chromophores.

DDGS, the dried remains of ethanol production from corn, is a valuable commodity as a feed supplement for

livestock and poultry because it is rich in protein, fat, minerals and vitamins. During corn fermentation, a mixture of antibiotics is added to prevent bacterial growth, which reduces ethanol yield. These antibiotics can end up in the DDGS which is fed to animals. The U.S. FDA regulates drugs and ingredients used in feed production and has raised concern about levels of antibiotics in DDGS.

Thermo Fisher created a method to extract and separate these antibiotics using a column designed for fast, high-resolution separations of peptides and biological macromolecules. The Thermo Scientific™ Acclaim™ 300 C18 column, which was used in a volatile mobile phase, has wide pores which allow better chromatography than narrow pore columns typically used for antibiotic separations. In addition to an atypical column choice, the method pairs HPLC separation using the Thermo Scientific™ Dionex™ UltiMate™ 3000 RSLC system with the Thermo Scientific™ Dionex™ Corona™ ultra RS™ Charged Aerosol Detector, a universal detector capable of measuring non-volatile and semi-volatile compounds. Charged aerosol detection requires no chromophores for analyte detection and, with sub-nanogram sensitivity, is ideal for measuring these antibiotics at trace levels.

To learn more about this unique method, download the complete application note *Determination of Virginiamycin, Erythromycin, and Penicillin in Dried Distillers Grains with Solubles* at www.thermoscientific.com/foodsafetyinsider.

Ion Chromatography Enhances Workflows

Ion Chromatography (IC) has been used successfully for more than 30 years to separate, isolate and identify the components of chemical mixtures, including complex food matrices. Today, some of the most exciting uses of IC involve its coupling with detection techniques such as mass spectrometry (MS) and inductively coupled plasma MS (ICP-MS). Thermo Fisher Scientific has been building on the unique capabilities created by pairing these technologies to develop complete workflow solutions for food contamination analysis.

Perchlorate in Liquid and Powdered Baby Formula

High amounts of perchlorate in liquid and powdered baby formula can trigger adverse health effects in infants by inhibiting iodide uptake by the thyroid gland. The reduced uptake of iodide inhibits thyroid hormone production, which is essential for proper protein expression, neuronal differentiation and other functions. Analytical methods for perchlorate quantification include IC-MS/MS detection. To highlight how the high sensitivity and selectivity of MS detection provides greater data confidence while minimizing labor-intensive sample preparation, an analytical method for ultratrace-level perchlorate analysis was undertaken using the Thermo Scientific™ Dionex™ ICS-3000 Reagent-Free™ IC (RFIC™) system and Thermo Scientific™ TSQ Quantum Access MAX™ Triple-Stage Quadrupole LC-MS. This method demonstrated

excellent instrument precision and accuracy, as well as good recovery and reproducibility.

Arsenic Speciation In Fruit Juices

Elemental speciation analysis is growing in popularity as producers recognize the need to determine levels of harmful elemental contaminant species versus total contaminant levels. While inorganic forms of arsenic—As(III) and As(V)—are highly toxic, the organic forms (e. g. arsenobetaine) are not considered to be toxic. To demonstrate the abilities of coupling IC with ICP-MS for speciation analysis, apple juice samples were analyzed to determine the concentration of six arsenic species: two inorganic and toxic

Be Sure About Pathogen Results



Several years ago, a company acquisition suddenly gave our microbiology group access to a real-time PCR instrument, high quality molecular reagents and enzymes and a team of scientists experienced in PCR assay development. Combining our long legacy in culture media development with access to other products and consumables from inside the organization gave us the opportunity to offer customers a complete PCR test workflow. However, we didn't want to rush to market with 'just another' PCR system for pathogen detection. With greater numbers of PCR detection systems on the market, we had to ask ourselves, "What would make a company choose ours over others?"

species—As (III) and As (V)—and four organic species—arsenobetaine (AsB), arsenocholine (AsC), monomethylarsonic acid (MMA) and dimethylarsinic acid (DMA). Chromatographic separations were carried out using the Thermo Scientific Dionex ICS-5000 Ion Chromatography system. The Thermo Scientific™ iCAP™ Qc ICP-MS was then used as a highly sensitive and selective arsenic detector (IC-ICP/MS). The developed method offers high sample throughput that is crucial in food applications where large numbers of samples may have to be rapidly analyzed.

To download *Determination of Ultratrace Level Perchlorate in Liquid and Powdered Baby Formula* and *IC-ICP-MS Speciation Analysis of As in Apple Juice*, please visit www.thermoscientific.com/foodsafetyinsider.

Before going to market, we spent a great deal of effort working with customers to build our knowledge and to ensure that we specified and designed the right product. Over the years, we've seen our customers strive to meet increasing consumer and legislative demands while managing costs. But we also learned that, these days, we need to offer *more* than just a test that delivers proven sensitivity and specificity. Our customers also need to streamline test workflows and reduce time to results. Therefore, we focused on delivering speed, ease of use, reliability and value. We could have commercialized a product range sooner, but that would have meant compromising some of the product attributes we knew were important to incorporate.

The Thermo Scientific™ SureTect™ Real-Time PCR System launched this year and has received positive user reviews. The simple workflow and flexibility for sample throughput have been particularly well received. Alliant Food Safety Labs was one of the first U.S. sites to install the SureTect system and Lab Manager Jeff Krawazak commented, "We've been impressed by the quick and easy sample preparation steps and the ability to process any combination of assays together. Implementation and staff training have been very quick and straightforward."

Customers can be assured of high quality performance of the SureTect assays, even among challenging sample matrices. We've recently been granted Performance Tested MethodSM status by the AOAC Research Institute for a wide range of food and associated food matrices for SureTect *Salmonella* species Assay and for the SureTect *Listeria* Assays. Studies to attain AFNOR certification through AF validation according to ISO 16140 (the ISO standard method for method comparison), and to extend the range of matrices with AOAC Performance Tested Method status, are underway and due to be completed later this year.

Assays for *Salmonella* species, *Listeria* species and *Listeria monocytogenes* are available now. An assay for *Escherichia coli* O157:H7 will be released later this year, with further tests for other key pathogens in development.

To learn more about the SureTect PCR solutions, please visit www.thermoscientific.com/foodsafetyinsider.

Focused Resources for Persistent Organic Pollutants

Persistent organic pollutants (POPs) are chemical substances that are of worldwide concern. As a result of industrial activity, POPs are widespread in the environment and persist for many years after formation. Exposure to POPs can be harmful to living organisms, including humans, because POPs produce a toxic effect at very low concentrations and bio-accumulate in fatty body tissues for long periods. Dietary exposure to POPs is of great concern due to their ability to bio-magnify up the food chain. Like any other contaminant, food contamination incidents involving POPs can fast become global news, damage brands and negatively affect international trade.

Controlling POPs in the food chain is critical to ensuring environmental and human health. Due to concerns about these substances, the Stockholm Convention on POPs (an international treaty administered by the United Nations Environment Program to eradicate or severely restrict POPs use) has been ratified by more than 160 nations to protect human health, wildlife and the environment.¹ Continuous monitoring of the presence of POPs in food, food additives and the environment is a key aspect to controlling exposure. Strong legislation with strict testing requirements has been established by organizations such as U.S. FDA, U.S. EPA and the EU Commission.

Some of the POPs present in humans that are of greatest concern are polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). These two groups of chemicals are collectively referred to as dioxins and are known to be highly toxic, cause reproductive and developmental problems, damage

the immune system, interfere with hormones and also cause cancer.² The majority of exposure to these chemicals usually occurs through diet.³

Our corporate mission was the driving force behind the formation of the Thermo Fisher Scientific POPs Center of Excellence. Established in 2011, this Center was created to support laboratories with the task of researching and monitoring POPs in food and the environment. The Center is focused on enabling high productivity, providing valuable solutions for some of the most challenging POPs determinations and consolidating the POPs resources and expertise offered by Thermo Fisher.

Located in Bremen, Germany, the POPs Center supports customers and associates internationally as a:

- Reference for POPs analysis
- Point for access to POPs methodology using Thermo Scientific products
- Resource for collaborative projects on the latest instrumentation
- Knowledge hub for Thermo Scientific product users who are working in POPs analysis
- Partner to industry and government labs to improve the quality and efficiency of POPs monitoring

Members of the POPs Center of Excellence team have worked within the area of POPs analysis for many years, both within Thermo Fisher and also with a variety of organizations including government institutions for regulatory monitoring, universities researching POPs and high-throughput contract testing labs. This brings the Center a wealth of experience and expertise while it also enables a high level of collaboration with outside organizations, especially with respect to the latest technologies applicable for monitoring POPs.



Supporting Regulatory Change for Safer Food

For many years, EU legislation has stipulated that only GC-MS instrumentation that can provide high resolution ($R = 10,000$) accurate mass for PCDDs/PCDFs and dioxin-like (dl)-PCBs analysis are applicable for reporting confirmatory results for dioxins in food and feed samples.⁴ This requirement is driven by the need for these compounds to be monitored at ultratrace levels in food and feed due to concerns about their toxic effects in humans at very low concentrations and their ability to accumulate in fatty body tissues for long periods. The combination of complex sample matrices (food and feed) and ultratrace quantitation requirements (low pg/g) means that very high sensitivity and selectivity is required throughout the method to ensure the total toxicity of the sample is determined accurately.

The gold standard to provide the required performance for this analytical challenge is GC-MS on magnetic sector instruments (GC-HRMS) such as the Thermo Scientific™ DFS™ High-Resolution GC-MS system. These systems provide the ultimate performance to measure dioxins and other compounds very accurately and precisely at extremely low concentrations in a variety of complex matrices. They are especially suited to provide data for background level studies and official maximum level control in food and feed.

In recent years, there has been a growing interest in GC-MS/MS techniques as a means to supplement GC-HRMS systems in the official control of POPs in the food chain. Recently, European reference laboratories undertook a project to look at GC-MS/MS in the context of current legislation and the Thermo Fisher Scientific POPs Center supported their efforts. Dr. Martin Rose of the UK National Reference Laboratory (NRL) for Contaminants in Food and Feed at The Food and Environmental Research Agency (FERA) comments, “Thermo Fisher has helped us as an NRL to evaluate the suitability of using GC-MS/MS for official food and feed control of dioxins. We wanted to establish whether or not this technique was at a stage where it could meet the highly demanding analytical criteria

required for dioxins analysis, which previously allowed only HRMS to be used as a confirmatory technique.”

In addition to investigating the suitability of GC-MS/MS as a confirmatory technique, EU reference laboratories were charged with making a recommendation to the EU Commission about amending the regulations and defining analytical performance criteria associated with the analysis. The POPs Center collaborated in the investigation and presentation of the data to the scientific community for discussion. In some cases, the Thermo Scientific™ TSQ Quantum XLS Ultra™ GC-MS/MS was provided to the reference laboratories along with support and consultation from the POPs Center team, especially in training and setting up the instrument methods. The help of the Center facilitated the development of a rich data set on a variety of matrices and helped accelerate the working group’s ability to engage in the scientific debate and discussion. In fact, the POPs Center also helped encourage the discussions by establishing their own meetings that took place during dioxin conferences in San Antonio, Brussels and Australia. In addition, the popular *Recent Advances in POPs Analysis* symposium organized by the Center is running into its 9th occurrence and has seen presentations from leading researchers and industry experts on this subject and many more associated with POPs analysis. Dr. Rose states, “The POPs Center symposia are high quality international events with the same scientific caliber (but a more narrow analytical focus) as the wider, more prestigious international conferences that focus on POPs research. They are very well organized and take place in carefully chosen locations to help make them very memorable events.” Some of the findings of the Reference Laboratories working group were also presented at *Dioxins 2012* in Cairns, Australia.⁵

The result of the investigative work in dioxins and PCBs was a recommendation to update the legislation in the EU. The new legislation will allow for the use of GC triple quadrupole MS in addition to GC-HRMS for the official control of food and feed samples. According to Dr. Rose, "Being able to use MS/MS will open up the possibility of undertaking dioxins analysis to a much larger number of food and feed control laboratories who do not have access to HRMS. The more laboratories undertaking this analysis, the more analysis and control will be undertaken, resulting in a safer food supply."

What's Next?

There has been a marked increase in the desire of many food producers and ingredient manufacturers to monitor their own processes extremely closely in order to protect consumers from exposure to POPs. As new regulations appear, the POPs Center team will focus on supporting organizations that interact with the food chain to ensure they have access to the best analytical technologies and methods available. In addition, the Center will be working with researchers to develop new, efficient methods using the latest technologies available to monitor new POPs that are still being classified.

To find out more please visit: www.thermoscientific.com/foodsafetyinsider.

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Pesticide Analysis Center Established

*An interview with Paul Silcock, GC-MS Marketing Manager
and Member of the Thermo Fisher Scientific Pesticide Analysis Center of Excellence*

Q: Why is Thermo Fisher Scientific investing in this new Pesticide Analysis Center of Excellence? Is it modeled on the Persistent Organic Pollutants (POPs) Center?

We have has a strong commitment to enabling our customers to make the world healthier, cleaner and safer. This commitment has led to specific investments and initiatives related to key areas of food safety and environmental analysis, such as the POPs Center of Excellence. The success of this consolidation of resources and expertise in the POPs Center naturally led to us wanting to address another hugely important area – pesticide analysis. As with POPs, we have a great amount of expertise, experience and cutting-edge technology in the area of pesticides analysis. Through the new Center, we will consolidate all of that capability to support labs working in this field.

Especially popular for the POPs Center is a focused annual event that brings scientists together to discuss discoveries, challenges and solutions. We hope to have the same level of participation as we offer our first Pesticide Analysis Center of Excellence events in 2014.

Q: What special resources will the Pesticide Analysis Center of Excellence offer?

The Center will provide customers a reference for pesticide analysis that is specifically focused on high productivity analytical technologies. We will also collaborate on projects

to make advances in our worldwide capacity to measure pesticides in the environment and the food we eat. Another key element will be to provide consultation and advice for pesticides analysis when using Thermo Scientific products.

We also launched a brand new web portal for the Pesticide Analysis Center of Excellence. This helps our customers easily access all of our resources associated with pesticides analysis. This includes the latest technology developments, applications, webinars and other scientific materials.

Q: Thermo Fisher Scientific also has a food focused resource, the Food Safety Response Center. How will all of these Centers work together?

The Food Safety Response Center (FSRC) is of course another example of the corporation's commitment to supporting food safety. FSRC's unique strength is the ability to activate a fast response to emerging concerns of chemical contamination in the food chain. The Pesticide Analysis Center of Excellence will support this response if the incident involves pesticide residues. In addition, when there is no crisis occurring, the FSRC team is deploying their expertise to help validate methodologies in the area of food safety. On occasion, these are pesticide methods and, as such, the Pesticide Analysis Center of Excellence collaborates closely with the FSRC to provide the best possible methodologies. The three Centers combined are really a network of resources focused on food safety and they work together whenever needed to assist customers and regulators.

LIMS Delivers Better Data

As new legislation, such as the U.S. Food Safety Modernization Act, increases requirements around traceability and record maintenance, food processors and producers, as well as contract test laboratories, are turning to Laboratory Information management Systems (LIMS) to improve data management. A LIMS is designed to automate repeatable laboratory processes and centralize data collection, sample analysis and reporting within a secure and auditable environment.

Using a LIMS, management of information and data becomes straightforward and automatic; secure and reliable; and defensible for audit trails and regulatory compliance. A LIMS gives lab managers and scientists the ability to control the lab environment, to improve efficiencies and to reduce costs while making critical information available as soon as it is generated. A LIMS also allows integration with other enterprise-level systems, thereby improving the quality of information by providing an integrated picture of processes across the entire organization.

Because the safety of food products is top priority for food and beverage producers, more of them are integrating the LIMS with existing ERP, production or manufacturing enterprise systems, and smaller food producers are now realizing that traceable data must be collected electronically in order to comply with regulations and to maintain safe processes. LIMS data can be distributed to key stakeholders quickly to help ensure that contaminated products will not reach consumers. With a LIMS, lab managers are rapidly alerted to any unexpected or out of tolerance results. Along with food safety assurance, a LIMS provides brand security by making critical information available to management. This information aids in making decisions about the continuation or disruption of processes or the eventual distribution of product to the marketplace.

LIMS Capabilities and Benefits

- *Farm to fork traceability of samples and lab processes*
- *Central repository for data and test results*
- *Assurance of regulatory compliance*

- ✓ Automated data collection from testing and delivery of records of proof that are required for regulatory compliance around the world, including US FDA, EU and international ISO 17025 standards
- ✓ A secure environment for monitoring batch relationships between raw materials, processed materials and packaged goods
- ✓ A centralized system that collects, stores, processes and reports all the data generated within food laboratories, providing a complete overview of product quality
- ✓ Automated checks for out-of-specification results and identification of suspect products to prevent release pending investigation
- ✓ Assurance that all samples are handled and processed correctly
- ✓ Secure document management and storage of all data for any future inspection
- ✓ Integration of the laboratory environment with the rest of the enterprise



Irish Agency Experiences LIMS Efficiency

The Irish Department of Agriculture, Fisheries and Food is charged with tracking animals for food consumption from birth on the farm through to supermarket distribution. The laboratories that support the Department are geographically spread throughout the country and, as such, require timely and accurate flow of information and research results across locations. The Department selected Thermo Scientific™ LIMS for its laboratory services to improve the quality of information generated, to improve efficiency in laboratory operations and to generate and store epidemiology and disease surveillance information.

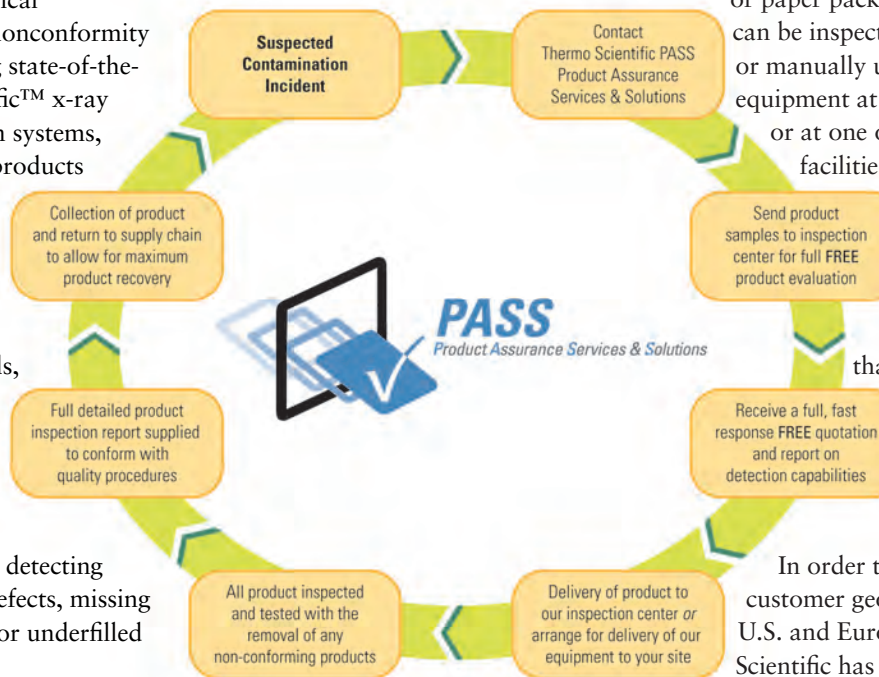
The LIMS solution provided the Department's Central Veterinary Laboratory Services with a full laboratory data recording, management, retrieval and reporting system. At sample intake, the LIMS has improved the efficiency and security of data entry and has greatly assisted sample identification and tracking by printed and automated label generation. As all laboratory data are now recorded on a single electronic database, the LIMS has provided the Laboratory Services with a means to retrieve, analyze and report data in a way that would never have been possible with the previous paper-based system, including sending results electronically to third parties and regulatory agencies. The LIMS also provides a database for national animal disease surveillance, reduces information transcription and enables information sharing across labs while providing traceability of samples. In addition, the LIMS has been integrated with the Department of Agriculture's existing ERP system, SAP, removing a large burden from the laboratory and administration staff in generating monthly invoices.

For more information about enterprise level Informatics solutions, click on the Informatics link at www.thermoscientific.com/foodsafetyinsider.



Help for Product Assurance

Thermo Scientific™ Product Assurance Services & Solutions (PASS) provides food producers with a fast, confidential way to thoroughly test and inspect product when physical contamination or nonconformity is suspected. Using state-of-the-art Thermo Scientific™ x-ray and metal detection systems, PASS can inspect products for a wide range of dense contaminants including ferrous, non-ferrous and stainless steel metals, glass, stone, bone, PVC-based plastics and rubber. In addition, PASS staff members are also experienced at detecting product damage, defects, missing products and over or underfilled packages.



PASS inspection capabilities cover a broad range of metal, glass, plastic or paper packaging types. Products can be inspected automatically or manually using a variety of equipment at the customer's facility or at one of our inspection facilities. The PASS program guarantees rapid turnaround of products, and expert packaging professionals ensure that products are repacked the same way as they are at the original food manufacturing plant.

In order to support diverse customer geographies in the U.S. and Europe, Thermo Fisher Scientific has PASS facilities in Houston, Texas, Chicago, Illinois and in Rugby, Warwickshire.

Typically, food producers don't have the time, the capability, the access to multiple idle detection machines or the floor space required to thoroughly test and inspect product when contamination or nonconformity is suspected. That's why they look to an off-site solutions provider to quickly evaluate, identify contaminants, remove the problematic packages and return the "good" product back to continue on its distribution journey.

For more information, please click on the PASS link at www.thermoscientific.com/foodsafetyinsider.

Financial Flexibility

We understand not just your advanced technology and application requirements, but the challenges you face when financing your critical equipment assets.

Cost-effective financing designed for each individual customer is key to any successful capital equipment solution. If you are looking for off-balance sheet financing, accelerated ROI, technology protection or cash flow management, our innovative financing options can help meet your budgetary needs and bottom-line goals.

For more information, please click on the Financial Services link at www.thermoscientific.com/foodsafetyinsider.

Let Our Expertise Complement Yours

Unity Lab Services takes serving science seriously. We offer a range of capabilities, from traditional laboratory instrument and equipment services to enterprise-level support, including business analytics for continuous improvement and management of laboratory staffing and consumables inventory. These multi-vendor services can be implemented across a broad range of laboratory environments. From scalable service on a single instrument to a highly customized, comprehensive service program at the laboratory, site or enterprise level, we provide the solution you need.

Unity Lab Services also delivers service solutions for all instruments, equipment and laboratory supplies, regardless of vendor. We incorporate best practices in lean enterprise, continuous improvement and change management to create immediate and measurable productivity gains. We also leverage processes that have been developed over time from our extensive customer base. Our SmartSystem program model leverages more than 50 years of service experience and features our proprietary SmartTrac™ metrics so you can closely monitor your program results



Simple Access to Integrated Service Delivery through Enterprise Services

Unity Lab Services provides complete solution design and implementation for seamless laboratory service and support management with one partner. By consolidating fragmented service delivery methods and vendors into a single solution for laboratory service and support, we deliver increased laboratory productivity while reducing costs and helping to generate metrics that improve decision making.

Protecting Your Investments through Instrument Services

From instrument and equipment acquisition to disposition, Unity Lab Services provides a complete portfolio of services and support solutions designed to help you improve productivity, reduce total cost of ownership and ensure performance throughout your laboratory.



Leverage Expert Resources

For more information, please visit www.thermoscientific.com/foodsafetyinsider and click on the Unity Lab Services link. There you'll find contact information, training course schedules, access to parts and consumables order sites, and links to our Knowledge Bases which include online technical documentation.

What's New in Food?

Keep up with the latest in food analysis through our free online Food and Beverage Knowledge Library, a continually expanding collection of resources including application notes, analytical methods, posters, videos, educational webinars, case studies and podcasts. Utilize our resources to help maximize performance in application areas including:

- Adulteration, Authenticity & Traceability
- Allergen Detection
- Environmental Pollutants
- Natural Toxins and Biotoxins
- Food Contact Materials/Packaging
- Pesticide Residues
- Processing Contaminants
- Quality Control & Nutritional Chemistry
- Trace Elements
- Veterinary Drugs

For access, please click on the Knowledge Library link at www.thermoscientific.com/foodsafetyinsider.



Supporting Scientists in Need

By Nina Dudnik, Ph.D., Founder of Seeding Labs

Dr. Nina Dudnik has always tried to combine science and global development. After working in labs on three continents, she realized that sharing existing resources could help the global community of scientists put their skills to work. Dr. Dudnik obtained her Ph.D. in molecular biology from Harvard Graduate School of Arts and Sciences and a B.Sc. in biochemistry from Brown University.

Seeding Labs

The United Nations estimates that more than 870 million people in the world today are undernourished; people who are not getting enough food or not getting the right nutrients in the food they eat. This takes an incredible toll physically, mentally and economically. Children who go hungry do not grow properly, they have trouble fighting off diseases and they don't do as well in school. In addition, food insecurity negatively affects the health and productivity of working adults. Providing safe and nutritious food is a struggle in many emerging regions.

The good news is that, in labs and fields across the world, talented and motivated researchers are working on ways to address local food challenges. At Seeding Labs, we focus on making sure these researchers have the tools and the training to accomplish their goals. We do this by working with external organizations and companies like Thermo Fisher Scientific, who support our efforts in a variety of ways including:

- *Donation of surplus equipment.* New scientific equipment is out of reach of the budgets of many researchers and their universities. Students wash and reuse test tubes, petri dishes and even latex gloves. We've created a worldwide distribution system that transfers needed equipment and supplies to researchers and their students.
- *Training and professional opportunities.* Access to continuing education and strong mentorship can be difficult for scientists in the developing world. We provide training in key professional skills as well as opportunities for scientists to showcase their work.
- *Connections with colleagues.* We know the importance of collaborations and the exchange of ideas between scientists of different expertise. We connect colleagues globally to share their experiences and spark new collaborations.

I invite you to learn more about Seeding Labs and our support for scientific research in food and a range of other areas by signing up for our monthly newsletter or by checking out our blog. In addition, Seeding Labs always welcomes new donors, partners and experts who are willing to share their scientific expertise and resources.

Please visit www.thermoscientific.com/foodsafetyinsider for more details.



Dr. Steven Runo and Dr. Mildred Nawiri, participants in Seeding Labs' fellowship program, visited a Thermo Fisher Scientific laboratory during a visit to the U.S. Both scientists are working on food and nutrition challenges in their home country of Kenya.

confidence to confront

Food safety isn't easy, it's demanding. It requires a range of innovative technologies to address numerous concerns, and the know-how to use the tools effectively. Our superior options for food safety and experienced service and support give you the confidence to face these challenges. Learn how we can help.

food safety challenges

• thermoscientific.com/foodsafety

