PLUS Solving Pest Problems ■ Enhancing Employee Training ■ Analysis of Salt Content

Volume 22 Number 3
JUNE /JULY 2015

Food Quality & Safety

FARM TO FORK SAFETY

Industry is Reducing its Ecological Footprint

Companies are striding for green, multi-faceted sustainable practices in facility designs, production, and waste management

WWW.FOODQUALITYANDSAFETY.COM

WILEY

Naturally, she prefers the taste of safe ingredients.

One common element across the Food & Beverage industry is a devotion to supplying safe, delectable products to consumers around the world, and demand for natural ingredients have placed a spotlight on the issue for consistent regulatory standards across the globe.

At Sigma-Aldrich, we understand it's not enough to have ingredients that taste good, they have to be safe. Our Natural ingredients have been quality-tested and come with easily accessible third party validation, helping you satisfy your customers' needs with confidence.

Visit our booth at the IFT Annual Expo in Chicago, or log on to our website to learn more. It's safe to say you'll like it.

sigma-aldrich.com/naturals

VISIT US AT IFT
July 11-14
Booth #2084

Be smart – take a shortcut!

Readybag® dehydrated culture media pouches

EMD Millipore's preweighed and gamma-irradiated Readybag® pouches speed up and simplify your food pathogen testing routines. All media preparation steps are eliminated from your workflow. Just add sterile water before incubation. It is so easy!

Readybag® dehydrated culture media pouches for fast and easy pathogen testing:

- no weighing
- no autoclaving
- no supplement handling and
- no need for extra lab space or equipment

www.emdmillipore.com/readybag

EMD Millipore is a division of Merck KGaA, Darmstadt, Germany

EQUIP YOUR LAB FOR SUCCESS.

(THE RIGHT SOLUTION CAN MAKE ALL THE DIFFERENCE.)

Bio-Rad offers the most comprehensive food safety testing solution available. Our innovative technology—including best-in-class media, PCR kits, and instruments—is designed to deliver rapid, reliable results every time. With a 60-year track record and an unmatched level of service and support, it's easy to see why more and more labs trust Bio-Rad for their food safety testing needs.

Find out more at bio-rad.com/ad/productivity

BIO-RAD

Contents

JUNE/JULY 2015 • VOLUME 22 NUMBER 3 • www.foodqualityandsafety.com

20

COVER STORY

Industry is Reducing its Ecological Footprint

Companies are striding for green, multifaceted sustainable practices in facility designs, production, and waste management

BY LINDA L. LEAKE, MS

Features

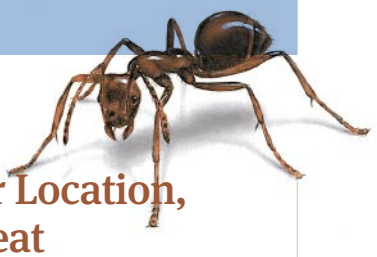
Safety & Sanitation

28

Beating The Buzz

An integrated approach to fly problems will ensure a facility is protected against potential contamination and is compliant with audit standards

BY JUDY BLACK, MS, BCE, CP-FS



31

No Matter Your Location, Ants Are a Threat

IPM programs can protect against ants that enter through the tiniest of holes and leave invisible trails for the possibility of hundreds of thousands to follow

BY ZIA SIDDIQI, PHD, BCE

Food Quality & Safety (ISSN 1092-7514) is published 6 times a year in Feb/Mar, Apr/May, Jun/July, Aug/Sept, Oct/Nov, Dec/Jan by Wiley Subscription Services, Inc., a Wiley Company, 111 River St., Hoboken, NJ 07030-5774. Periodical postage paid at Hoboken, NJ, and additional mailing offices. Subscription for U.S. is $126 per year. International subscription is $160.

Food Quality & Safety is a proud member of: United Fresh Produce Association
Folio Ozzie and ASBPE award winner for editorial and graphics excellence.

POSTMASTER: Returns and address changes to *Food Quality & Safety* magazine, PO Box 986, Levittown PA 19055-0986

Features Cont.

33 EVOLUTION OF PEST MANAGEMENT DOCUMENTATION TO THE ELECTRONIC TABLET

Documents that were kept as paper such as maps, pest sighting reports, service reports, pesticide labels, and all essential documents are now more effectively retrieved using a tablet

BY PATRICIA HOTTEL

35 HOW TO FIT TRAINING INTO YOUR PRODUCTION SCHEDULE: PART 3

Providing managers with tools to help them strengthen the learning culture after employees leave the classroom and venture onto the processing floor

BY IAIN WRIGHT AND MARIE LEFAIVE

37 REPEAT AFTER ME...

How spaced repetition can enhance employee training in the food and beverage industry

BY PHIL SIMMONDS

40 HEPATITIS A IN PRODUCE: RISK AND PREVENTION

Because the virus can spread via fecal contamination in food and water, proper sanitation practices are keys to preventing outbreaks

BY ANDREA CIPRIANI, MS

Manufacturing & Distribution

42 MOVING YOUR LUBRICATION PROGRAM IN THE RIGHT DIRECTION

Implementing lubrication practices as a prerequisite program goes beyond simply purchasing food grade lubricants

BY BENJAMIN A. BRISEÑO

In The Lab

46 DETERMINING SALT IN FOOD

Guidelines and considerations that serve as a starting point in quality control protocol for measuring salt in foodstuffs

BY DAVID MASULLI

49 WHAT DO MICROBIOLOGY TEST RESULTS REALLY MEAN?

When striving for an accurate status of plant hygiene and product quality, results must be interpreted with care and recognition of limitations

BY MARTIN EASTER, PHD

51 LAB CHIEFS ASSESS CURRENT STATE OF TESTING

Survey provides an inside look at the standards employed by today's food laboratories

BY ROBIN E. STOMBLER

Food Service & Retail

54 A HOLISTIC APPROACH TO TRACEABILITY

Companies can share specific product information more efficiently and accurately by using the same standards to identify and capture product data

BY ANGELA FERNANDEZ

facebook.com/FoodQualityandSafety

Columns

Washington Report

12 FDA'S RECALL POWERS

The agency is taking its increased abilities under FSMA seriously, imposing significant consequences on those who refuse to follow its rules

BY TED AGRES

Industry Insights

14 HOLDING FOOD COMPANIES ACCOUNTABLE

PCA executives were found guilty in a criminal trial for their role in a deadly *Salmonella* outbreak that began seven years ago

BY DARIN DETWILER, M.A.ED.

Around The World

16 ASIA'S FORGING AHEAD WITH BIG STEPS AND LITTLE STEPS

Food safety is a burgeoning priority on the world's largest continent

BY LINDA L. LEAKE, MS

Departments

8 FROM THE EDITOR

10 NEWS & NOTES

56 NEW PRODUCTS

58 ADVERTISER INDEX

58 EVENT: FOOD QUALITY & SAFETY AWARD PREVIEW

Exclusive Online Content

To read this article, go to the current June/July 2015 issue on www.foodqualityandsafety.com:

- Data Logging in the Supply Chain

From The Editor

On May 12, PBS' *FRONTLINE* aired an episode entitled "The Trouble With Chicken," which investigated the spread of dangerous pathogens in meat, focusing in on the *Salmonella* Heidelberg outbreak linked to Foster Farms. Much discussion and debate followed the airing, including the fact that *Salmonella* (among the most frequent causes of foodborne illness) is not officially considered an adulterant and how regulators are failing to own up and prevent the spread of this pathogen.

As the report mentions, this stems back to a 1974 court case, *American Public Health Association v. Butz*, in which it was determined that the responsibility for meat safety should go to those doing the cooking, namely "housewives."

"American housewives and cooks normally are not ignorant or stupid and their methods of preparing and cooking of food do not ordinarily result in salmonellosis," the ruling read.

There have since been attempts to have this antiquated way of thinking changed. Most notable was CSPI's request in 2011 to have antibiotic-resistant *Salmonella* declared as an adulterant. The USDA's FSIS denied the petition three years later.

However, after the airing of the *FRONTLINE* investigation, more efforts to help keep Americans safe from contaminated products are being initiated. Currently, the USDA will only issue a recall if a meat, poultry, or egg product is considered "adulterated." But on May 13, Senator Kirsten Gillibrand (D-NY) officially introduced the Meat and Poultry Recall Notification Act. The act would provide the USDA mandatory recall authority over contaminated meat and poultry, regardless of whether the harmful pathogen has been declared an adulterant or not.

"Our food safety system is failing to protect Americans, leaving thousands of people hospitalized every year with preventable illnesses," says Senator Gillibrand. "Poultry and meat known to be contaminated should never end up in market fridges and freezers or our kitchens."

In addition, Congresswomen Rosa DeLauro (D-CT) and Louise M. Slaughter (D-NY) recently reintroduced the Pathogen Reduction and Testing Reform Act.

"It's time to stop treating *Salmonella*, particularly antibiotic-resistant *Salmonella*, as just a natural part of meat and poultry," says David Plunkett, senior staff attorney, CSPI. "This legislation does away with the outdated notion that it's okay for food companies to sell us food that's contaminated with dangerous bacteria."

Marian Zboraj
Editor

Food Quality & Safety
FARM TO FORK SAFETY

PUBLISHER Lisa Dionne, ldionne@wiley.com
ASSOCIATE PUBLISHER Ken Potuznik, kpotuzni@wiley.com
EDITOR Marian Zboraj, mzboraj@wiley.com
DESIGN Maria Ender, mender@wiley.com
PRODUCTION Claudia Vogel, cvogel@wiley.com
Christiane Potthast, cpotthast@wiley.com
Elli Palzer, palzer@wiley.com
MANAGER, DIGITAL MEDIA & STRATEGY Jason Carris, jcarris@wiley.com

Advertising Sales Director
Stephen Jezzard
350 Main Street
Malden, MA 02148-5089
(781) 388-8532
sjezzard@wiley.com

Sales Office
U.S./Canada/International
Ken Potuznik
29822 N 51st Place, Cave Creek, AZ 85331
(480) 419-1851 • fax (480) 718-7719
kpotuzni@wiley.com

Editorial Office
111 River Street, Hoboken, NJ 07030-5774, USA
Reprints: E-mail kpotuzni@wiley.com

Printed in the United States by Dartmouth Printing, Hanover, NH.

HEAD BUZZING WITH AUDIT CONCERNS?

It's not just the pests you have to worry about – it's the proof. Steritech's AuditReady® Pest Prevention Program gives you the best of both. Our trained experts design, implement, and manage a customized plan. They follow through with consistent service, and provide complete, accurate documentation.

Is your pest program everything it should be? Find out. Let a Steritech expert perform a program evaluation. Call 1.800.868.0089 or visit www.steritech.com/auditready.

Steritech®

NEWS & NOTES

Antimicrobial Sales and Distribution Info by Animal Species

The U.S. FDA is proposing revisions to its annual reporting requirements for drug sponsors of all antimicrobials sold or distributed for use in food-producing animals in order to obtain estimates of sales by major food-producing species (cattle, swine, chickens, and turkeys). The additional data would improve understanding about how antimicrobials are sold or distributed for use in major food-producing species and help FDA further target its efforts to ensure judicious use of medically important antimicrobials. FDA is currently accepting comments on this proposed rule.

Organic Certification Funding

The USDA Agricultural Marketing Service announces that approximately $11.9 million in organic certification assistance is available through state departments of agriculture to make organic certification more affordable for producers and handlers. Funding is provided on a cost share basis and certification assistance is distributed by two programs. Through the National Organic Certification Cost Share Program, $11 million is available to organic farms and businesses nationwide. Through the Agricultural Management Assistance Organic Certification Cost Share Program, $900,000 is for organic producers (crop and livestock operators) in Connecticut, Delaware, Hawaii, Maine, Maryland, Massachusetts, Nevada, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wyoming.

Support for Increased FSMA Budget

In a letter sent to Congressional leaders, AFDO supported increasing U.S. FDA food safety budget by $109.5 million for FSMA implementation. AFDO fears that inadequate funding would weaken the impact FSMA and inhibit the training for industry to comply with new requirements and government officials to ensure compliance. AFDO says failure to fund FSMA would cause negative effects to food processing and produce industries.

Specialty Eggs Online Book

The Specialty Eggs e-book is available through a free training app from the Auburn University Food Systems Institute. Food safety specialists can learn to differentiate between the kinds of specialty eggs and understand how the feed or production management of hens producing specialty eggs differs from that of hens in conventional production settings. They can also learn about the nutrition, safety, and quality in different kinds of eggs.

© ANDRIIGORULKO - FOTOLIA.COM

© JOSHUA RESNICK - FOTOLIA.COM

Labeling of Mechanically Tenderized Beef Pushed Up

The USDA's FSIS released its new labeling requirements for raw or partially cooked beef products that have been mechanically tenderized. These new requirements will become effective in May 2016, or one year from the date of the rule's publication in the Federal Register. Because of the public health significance of this change, FSIS is accelerating the effective date instead of waiting until the next Uniform Compliance Date for Food Labeling Regulations, which is Jan. 1, 2018. The potential presence of pathogens in the interior of these products means they should be cooked differently than intact cuts. Under this rule, labels must state that the products have been mechanically, blade, or needle tenderized. The labels must also include validated cooking instructions so that consumers know how to safely prepare them. The instructions will have to specify the minimum internal temperatures and any hold or "dwell" times for the products to ensure that they are fully cooked.

Business Briefs

S+S Separation and Sorting Technology GmbH of Schönberg, Bavaria, acquires 100% of the Italian special machine manufacturer **ASM Advanced Sorting Machines s.r.l.**

Claranor partners with the Ohio-based company **Industrial Machining Services, Inc.** to distribute its packaging sterilization equipment in the U.S.

Mérieux NutriSciences inaugurates a new microbiological lab in Beijing, China. It also acquires **ABC Research Holding Co., LLC** in Gainesville, Fla.

Watson-Marlow Pumps Group changes its name to **Watson-Marlow Fluid Technology Group** to better reflect its evolution to a provider of fluid path technology.

Færch Plast A/S, a Denmark-based manufacturer of plastic packaging, is building a network of overseas distributors for targeting expansion in Australia, New Zealand, U.S., Canada, South Africa, the Middle East, and Israel.

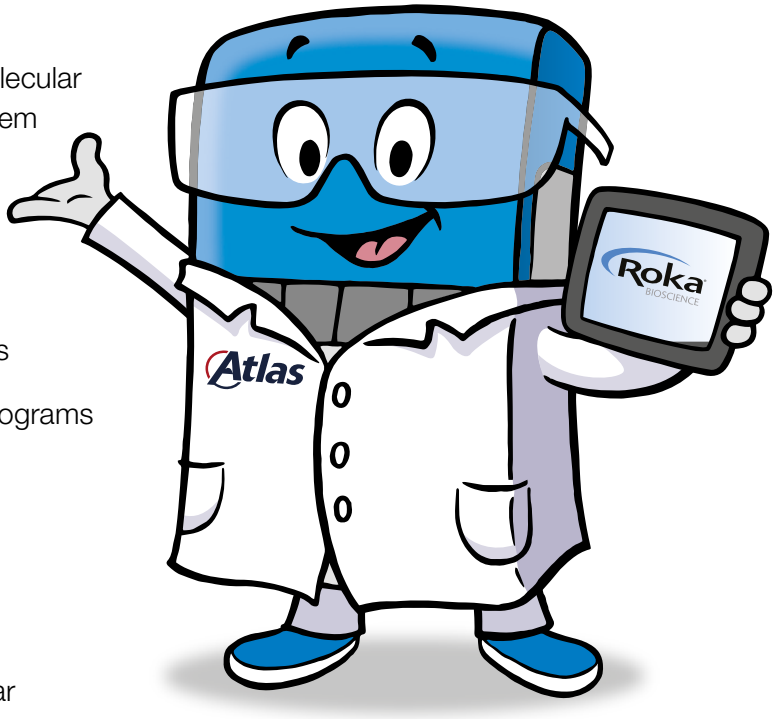
DuPont Diagnostics, a part of DuPont Nutrition & Health, signs a distribution agreement with **VWR,** an independent provider of products, services, and solutions to lab and production facilities, to allow VWR exclusive rights within U.S. to sell DuPont BAX System Q7 instrument, assays, and related products.

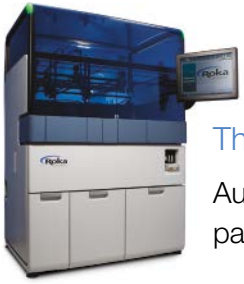
Let's think differently about your pathogen testing.

Times have changed. Innovation is bringing better solutions to today's food manufacturers.

By incorporating next-generation molecular technology on a fully automated system you can achieve:

- ☑ Higher-quality actionable results
- ☑ Faster turnaround time
- ☑ High performance in difficult matrices
- ☑ Improved picture of risk mitigation programs





The Atlas® System

Automated molecular pathogen detection

Ask for Atlas!

Come visit us at IAFP 2015
July 25-28, Portland, OR
Booth 335

It's time for a better solution.

Ask your third-party lab about the Atlas System today, or visit us at **www.askforatlas.com** to learn more.

Roka BIOSCIENCE

Follow us:

1.855.ROKABIO | **www.rokabio.com**

The Atlas® System is manufactured by Hologic, Inc. Roka molecular technology is licensed from Hologic, Inc.

Washington Report

FDA's Recall Powers

The agency is taking its increased abilities under FSMA seriously, imposing significant consequences on those who refuse to follow its rules | BY **TED AGRES**

In May, the FDA published draft guidance for industry on how the agency plans to implement the mandatory food recall authority granted it under the Food Safety Modernization Act (FSMA). Although FDA has exercised this mandatory recall power twice since FSMA was enacted in 2011, the draft guidance outlines specific steps the agency will take and how food producers, distributors, and other "registered facilities" are expected to respond.

Prior to FSMA, FDA had to rely on food companies to voluntarily recall their products when requested. If a company refused, FDA was required to take often time-consuming legal steps, including obtaining a court order to seize and remove unsafe products from commerce.

Section 206 of FSMA gives FDA the authority to order a recall directly when the agency determines that there is a reasonable probability that an article of food (other than infant formula, which is covered under a separate recall procedure) is adulterated or misbranded and that the use of or exposure to the food will cause serious adverse health consequences or death to humans or animals (known as SAHCODHA).

This authority covers all articles of food that are manufactured, processed, packed, or held at any food facility that is required to register under section 415(a) of the FD&C Act. FSMA defines "articles of food" as those used for food or drink for humans or animals, chewing gum, and articles used as components of any such food. As such, "food" also includes dietary supplements such as vitamins, minerals, herbs or other botanicals, amino acids, and substances to supplement the diet by increasing total dietary intake. Dietary ingredients also include extracts, metabolites, constituents, or concentrates, the agency says.

A "responsible party" is the person who submits a food facility registration, and can be an individual, partnership, corporation, or association. The owner, operator, or agent in charge of a facility who is responsible for submitting the registration is also responsible for implementing and assuring that the recall is performed, the FDA says.

Two conditions must exist before FDA can exercise its mandatory recall authority. First, FDA has to determine that there is a "reasonable probability" that the product is adulterated (under Section 402 of the FD&C Act) or misbranded (under Section 403(w) of the FD&C Act). Second, the agency must determine that there is a "reasonable probability" that the use of or exposure to such food will cause SAHCODHA.

According to the seven-page document, once FDA has determined that these criteria have been met, the agency must give the responsible party an opportunity to voluntarily stop distribution and recall the article of food. Notification will be given in written form "using an expeditious method." If the responsible party still refuses or does not voluntarily cease distribution and issue the recall within the timeframe and manner specified by FDA, the agency may order the responsible party to cease distributing the food, order it to notify others to also stop distributing it, and provide an opportunity for an informal hearing. Only after all these steps are completed may FDA formally order a recall, and this authority is reserved only for the FDA commissioner.

Adulteration and Misbranding

According to the guidance document, food is considered adulterated when it bears or contains "any poisonous or deleterious substance which may render it injurious to health; consists in whole or in part of any filthy, putrid, or decomposed substance, or is otherwise unfit for food; or has been prepared, packed, or held under insanitary

conditions whereby it may be rendered injurious to health."

Adulteration for a dietary supplement occurs when an ingredient represents a "significant or unreasonable risk of illness or injury under the conditions of use recommended or suggested in labeling; is a new dietary ingredient for which there is inadequate information to provide reasonable assurance that such ingredient does not present a significant or unreasonable risk of illness or injury; or is a dietary supplement declared by the secretary [of Health and Human Services] to pose an imminent hazard to public health or safety."

Products that contain a major food allergen (such as milk, egg, fish, shellfish, tree nuts, wheat, peanuts, or soybeans) are considered misbranded if the product label does not disclose allergen, either through a "Contains" statement or in the ingredient list. Some of the evidence FDA may consider in making determinations of adulteration or misbranding include observations made during inspections; results from sample analyses; epidemiological data; Reportable Food Registry data; and consumer and trade complaints.

FSMA allows FDA to collect user fees from companies that do not comply with a food recall order. These fees include the time spent by FDA in conducting food recall activities, including obtaining technical assistance, follow-up effectiveness checks, and public notifications. The agency can also assess civil monetary penalties. When finalized, the guidance document will reflect the agency's "current thinking" on this topic, FDA said.

Prior Mandatory Recalls

The FDA has exercised its mandatory recall authority twice since FSMA was enacted in 2011. In 2013, the agency ordered a mandatory recall of *Salmonella*-tainted pet treats manufactured by Kasel Associated Industries Inc., Denver, Colo. Kasel had initially voluntarily recalled some but not all its affected products. After receiving the mandatory notice, it subsequently completed the recall.

Also in 2013, FDA ordered the recall of OxyElite Pro dietary supplements manufactured by USPLabs LLC, Dallas, Texas, that had been linked to dozens of cases of acute non-viral hepatitis. At least 47 people were hospitalized, three received liver transplants, and one death was reported. The FDA warning letter said the products were adulterated because they contained aegeline, a new dietary ingredient for which USPLabs had not provided safety evidence, as required. After receiving the mandatory recall notice, the company voluntary recalled the products.

This was not the company's first run-in with FDA. A short time earlier USPLabs had destroyed different lots of OxyElite Pro after FDA issued an administrative detention order because of the presence of a stimulant in those products, DMAA (dimethylamylamine), which can cause high blood pressure and lead to heart attacks, seizures, psychiatric disorders, and death. The agency said it had received more than 100 reports of illness, including six deaths, among people who used the products. It was after this that USPLabs substituted aegeline for DMAA.

"Twice in a short period, this company has added new dietary ingredients to supplements without notifying the FDA and providing a reasonable expectation of safety, as required by law," said Daniel Fabricant, PhD, director of FDA's Division of Dietary Supplement Programs, at the time. "Losses to the company [estimated at $22 million retail] should also serve as a reminder that FDA's laws and regulations serve a purpose and must be followed."

Preparing for a Recall

"It is a well-founded truism in the food industry that it is not a matter of *if* you will have a recall but *when*," says Michael A. Walsh, a partner with the Strasburger & Price lawfirm in Dallas. The FDA is taking its expanded powers under FSMA seriously "and will impose significant costs on those who refuse to obey its edicts," he says. "It is also a well-founded truism that lack of planning distinguishes a problem from a crisis. More than ever, having a recall response team and procedures in place before you need them should be the first order of business," Walsh wrote in an online blog posting.

Preparedness is essential in order to respond adequately to any recall-related issue agrees David Acheson, MD, founder and CEO of The Acheson Group and a former FDA associate commissioner for foods. "A recall can happen in a variety of ways, including from a customer complaint, a call from a supplier who says there is a problem in what was shipped, or a call from the FDA," Dr. Acheson says. "It may not be your fault. Bad things happen to good companies because biological systems are not predictable."

Regardless of how a recall may be triggered, the time to figure how to respond is not when a regulator from FDA or USDA's Food Safety and Inspection Service shows up at the door. Food companies must first have access to a network of knowledgeable people and be able to contact them quickly, Dr. Acheson says.

While very large companies typically have this expertise in-house or readily available, most small- to mid-size companies have not previously faced a food safety issue and are usually unprepared to deal with it. "Determining the scope of the problem is important," Dr. Acheson tells *Food Quality & Safety* magazine. "Doing or saying something that gets you on the wrong side of the FDA or USDA is not a good place to be because you will find yourself digging out of a hole."

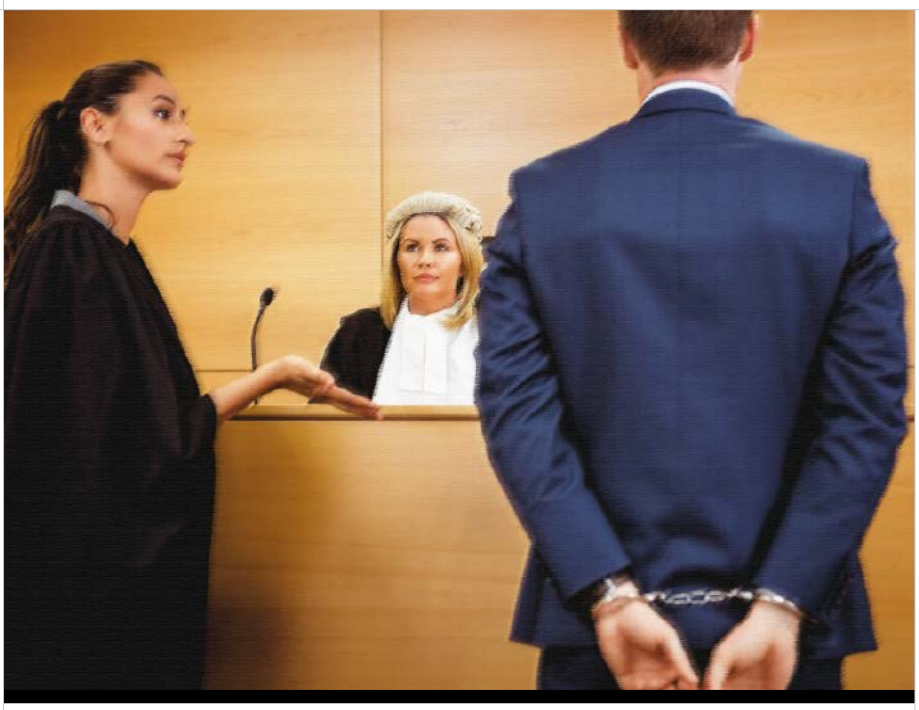
After contacting the appropriate people in your organization or through a network provided by a consultancy or lawfirm, the next step is to assemble and review your records, including where the ingredients came from, where they were stored, when they were used and in what lots, and when and to whom they were shipped. A final step involves communication, both internally to your employees and stakeholders and externally to the public, including the media, when appropriate.

"A recall is not a simple matter," Dr. Acheson says. "It's not just pulling back a product. There are many moving parts and many things can get screwed up. It's also an incredibly stressful time. For many companies, it's the first time such a thing has happened."

Dr. Acheson also suggests a company should conduct a mock recall exercise that spans its production chain from supplier traceability to shipment. "That's a way to diminish stress and will help you come out in good shape," Dr. Acheson says. "Of course, you can do it without experience and get all stressed out and do things that end up diminishing your brand." ■

Agres is a freelance writer based in Laurel, Md. Reach him at tedagres@yahoo.com.

Industry Insights



Holding Food Companies Accountable

PCA executives were found guilty in a criminal trial for their role in a deadly *Salmonella* outbreak that began seven years ago

BY **DARIN DETWILER, M.A.ED.**

Editor's Note: *This is the third in a three-part account of a 2008-2009 nationwide food safety crisis.*

In 2009, Jeff Almer sent a Mother's Day card to a man named Stewart Parnell. Before he sent the card, however, Jeff checked with his attorney. The lawyer responded "Well, personally, I wouldn't do it, but I'm not the one who lost his mom, so—what the hell—go for it."

Shirley Mae Almer had long gained assistance from her son Jeff, along with his two brothers and two sisters. After their father's death in 1990, the siblings helped as much as they could when their mother took over running the family business—a bowling alley in Minnesota. They also helped their mother through her successful battles with lung cancer and a brain tumor.

Then, in 2008, Shirley contracted a urinary tract infection. At age 72, her immune system was not strong enough to handle this new challenge and she was checked into a short-term care facility. The family's plan to bring Shirley home for Christmas was halted by doctors. The family was instead called in to gather by her bedside to say goodbye. She died by causes related to a *Salmonella* infection.

Shirley's death from *Salmonella* caught everyone by surprise, even her doctors. Investigators would eventually learn that Shirley ate toast with peanut butter while trying to regain her health for the holidays. This finding triggered a series of discoveries ultimately connecting her infection to adulterated peanuts from the Peanut Corporation of America (PCA).

The Effects of Outbreak

The 2008-2009 PCA *Salmonella* in peanut product outbreak involved the recall of over 3,500 different types of products from more than 200 different companies. The outbreak caused over 700 illnesses in 46 states and killed nine people, including Shirley Mae Almer.

Investigators found *Salmonella* in PCA's processing environment, indicating inadequate sanitation controls. They found that PCA's peanut roasting process had not been validated for its effectiveness as a control measure or kill stop for biological hazards, such as *Salmonella*. At the time, hundreds of companies used PCA's peanut ingredients in their products without an additional kill step.

Salmonella is one of the most common foodborne pathogens and among the most common causes of bacterial foodborne illness. An infection can cause diarrhea, fever, abdominal cramps, vomiting, bloodstream infections, reactive arthritis, and death. Symptoms generally appear 12 to 72 hours after eating contaminated food.

The federal government filed criminal charges related to adulterated and misbranded products to reach interstate commerce, taking the following PCA executives to trial:

- Stewart Parnell, owner,
- Michael Parnell, peanut broker, and
- Mary Wilkerson, former quality control manager.

Daniel Kilgore and Samuel Lightsey, both of which worked at the Blakely, Ga. plant, took plea deals and cooperated with prosecutors.

Viewing the Courtroom Proceedings

Jeff Almer has a unique perspective of the American legal system, having wit-

nessed the process as the family member of a victim and through his collaboration with the prosecution team in advance and throughout the PCA trial. The two lead investigators from the U.S. Department of Justice in D.C. and the lead prosecutor from Albany, Ga., gave him a personal call when they handed down the 76 indictments for the PCA executives. Almer felt obligated to attend as much of the trial as he could, having attended nine days of the trial in July and August 2014. He was also present when the verdicts came in on Sept. 19, 2014.

During an exclusive interview, Almer characterized the in-court tactics of Stewart Parnell's lead attorney, Thomas Bondurant, Jr., as that of playing the "government conspiracy game" as Bondurant claimed that the feds tried to "make an example of the little guy because it is easier than going after Kellogg's or the big companies," according to Almer. He also adds that Parnell's team insinuated that "the government was using Parnell to get more funding for the FDA.

"Bondurant also tried to make the jury sympathetic to 'a loving grandfather'" continues Almer. "He took a quote from Senator Patrick Leahy (D-VT) and twisted it around, claiming the senator said 'convict first, investigate later,' whereas what Sen. Leahy actually said was the responsible people needed to serve jail time."

On the day of the verdict, Almer prepared for the worst and hoped for the best. He went to the courtroom and sat in front row seat at the side opposite of the Parnell family and listened as the courtroom clerk read the verdicts. "Count one...we the jury find the defendant—guilty." They kept reading "guilty," "guilty," "guilty."

The clerk repeated guilty verdicts on most counts for Stewart's brother and former PCA peanut broker, Michael Parnell. Together, the Parnell brothers received guilty verdicts on a total of 97 federal felony counts including conspiracy and fraud. The court also found Mary Wilkerson guilty on one of two counts (obstruction of justice).

Almer says he remembered his mother's last days as the clerk read the verdicts. He was overwhelmed with emotion sitting with tears in his eyes and feeling far too alone as his own family and other victims' families were not present due to the fluid nature of the court proceeding, making attendance near impossible.

He also watched as the three defendants' families reacted to the verdicts, recalling how Parnell's family members started sobbing, the sounds of their crying filled the courtroom. This emotional moment hit Almer hard—relief and closure for some, yet new pain and uncertainty for other families. He says he didn't take any personal satisfaction as he watched another family become destroyed.

Almer could not help but notice that the prosecution team was emotional, too. He thanked them for their years of work on the case and putting their lives on hold for five years. "Sorry I was a pain in your butts for so long," he told attorney Patrick Hearn. The prosecutor's reply left Almer speechless, "Jeff, you made us care about this case."

(At the time this issue went to print, none of the PCA defendants have been sentenced yet.)

A Food Safety Plan

Perhaps if PCA had a food safety plan in place, the deadly *Salmonella* outbreak could have been prevented or at least its investigation shortened. Required components of a food safety plan (as required by FSMA) include:

- **Hazard Analysis,**
- **Prevention Control,**
  - **-Process Preventive Controls**
  - **-Food Allergen Preventive Controls**
  - **-Sanitation Preventive Controls**
  - **-Supplier Preventive Controls**
- **Recall Plan, and**
- **Implementation Records.—*D.D.***

The 2008-2009 PCA *Salmonella* outbreak and subsequent recall illustrates the importance of process validation, sanitation controls, and supplier controls.

A Rare Case

The PCA case—*U.S. v. Stewart Parnell, Michael Parnell, and Mary Wilkerson*—is one of only a few examples of court cases where the executives of a food company have been prosecuted in court for its actions involving the Responsible Corporate Officer doctrine of criminal liability that resulted from the Supreme Court's decision in *U.S. v. Park* (1975). The only other food cases in the 40 years since the Supreme Court's decision are 2013's *U.S. v. Eric Jensen and Ryan Jensen* (pertaining to a 2011 *Listeria* outbreak in which their adulterated cantaloupe sickened more than 125 people in 28 states and killed over 30 people) and the recent *U.S. v. Quality Egg, LLC, Austin DeCoster, and Peter DeCoster* (for allowing contaminated eggs to reach consumers in 2010, causing an outbreak of *Salmonella* and the recall of over a half a billion eggs).

The 2008-2009 PCA *Salmonella* outbreak and subsequent recall illustrates the importance of process validation, sanitation controls, and supplier controls. Many policymakers viewed this event as one of the reasons why Congress later passed the FDA Food Safety Modernization Act. ■

Detwiler is the senior policy coordinator for food safety at STOP Foodborne Illness. He has over 20 years of involvement in food safety reform, including having served two terms as a USDA regulatory policy advisor on meat and poultry inspection. Detwiler teaches Regulatory Affairs of Food at Northeastern University where his is also a Doctoral Candidate in Law and Policy. Reach him at ddetwiler@stopfoodborneillness.org.

Around The World

Asia's Forging Ahead with Big Steps and Little Steps

Food safety is a burgeoning priority on the world's largest continent | BY **LINDA L. LEAKE, MS**

Editor's Note: *This is the fourth in a six-part series of articles that will showcase food quality, safety, and regulatory issues of each continent.*

Spring rolls, satay, and sushi, these are just a few of the most familiar dishes in Asia, a continent renowned for having some of the best cuisines in the world. With fast-growing economies, a burgeoning middle class, and complex supply chains, the countries in Asia face a growing array of food safety challenges. These are giving rise to innovative solutions and collaborative initiatives by governments and the private sector across the region.

"Food safety is a key issue for consumers in Asia," says Matt Kovac, policy director of Food Industry Asia (FIA), a pan-Asia industry group with its headquarters in Singapore. "Over 70 percent of senior executives who attended our recent annual general meeting selected food safety as being the issue that will have the greatest impact on consumer preference in Asia in coming years."

Kovac explains that the question was posed as part of an opinion poll conducted by FIA on April 16, 2015. "The topic of food safety polled considerably higher than other issues, including sustainable sourcing, genetically modified ingredients, health and wellness, and price," he elaborates.

Addressing food safety and harmonization of regulations feature prominently in FIA's work plans this year, Kovac says. "We believe in harmonized standards, especially in the context of food quality and safety," he relates. "By harnessing the technical expertise of our member companies, we work with appropriate authorities to accelerate the removal of trade barriers and promote the alignment of standards with international best practice."

A key focus of FIA's five-year strategic plan will be accelerating food safety improvements in fast emerging markets, such as China, by scaling up capacity building and providing local trade associations with scientific information, education, and industry best practice, Kovac adds.

China

According to a 2010 World Trade Organization report, China is the world's top producer of agricultural products by value, with total production of about $536 billion.

China's principal food crops are rice, corn, wheat, and soybeans, along with apples and other fruits and vegetables. China's key livestock products include pork, beef, dairy, and eggs.

At the same time that China is posting impressive food production statistics, a growing number of alarming safety issues have come to light in recent years, says Linhai Wu, PhD, professor and a chief specialist of Jiangsu Provincial Food Safety Research Base of Jiangnan University in Wuxi, China.

Dr. Wu and his colleague Dian Zhu, PhD, co-authored the 2014 book *Food Safety in China: A Comprehensive Review*.

"As China is in a profound state of social transition, including reconstructing the social order, improving the legal system of food safety, and recovering consumer confidence, food safety incidents have occurred more frequently," Dr. Wu says. "Moreover, the media indiscriminately spreads related news and sometimes even intentionally exaggerates the problems in such a way that food safety incidents become the focus of widespread concern."

It was not an exaggeration that, in 2008, milk and infant formula in China were intentionally adulterated with the chemical melamine, supposedly to cause these products to appear to have a higher protein content.

The outcome was an estimated 300,000 victims with six babies dying from kidney stones and other kidney damage and an estimated 54,000 babies being hospitalized after consuming melamine-tainted product.

Recent Regulatory History

The Chinese government had attempted to consolidate food safety regulation with the creation of the State Food and Drug Administration of China in 2003.

On Feb. 28, 2009, China's National People's Congress (NPC) Standing Committee passed the first comprehensive Food Safety Law (FSL) for that country. The FSL took effect on June 1, 2009.

In March 2013, the 2003-established regulatory body was rebranded and restructured as the China Food and Drug Administration (CFDA).

On April 24, 2015, the NPC approved and released the amended FSL, which will become effective on Oct. 1, 2015. Hailed as China's strictest food safety law to date, the law requires food industry companies to establish a self-examination system and ensure that their food is traceable. Moreover, online food retailers will be held liable if they can't provide to consumers the correct name, address, and contact information of a food distributor.

Not surprisingly, updated regulations governing the production of infant formula are much stricter. Specifically, infant formula manufacturers are now required to provide for the provincial CFDA a list of their raw materials, additives, labels, and relevant information; they must register their product formulas with the CFDA and submit supporting research materials.

Chemical Issues

China has some food safety issues that are particular to this country, Dr. Wu says.

Topping the list, excessive and inefficient uses of chemical fertilizers are outstanding problems. "The application rate of chemical fertilizers in agricultural production in China ranks number one in the world," Dr. Wu relates.

Excessive and inefficient applications of chemical fertilizers have destroyed the Chinese agricultural ecological environment, along with sustainability, Dr. Wu says. "As a result, residues of nitrates, nitrites, heavy metals, and other harmful substances in edible agricultural products far exceed the allowable limit, causing harm to human health," he elaborates.

Compounding the chemical fertilizer issues, abuse of chemical pesticides worsens the ecological environment in China and severely affects the safety and quality of the country's edible agricultural products, Dr. Wu says.

The Chinese government has banned the use of highly toxic, highly residual, carcinogenic, teratogenic, and/or mutagenic pesticides and requires rigid adherence to the safe application standards and rational application guidelines of pesticides. "Nonetheless," Dr. Wu says, "banned/prohibited pesticides continue to be used in actual agricultural production, and pesticide abuse violating the safe application standards and rational application guidelines of pesticides remains widespread."

Most especially, fraudulent and unscrupulous behavior of producers still leads to food safety issues in China, as was the case with melamine in 2008, Dr. Wu relates.

Recent Meat Scandal

A recent incident showcasing unscrupulous behavior came to light in July 2014, when a local reporter in Shanghai secretly captured

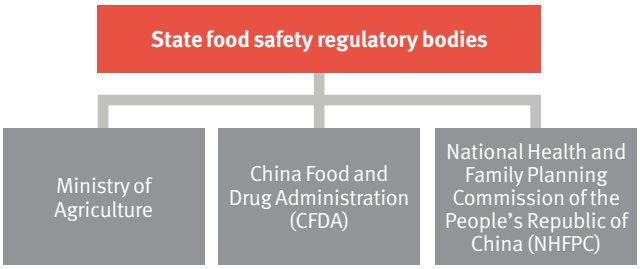
(Continued on p. 18)

(Continued from p. 17)

footage of contaminated meat being processed inside a facility operated by Shanghai Husi Food Co. Limited, a subsidiary of the American-based OSI Group LLC.

Shanghai Husi Food was forced to shut down after a local television station ran footage of the company's factory workers picking hamburger patties from off the factory floor and tossing them directly into meat mixers. Workers on the assembly line were also recorded handling poultry and beef with their bare hands. The footage reportedly showed sewage and trash spread all over the floor of the plant.

The Shanghai Municipal Food and Drug Administration investigated the Shanghai Husi Food plant. Officials found that expired chicken and beef products were repackaged and processed with new expiration dates and some 3,000 cases of contaminated beef had already been sold.



The general framework of China's new food safety management after institutional reform in March 2013.

Technology Shortcomings

The inadequacies of the existing technology support system greatly hinder food safety in China, Dr. Wu adds. "Because of freshness, perishability, and specificity of processing concerns, compounded with the high demand for circulation of food, hazardous factors may exist in all aspects of the Chinese food supply chain that can lead to food safety incidents," he points out. "Our food safety technology security system has made great progress in China in recent years, however, because of the diversity of Chinese food and consumer culture, along with the diversity of climate across the country, the inadequacies of the food safety technology support system definitely affects food safety in China in a significant way."

India: Aspiring World Food Factory

As per the 2010 Food and Agricultural Organization of the United Nations world agriculture statistics, India is the world's largest producer of many fresh fruits and vegetables, milk, and major spices. It's the second largest producer of wheat and rice, considered the world's major food staples.

India is also the world's second or third largest producer of several dry fruits, roots and tuber crops, pulses, farmed fish, eggs, coconut, and sugarcane. India ranked within the world's five largest producers of over 80 percent of agricultural produce items, including many cash crops such as coffee and cotton in 2010.

According to the USDA Foreign Agricultural Service, India is also one of the world's five largest producers of livestock and poultry meat, with one of the fastest growth rates, as of 2011.

Although India is fundamentally an agricultural country and is on track to become the undisputed food factory of the world in time, the country has, thus far, failed to create a significant niche in the global food market because it has not been able to deliver consistent quality and consistent characteristic parameters in food due to infrastructure constraints and some climatic conditions, according to Deepa Bhajekar, PhD, director of "d technology" based in Navi Mumbai, India.

"The major reason for India not being able to get a large market share of the business from the global market is lack of consistent quality and some constraints in infrastructure," Dr. Bhajekar emphasizes. She believes India would be able to expand its food market if all the stakeholders in the chain ensure that their food products are of good quality and the right mechanisms are used for food production.

Dr. Bhajekar is quick to point out that, unfortunately, India currently faces a number of food safety and quality challenges that are hindering those efforts.

For starters, she says, the majority of food processing units are in a small and unorganized sector. Then there is a tremendous diversity of food products, ingredients, cuisines, and methods of processing. And, while recognizing the value of food safety to international levels and standards is gaining importance, it is not fully in place. Another issue is that food handlers are not fully trained on safety and quality.

"Laboratory infrastructure is inadequate against the country's requirement with only a handful of private labs having updated sophisticated equipment," Dr. Bhajekar, a food microbiologist, adds.

At the farm level, food safety issues in India can be traced to the climate, Dr. Bhajekar relates. "India has a climate which is hot, humid, and dusty," she mentions. "This acts as a good incubation center for a variety of microflora to proliferate, which, in turn, creates many issues with respect to microbial safety. In some areas, heavy use of antibiotics in shellfish or poultry gives rise to resistant microbial species which could be difficult to counter. Proliferation of these microorganisms, which is made conducive by some old farm practices, like drying products naturally on the farms postharvest, gives rise to chemical contaminants like toxins, mycotoxins for example."

To curtail the spread of pests that attack a variety of crops, Dr. Bhajekar says many Indian farmers are forced to resort to pesticides, herbicides, insecticides, and chemicals that can stay in the crop and be consumed by humans and animals based on the half-life of the chemical.

"New research, including the use of biopesticides and other natural means to curb these pests, is ongoing in India by most of the prominent agricultural institutes," she mentions. "Plans to upgrade infrastructure on the farms are taking shape, which should eventually resolve some of the problems."

Dr. Bhajekar also says that the inadequate cold chain in the Indian food distribution system poses some additional challenges.

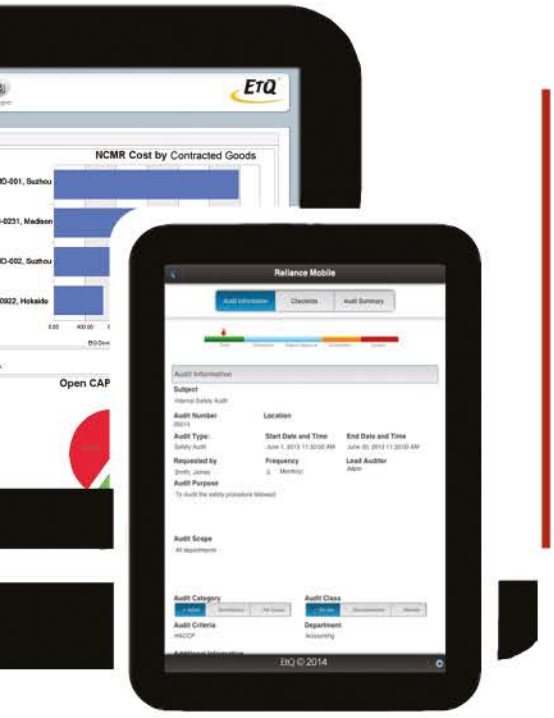
"In the food safety plus column," Dr. Bhajekar points out, "Indian food cooking involves a lot of heating, pressure cooking, steaming, and sometimes has a high level of salt and sugar, all of which act as a preservative mechanism naturally." ■

Leake, doing business as Food Safety Ink, is a food safety consultant, auditor, and award-winning journalist based in Wilmington, N.C. Reach her at LLLeake@aol.com.

For bonus content, go to June/July 2015 issue on www.foodqualityandsafety.com and click on "Food Safety in Asia."

Robust Simplicity.

EtQ features the most comprehensive Food Safety Management Solution that is completely configurable to your business needs



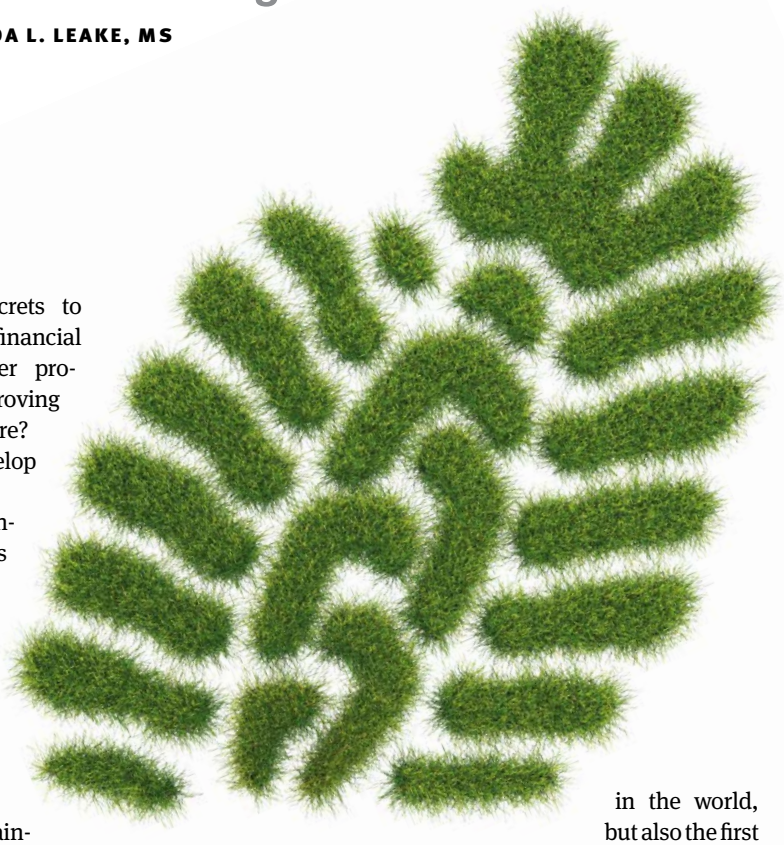
- Automates processes such as Supplier Management, HACCP, Corrective Action and Risk Management
- Ease compliance with ISO 22000 and GFSI-benchmarked schemes
- Increases visibility into the supply chain
- Enables food chain traceability
- Make any application mobile and access your data anywhere, anytime

EtQ | info@etq.com
800.354.4476
http://www.etq.com/food

Industry is Reducing its Ecological Footprint

Companies are striding for green, multifaceted sustainable practices in facility designs, production, and waste management

BY **LINDA L. LEAKE, MS**



What are some secrets to achieving greater financial success with lower production costs, improving product function and quality, and increasing market share?

How do we improve environmental performance, develop better relationships with stakeholders, and lower risks?

According to the World Business Council for Sustainable Development, the answers to all of these questions are one and the same: incorporate sustainable practices.

For many consumers, sustainability is no longer just "nice to have" but is instead a critical differentiator, according to a 2010 UN Global Compact-Accenture CEO Study. Furthermore, the report says, "as consumer awareness of sustainability issues increases, companies are being held to a higher standard and being asked to demonstrate the wider impact of their operations."

In response to consumer demand for more sustainably produced foods, companies are doing their part to be good stewards of Mother Earth's resources with ever increasing fervor.

First LEED Platinum Food Plant

On June 16, 2010, Shearer's Snacks Millennium Manufacturing facility, Massillon, Ohio, attained LEED Platinum status. In achieving this prestigious distinction, the Massillon plant became what is believed to be not only the first LEED Platinum snack-food manufacturing facility in the world, but also the first LEED Platinum food manufacturing facility of any kind in the world.

Developed by the U.S. Green Building Council, Leadership in Energy & Environmental Design, or LEED, is a green building certification program that recognizes best-in-class building strategies and practices. LEED certification provides inde-

pendent, third-party verification that a building, home, or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health, namely sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. (LEED is a registered trademark of the USBC.)

There are four levels of LEED certification: Certified (40 to 49 points), Silver (50 to 59 points), Gold (60 to 79 points), and Platinum (80 or more points).

Construction of Shearer's landmark then $10 million project began in July 2009; and the result was a brand new 47,000-foot $(ft.)^2$ plant on 34 acres designed for the production of chips in the Shapers and Tangos lines.

"Before we started, we developed a vision for the facility," says Mark Schwerdtfeger, Shearer's vice president of sustainability, safety, and wellness. "We wanted to create the most sustainable snack manufacturing plant we possibly could, while overcoming the limitations of our small municipal footprint. Key goals were to optimize plant layout and process flow, and also to automate building controls. We wanted all of this to allow for easy expansion."

Shearer's Snacks is a custom manufacturer and private-label producer for retailers throughout the country. It manufactures potato chips (regular and kettle), tortilla chips, extruded products (corn curls), rice crisps, multigrain chips, cookies, and crackers.

Shearer's Snacks has formalized a solid corporate sustainability mindset. "At Shearer's, sustainability is not just a philosophy," Schwerdtfeger emphasizes. "It's about finding creative ways to positively impact the environment, our community, and our business. We try to incorporate sustainability in everything we do on a daily basis."

Millennium Manufacturing has enjoyed four additions since the original building was completed. The second and most notable expansion, completed in 2011, added 64,000 $ft.^2$ at a cost of $12 million. "This 2011 addition was constructed with at least 22 percent recycled materials," Schwerdtfeger notes. "The initial investment of $40 million had a return on investment based on energy savings of about three years."

The Millennium Manufacturing building features R50+ insulation, argon encapsulated windows, Forest Stewardship Council-certified materials, extensive day lighting and controls, thermal comfort controls, and continuous outside air monitoring. "We have a white roof and parking lot to lower building temperature," Schwerdtfeger says. "What's more, indigenous plantings account for more than 50 percent of our landscaping."

Shearer's Company-Wide Green Accomplishments

Shearer's Snacks set the corporate goal of sending less than one percent of waste to the landfill and shipping non-sellable, non-usable edible materials for animal feed. "These efforts helped us to divert 24 million pounds of waste from the landfill in 2014," Schwerdtfeger relates. "Six of our factories reached zero waste status in 2014, with recycling revenues reaching almost $2 million last year."

With regard to utility consumption, Shearer's 2014 corporate goals for reduction of natural gas, electric, and water consumption were set at greater than four percent annually. "We actually had a nine percent reduction in water use over 2013, a six percent reduction in electric use, and a four percent reduction in natural gas use," Schwerdtfeger says. "We enjoyed a $600,000 savings from our utility conservation efforts in 2014."

In response to consumer demand for more sustainably produced foods, companies are doing their part to be good stewards of Mother Earth's resources with ever increasing fervor.

Schwerdtfeger is quick to point out that Shearer's Snacks is committed to the human element of sustainability as well. "We offer a wellness program to all of our employees, along with incentives for participation," he relates. "We provide free ongoing, onsite medical clinics for our associates at all of our U.S. plants. We also have financial incentives for meeting healthy biometric targets."

(Continued on p. 22)

(Continued from p. 21)

SHEARER'S SNACKS

Shearer's diverted more than 24 million pounds of waste from the landfill.

Schwerdtfeger adds that all Shearer's Snacks team members, company-wide, are fully invested in another vital component of sustainability, namely openness to change and a willingness to embrace sustainability as an integral part of company culture. "Shearer's is not afraid to install new equipment with a serial number of 1, meaning new innovative designed building and process equipment," Schwerdtfeger says.

By the way, Earth Day, April 22, is a big deal for Shearer's Snacks.

"Associates at many of the factories will provide park cleaning efforts on this day," Schwerdtfeger says. "Additionally management provides a green gift, an energy efficient light bulb, for a green idea submitted by associates. Some of the factories have provided tree seedlings to employees to plant at home and others even provide a sustainable garden onsite for them to grow crops."

Developed by the U.S. Green Building Council, Leadership in Energy & Environmental Design, or LEED, is a green building certification program that recognizes best-in-class building strategies and practices.

To further honor Earth Day, Schwerdtfeger shares company milestones with all the Shearer's associates. In 2015 he proudly shared these: "In the past year, our recycling efforts generated over $2 million of positive impact to the company. We avoided more than 24 million pounds of waste that normally would have gone to landfills. Six of

our factories are considered zero waste facilities. We had over $600,000 last year in utility savings. In natural gas and electric we saved approximately the equivalent of planting 53,000 trees, eliminating 450 cars, and heating 300 homes for the year. And we saved roughly enough water last year to fill 46 Olympic-size swimming pools."

Lamb Weston: Something Sweet

Jan. 20, 2011 was a sweet day for Lamb Weston's processing facility in Delhi, La. That's when the Delhi operation reportedly became the first frozen food manufacturing plant in the world to earn LEED Platinum certification.

The plant primarily processes sweet potatoes from Louisiana and the surrounding states, which are prime sweet potato-growing regions. "We produce many different frozen retail and restaurant products," says Rick Martin, Lamb Weston's vice president for manufacturing. Operations at the Delhi plant began in September 2010.

A brand of ConAgra Foods, Inc., the Kennewick, Wash.-based Lamb Weston is an international supplier of frozen potato, sweet potato, appetizer, and other vegetable products, serving both the food service and retail industries around the globe. Lamb Weston maintains 16 manufacturing facilities in the U.S., Canada, and China.

Built from the ground up using the newest and best processing and packaging technologies, the state-of-the art equipment featured in the 164,000 ft.^{2}- Delhi plant was uniquely designed to process sweet potatoes in the most efficient

(Continued on p. 24)

Don't Forget About Green Packaging

According to TechNavio's report, "Global Green Packaging Market 2015-2019," green packaging is expected to grow at a CAGR of 7.84%. With increased environmental concerns worldwide and need to reduce toxic emissions, green packaging is being adopted by many industries, including food and beverage.

(Continued from p. 23)

and environmentally responsible way, all geared for long-term, economic sustainability, Martin says.

"We believe the plant's unique design provides positive environmental and economic benefits to the local community, including water conservation and energy efficiency," he elaborates. "For Lamb Weston, efficient operations mean more efficient use of natural resources within the community, including energy and water."

Martin says the company's 10 years of experience with producing quality sweet potato products allowed the Lamb Weston team to bring the best of what they had learned to the design and construction of the Delhi plant.

"From the beginning, LEED was used as a back check to validate the sustainable strategies implemented during design and construction," Martin says. "To earn the distinction as the first LEED Platinum frozen food manufacturing plant in the world reflects the entire project team's hard work and ConAgra Foods' investment in innovation and excellence. The Platinum rating is the positive outcome of our team's focus on balancing the project's impacts to the planet, employees and the community, and Lamb Weston's bottom line."

As a green benefit for employees, the entire plant is climate controlled to increase worker productivity, safety, and comfort. "Climate control in such a hot, humid environment reduces condensation build up and water on the floors, reducing slip and fall hazards," Martin notes.

Materials, such as low VOC (volatile organic compounds) carpeting, cleaning products, and paints are used in the interior of the plant to reduce occupant exposure to airborne pollutants.

Energy-saving processing equipment saves 40 percent of the annual energy consumed at a comparable plant. "By identifying and recovering potential wasted energy within the building systems and processes, energy demand is greatly reduced," Martin adds.

Biogas, produced by treating process waste water, is piped back to the plant boilers to produce steam. "This process offsets approximately 20 percent of the annual natural gas demand of the plant and prevents methane, a harmful greenhouse gas, from entering the atmosphere," Martin says.

More than 100 acres of the Delhi property are maintained as open space, including protected wetland areas, ponds, and restored native vegetation. Water is conserved outside the building by landscaping with native plant species that require no irrigation once established.

As a unique perk to employees, priority parking is given to low-emission, fuel efficient vehicles. "Beyond the efficiencies related to the building, we want to create a culture of sustainability among our employees," Martin says.

He is quick to reiterate Lamb Weston's global vision for sustainability.

"Operating sustainably, and doing our part to address environmental issues like climate change, water resources, waste elimination, and access to materials is critical to creating a sustainable global food supply," Martin emphasizes.

Sustainability is a Top Priority for Consumers Buying Seafood

A report released this year by the Institute of Food Technologists Global Food Traceability Center highlights the growing need for traceability as a means to improving seafood industry performance, including reducing waste and enhancing consumer trust.

The research confirmed that the more that companies embrace traceability (practices and systems), the more benefits and real business value they achieve. Individual businesses maintained that by applying traceability to management of supply chains, more significant business and industry-wide benefits are achieved. These business benefits included the ability to substantiate sustainability claims.

The research also examined consumer perceptions about seafood and how traceability influences their purchasing decisions. One of the more significant finding was that consumers value verification that a seafood product is produced or harvested in a sustainable manner even higher than confirmation that the fish is actually what is advertised or labeled.—*FQ&S*

WhiteWave Gone Green

You could say WhiteWave Foods Company is riding a green wave since its beverage manufacturing plant in Dallas, Texas achieved LEED Certified status for new construction in July 2014. The 325,000 ft.^{2}-facility, which produces Silk soymilk, almond milk, and coconut milk, along with Horizon Organic milk and International Delight flavored coffee creamers, was completed in 2012 and employs nearly 300 people.

Becoming LEED Certified, WhiteWave's Dallas plant follows the LEED Certified achievement of the company's North American headquarters in Broomfield, Colo.

"WhiteWave is committed to changing the way the world eats for the better," says Tom Wiester, Jr., the firm's vice president of quality assurance and food safety. "To that end, we recognize that how we make our products is just as important as what we make. Sustainability is embedded in how WhiteWave does busi-

Leadership in Environmental Sustainability

Last year, the Grocery Manufacturers Association (GMA) released a report that spotlights progress and achievements by food, beverage, and consumer products companies as they work to reduce their environmental footprints and implement innovative sustainable business practices. Titled "Environmental Success Stories in the Consumer Packaged Goods Industry," the report was compiled by PricewaterhouseCoopers and features industry success stories in the categories of air, water, and waste management. This is the second edition of the report; the first edition was released in 2012.

The report highlights a diverse cross-section of initiatives from an equally diverse slate of manufacturers. Among the success stories selected include companies that have introduced successful products that reduce consumer energy consumption and packaging waste; redesigned packaging to reduce overall inputs; launched innovative waste recycling programs; and implemented wastewater management programs that led to cleaner groundwater.—*FQ&S*

ness, from sourcing and manufacturing to our buildings and employee programs."

"Improving the environmental profile of our manufacturing process helps us to offer consumers more sustainable food choices and reinforces our commitments to reduce our environmental impact," says Wendy Behr, senior vice president of R&D and sustainability at WhiteWave Foods. "Having a LEED Certified plant was a major step for our company to showcase our commitment to sustainability by taking an approach that emphasizes sustainability at all levels of the construction and production process."

Nearly half of all building materials were manufactured within 500 miles of the site, Behr points out. "One-hundred percent of the wood-based building materials we used are certified sustainable by the Forest Stewardship Council," she relates. "And nearly 90 percent of all demolition and construction waste associated with the project was diverted from landfills."

WhiteWave used materials and design techniques that facilitate solar reflectivity, such as choosing light colors to help reduce heat transfer. "This helps to address 'heat island' challenges associated with urban development here in Dallas," Behr explains.

On the water conservation front, WhiteWave's Dallas plant features landscaping that requires no irrigation and plumbing fixtures, such as high-efficiency appliances in washrooms that use 30 percent less water than standard versions. "Water conservation is a major focus at WhiteWave throughout the production process," Behr mentions. "We're committed to using less water and the LEED building program provided an opportunity for us to have that positive impact."

WhiteWave Foods manufactures plant-based foods and beverages, coffee creamers and beverages, premium dairy products, and organic produce at eight facilities in the U.S., including Jacksonville, Fl., Mount Crawford, Va., and Dallas, Texas.

In addition to its recent focus on green building, WhiteWave's sustainability initiatives are driven throughout its supply chain, according to Deanna Bratter, the company's director of sustainability. "Improving the environmental and social impacts of our business; improving responsible material sourcing; increasing packaging sustainability; and reducing waste to landfill, water consumption, and greenhouse gas emissions are all important components of driving our business and our sustainability ambitions," Bratter emphasizes.

"From 2013 to 2014 WhiteWave has reduced greenhouse gas emissions five percent, waste to landfill by 17 percent, and non-ingredient water use by four percent per pound of product produced at all of our owned manufacturing facilities," Bratter relates.

As for upcoming sustainability plans, WhiteWave is applying for LEED Certified status for its new Technical Innovation Center, located in Louisville, Co.

"We recognize that our goal as a company isn't just about producing great-tasting food, it's about doing so in a way that's good for people and the planet," Bratter says. "Sustainability is core to the mission of WhiteWave and we look forward to continued progress toward our sustainability goals for years to come." ■

Leake, doing business as Food Safety Ink, is a food safety consultant, auditor, and award-winning journalist based in Wilmington, N.C. She has written feature articles showcasing sustainable practices and LEED for *Green Builder* magazine. Reach her at LLLeake@aol.com.

For bonus content, go to June/July 2015 issue on www.foodqualityandsafety.com and click on "Industry is Reducing its Ecological Footprint."

Introducing

AccuPoint® Advanced

the ATP hygiene monitoring system that delivers more

Expect More...

The new AccuPoint Advanced ATP hygiene monitoring system delivers:

- A newly optimized sampler, with liquid stable chemistry, that provides more accurate and more consistent recovery of ATP from surfaces
- Data Manager software that helps interpret data to drive hygiene decisions by monitoring trends for continuous improvement
- An intelligent instrument that guides users to optimize facility coverage with faster time to results
- RFID capability to scan areas, select designated or random test sites

The AccuPoint Advanced system is designed to get to a new level of clean!

NEOGEN®

800-234-5333 (USA/Canada) • 517-372-9200
foodsafety@neogen.com • www.neogen.com

Expect a New Level of Clean

Make Informed Decisions

AccuPoint Advanced provides actionable information users need when they need it.

Prevention and Compliance

AccuPoint Advanced can help producers verify their hygiene and preventive control programs are effective.

Brand Protection

AccuPoint Advanced provides confidence in results that maintain brand reputation.

What kind of program do you have? What kind of program do you want? Don't settle.

Could you get more than what your current system offers? Contact a Neogen sales representative to get a free, no obligation ATP Program Self-Assessment and find out.

Step up to the most complete ATP monitoring system with our trade-up program.

800-234-5333

blog

Beating The Buzz

An integrated approach to fly problems will ensure a facility is protected against potential contamination and is compliant with audit standards | BY **JUDY BLACK, MS, BCE, CP-FS**

The dog days of summer are here. For food processing facilities, that means that issues with flies are likely on the rise. These buzzing pests are more than just an annoyance—they spell danger. By understanding how flies operate, you can take action to reduce or even eliminate them at your facility.

Flies have very clearly been associated with disease causing organisms: *E. coli*, *Salmonella*, *Staphylococcus*, and more. Every time a fly lands, it is potentially spreading these dangerous bacteria, contaminating the food you produce and your equipment. Depending on where in the process that contamination occurs, the presence of flies could be putting people who eat that food at risk.

And while contaminated food and equipment is certainly the largest concern that flies pose to food processors, there's another danger that flies can pose for processing facilities. Third-party audits and regulatory compliance are placing an increased focus on risk-based pest management programs. Cockroaches, rodents, and other pests food processing facilities often deal with are nocturnal or cryptobiotic, meaning that they like to hide, which makes them less likely to be out in the open during day-to-day operations. Flies are the complete opposite. They are out during the day and actively flying, and that makes them very visible to auditors and regulatory officials. Simply seeing flies might signal a concern about a facility's entire pest management program.

Flies are more than just an annoyance. They are a real and present danger that needs to be addressed as part of a pest management program for a food processing facility.

The Science Behind Your Fly Problem

For food processing facilities, the most likely culprits for fly issues will be house flies, blow flies, and on occasion, bottle flies.

Adult house flies can live for up to 25 days—more than enough time for a single female house fly to produce a virtual army of flies. In her lifetime, she can lay between 350 and 900 eggs. Adult females of other filth fly species can wreak even more havoc; blow and bottle flies can produce as many as 2,300 eggs. Simple math will show you how quickly a relatively small fly issue can become a major problem for a processing facility.

Flies are attracted to mainly two things: heat and odors. Heat signals optimal living and breeding conditions, and odors draw them to potential food and breeding sources.

Food processing facilities naturally generate heat through the use of machinery. If heat is escaping through gaps, cracks, windows, and doors, it may be attracting flies toward your facility. Remember, a fly's sole purpose in life is to reproduce; the optimal temperature for egg production is between 77 and 86 degrees Fahrenheit, so flies will seek out that temperature range. If your facility handles livestock or poultry, you may also be generating heat through the presence of animals and their manure.

Odors that are both good and bad to humans can be fly attractants. Flies have an extraordinary ability to detect these odors from great distances. While most house flies will fly about a mile to find food and breeding sources, they have been shown to be able to detect odors from as far as five miles away.

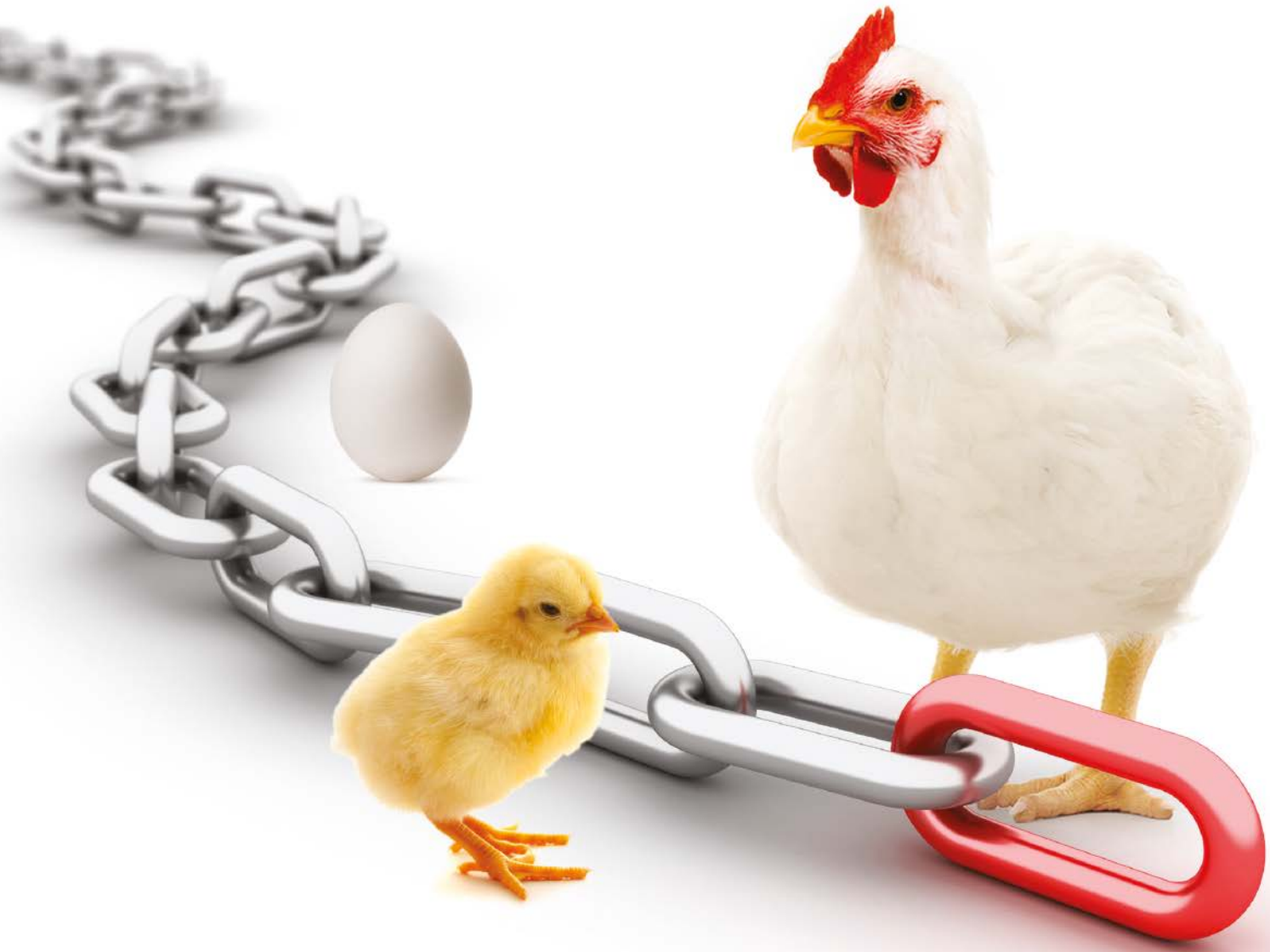
Think about what is in a five-mile radius of your facility. If your operation produces any odor that is attractive to flies, they can find their way from naturally occurring breeding sites, sewage treatment plants, farms, and even something as small as the carcass of an animal on the side of a road.

Using an Integrated Approach

Integrated pest management (IPM) is not a new concept to most processing professionals. The most effective way to resolve most pest issues is to use a variety of control or elimination methods. It's no different for flies. By using what we know about fly biology, facilities can use a combination of tactics to reduce and eliminate fly issues.

Reduce fly attractants. The best way to solve a fly issue is to get rid of the things that are attracting flies. By working with your pest management provider, you can identify what on your

(Continued on p. 30)



Strengthen Your Chain.

Weak links put our food chain and your brand at risk. Don't let poultry health be the weak link in your food safety chain.

Feeding Diamond V **Original XPC™** strengthens the pre-harvest food safety link while improving poultry production efficiency. Original XPC is an unique, all-natural fermentation product that helps maintain poultry immune strength by balancing immune response.

A stronger pre-harvest link — breeder, hatchery, broiler grow-out or egg production — reduces risks to food safety throughout the food chain.

Strengthen your food safety chain with Original XPC. Stronger links mean safer food for everyone.

Make smart, science-based decisions.

ORIGINAL XPC™ | Diamond V®

The Trusted Experts In Nutrition & Health®

For more information, call 800-373-7234 or visit www.diamondv.com

(Continued from p. 28)

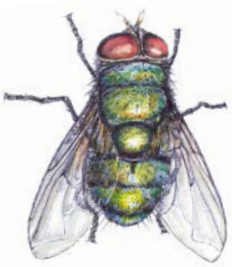
property may be attracting flies. For most facilities, a fly problem on the interior isn't likely. When it comes to breeding, large flies need very decayed organic matter to be successful. The odors created by these breeding sources are usually very strong, putrid smells—decaying animal carcasses, rotting organic materials, etc. Most often, these breeding sources will be outdoors.

If the breeding source is on your property, remove it. If it is not possible to remove it, your pest management provider can discuss with you ways to contaminate that breeding source to make it uninhabitable to flies.

If you've never had a fly issue before and one suddenly develops, your pest management provider may ask you questions about recent changes in process to see if there's something new that could be attracting flies.

In many cases, the entire fly breeding source may not be on a facility's property and flies may be attracted to your facility from other areas. In these cases, removing the breeding source may not be an option, so setting up a defensive perimeter is your next course of action.

Engineer your facility to fight flies. In combination with reducing fly attractants, putting measures in place to prevent fly entry into a facility is critical. For most processing facilities, the highest risk of fly entry can be found at receiving areas where livestock may be brought in or product spillage is occurring.



The blow fly.

On the interior, preventing fly entry can be as simple as installing door sweeps, screens, air curtains, or plastic strip doors. Educating employees to keep exterior doors closed when not in use can also go a long way toward keeping flies out. Installing a gauntlet of insect light traps and other fly traps is another way to catch flies before they enter critical processing areas.

Engineering your facility to fight flies may also mean working with your facility's engineering team to reduce the amount of air escaping through door seals, window frames, and other openings. This reduces heat that may be attracting flies to your facility.

In addition, when possible, ensure that your facility has positive air pressure. What is positive air pressure? We've all experienced it—when you open the door to a building and feel air pushing back out at you. Positive air pressure works to deter flies because flies can't or won't fight against the air current escaping to enter the facility. Changing the air pressure of a facility may simply not be possible, however, if it is a core problem with the facility's HVAC system.

The house fly.

Odor management systems. Many facilities may be able to drastically reduce or even eliminate fly issues by addressing odor issues.

> Positive air pressure works to deter flies because flies can't or won't fight against the air current escaping to enter the facility.

When used as part of an IPM strategy, odor management technology can be an effective way to deter pests from a variety of operations. At one time, food processing facilities needing odor management systems had to invest in expensive equipment that was messy and required ongoing maintenance. Today, there are alternatives available that are compact, cost-efficient, easy-to-maintain, and utilize environmentally friendly odor neutralizers that work to eliminate odors, rather than just mask them.

Fly baiting programs. Utilizing fly baits has proven one of the most effective ways to deter flies from a facility. However, traditional scattered/broadcast granular fly baits can be problematic in processing environments where loose baits can contaminate product when they are inadvertently spread by foot and vehicular traffic.

Pheromone-based fly baiting is an ideal solution. Granular fly bait containing pheromones can be strategically placed in bait stations around the facility so that flies are attracted to the stations before they reach openings in your structure. These stations also dramatically reduce the possibility of product contamination with loose bait. These newer fly bait formulations are considered much more attractive than their older cousins and use different active ingredients to kill the flies.

Parasitic wasps. It may sound like something out of a futuristic horror movie, but parasitic wasps are actually a very effective and truly green form of pest management that can significantly crush fly populations. These tiny, sterile, non-stinging wasps have a short life cycle with a singular mission: to reproduce. Unfortunately for flies, parasitic wasps depend on fly pupae to do that.

A pest management professional can install parasitic wasp release stations at strategic points on your property. Once they are released, these wasps begin to hunt out fly pupae in which to lay their own eggs. The wasp uses its non-functioning stinger to break into the fly pupae and lay its eggs. When the wasp egg hatches, it feeds on the immature fly. In doing this, the wasps prevent new flies from becoming adults.

You'll need to work with a pest management professional to set up a parasitic wasp program as the wasp life cycle is short and populations will need to be refreshed periodically.

There's no silver bullet to fly problems. Fly issues will be unique at every facility depending on the products being produced, processes being used, and environment surrounding the facility. To best protect your facility, work with an experienced pest management provider to address the specific risks present at your facility. This integrated, custom approach to fly problems will ensure that your facility is compliant with audit standards and, most importantly, the product you are producing remains safe from potential contamination. ■

Black is a board certified entomologist and vice president, technical services for The Steritech Group, Inc. She received her MS in Entomology and her BS in Agriculture from West Virginia University and has nearly 30 years of experience in the pest management industry. Reach her at judy.black@steritech.com.

THE STERITECH GROUP, INC./DAVID WILLIAMS

ORKIN

Carpenter, fire, and Argentine ants (from left to right).

No Matter Your Location, Ants Are a Threat

IPM programs can protect against ants that enter through the tiniest of holes and leave invisible trails for the possibility of hundreds of thousands to follow | BY **ZIA SIDDIQI, PHD, BCE**

Why are ants so hard to control?

Ants don't play favorites. They are active across the country in just about every commercial field. Just take a look over your lawn and you may find them crawling around.

When ants march their way inside, foraging for food—especially at food processing facilities—they become an even bigger problem.

Ants can enter through the tiniest openings and nest out of sight in walls, storage rooms, and the landscaping surrounding a building. Once ants get into a building, they leave an invisible pheromone trail for others in their colony—the colony can be home to hundreds of thousands of them—to follow.

What's more, ants can signal a warning via pheromones to the colony to disperse and relocate if they sense a threat. Because of their strong survival instincts, ant colonies can be very difficult to control once inside your facility.

Just what kind of ants pose a threat to your facility depends on where you are in the country. Fire ants show their aggression in the Southeast and carpenter ants can infest any building in the Northeast and Pacific Northwest, while on the West Coast, Argentine ant colonies can contain millions of worker ants and hundreds of queens. The Southwest faces the threat of tawny crazy ants, which can be even more destructive than fire ants. No matter where your facilities are, ants are nearby.

Fortunately, there are tactics you can put in place to give your facility a fighting chance. Many of these fall under the integrated pest management (IPM) umbrella. By eliminating conducive conditions, an IPM program can help control ant colonies, as well as other pests. A pest management professional can help customize an IPM program for your facility and target the controlling strategies based on proper identification of the ant species you are dealing with.

Work with a pest management professional to implement an IPM program that keeps ants on the outside looking in.

Make Your Facility a Fortress

While ants can hitchhike their way into your facility via shipments or unsuspecting visitors, they pose their greatest threats from the outside. The entrances to your facility, as well as your building's exterior, are the front lines of your battle, a battle you can end with the right IPM defenses.

Be sure to add door sweeps and use weather stripping to minimize any gaps around doors and windows. If possible, install automatic doors to ensure entrances stay closed as much as possible.

(Continued on p. 32)

(Continued from p. 31)

Survey the exterior of the building, looking for cracks and imperfections. Seal any cracks in the building's windows, ceilings, floors, and exterior walls with weather-resistant sealant and add copper mesh around pipes and drains before sealing. Use window screens and additional weather stripping as protective barriers to foil ants from crawling inside.

When it comes to landscaping, create a buffer to make sure that no plants, trees, or shrubs touch the building. If possible, add a two-foot gravel strip between bushes and walls, as this makes it difficult for ants—and other pests like rodents—to move around.

Keep an eye on your parking lot and any sidewalks too because any remnants of trash can attract ants to the area. Clean dumpsters on a regular basis, and prevent trash and clutter buildup around them to give ants one less place to hang out.

Don't Receive and Store Ants

Loading docks are prime pest targets at food processing facilities because they tend to be the most accessible entrance. Pests can find their way inside through receiving doors and, at times, hitch a ride in on shipments.

To limit your risk, make sure that exterior receiving doors seal tightly when closed, as it doesn't take much room for ants and other pests to sneak through—rats only need an opening the size of a quarter, mice a dime, and cockroaches a fraction of an inch.

Inspect all incoming shipments for signs of pests, such as damaged packaging. Keep receiving areas clean, well lit, and free of unnecessary stockpiles—ants see clutter as a perfect hiding place. Dispose of empty and unused cardboard boxes as quickly as possible.

Containers with ingredients—or even dry goods for that matter—should remain closed with airtight lids and stored at least six inches off the floor and a foot and a half away from walls.

Prepare Your Interior for Success

Just like the exterior, you will want to search out and caulk any cracks and crevices around your wall and ceiling junctures, wall and floor junctures, and corners inside facility, and at utility penetration points.

Break rooms, offices, or locker rooms that employees use are another hotspot, as ants and other pests can find the food, water, and shelter needed to survive in these areas. Inform your staff of your new IPM measures to make sure they are doing their part to keep these areas clean and sanitary, especially underneath sinks, around drains, and near water pipes.

Empty trash cans often and clean up any spills immediately. These simple sanitation steps will make a noticeable difference for your IPM program. Additionally, you'll want to set up a routine sanitation schedule to clean equipment and floors to keep any liquids that could attract pests from building up. You can remove greasy buildups with an organic cleaner that will have a minimal impact on the environment.

To optimize the sanitation and cleaning of equipment and machinery, stay away from squeezing equipment into tight areas. The best floor plans have machinery in wide open spaces. This way, equipment and machinery are easily accessible from all sides and a lot easier to clean.

Remember, the sanitation team needs to be able to reach areas above, beneath, and along the sides of equipment without any problems. If they can't, consider moving equipment to a larger space. In addition, minimize any water and liquid accumulation to keep all areas within the facility dry and to prevent any damage to products.

When Treatments Are Needed

In some cases, you can use ants' own biology against them. Pheromone traps incorporate a synthetically reproduced version of natural pest pheromones, which offer another way to monitor pests by luring them into a trap. Insect growth regulators employ man-made hormones to stunt insect growth and prevent reproduction and population growth without posing any threat or health hazards to people.

Other non-chemical treatments include sticky boards, which can be used to trap and monitor ants.

If your pest management professional determines that chemical treatments are necessary, you can target ants and other pests with precise treatments rather than a general application all over your facility. Non-volatile and non-repellent gel baits can be applied directly to cracks and crevices where pests feed on them and can take them back to the colony. Unlike sprays, gel formulations will not become airborne so they won't be inhaled or contaminate sterile surfaces. Additionally, bait pucks and containerized baits can be used in damp, dark areas.

Ask your staff to report any ant sightings to your pest management professional and have your pest management professional talk to your staff about what they can do to help keep ants from becoming a problem in your facility—many providers offer staff training at no extra cost.

Follow these IPM guidelines and you can see your audit scores improve and your ant problems dissipate. ■

A pest management professional can make sure receiving doors form a tight seal to keep ants out.

ORKIN

Dr. Siddiqi is director of quality systems for Orkin. A board certified entomologist with more than 30 years in the industry, Dr. Siddiqi is an acknowledged leader in the field of pest management. Reach him at zsiddiqi@orkin.com.

MCCLOUD SERVICES

With electronic documentation, all records can now be available electronically whether onsite or at a remote location.

Evolution of Pest Management Documentation to the Electronic Tablet

Documents that were kept as paper such as maps, pest sighting reports, service reports, pesticide labels, and all essential documents are now more effectively retrieved using a tablet | BY **PATRICIA HOTTEL**

The depth of the required documentation for pest management services has evolved considerably over the past 40 years. This is especially true when it relates to the food industry and other commercial industries. Simple matching of the client information with the pest and pesticide application records was once considered sufficient. More sophisticated programs, in response to client requirements and pest management needs, have emerged over time. Some of the documentation requirements are driven by regulations and third-party audits but superior pest control results are also driving change. The most effective pest management strategies rely on an assessment of data and changes in response to what the data is telling us. For example, information provided by pest trending reports is essential in deciding program direction and timing of treatments. Data drives the program.

Technology Solutions

The need for comprehensive and detailed documentation does have its cost. Pest management professionals may spend as much time or more on completing documentation as performing pest remediation services. As the demand for more data increases, solutions for efficiently managing the data are needed. Technology offers solutions on how to better record and retrieve information. Overtime, the electronic tools available to the pest management industry have progressed. Partial electronic documentation packages were once the norm. Now companies are offering programs in which all documents are available electronically.

(Continued on p. 34)

(Continued from p. 33)

Examples of complete electronic documentation packaging include McCloud's LogIt and Copesan's Rapid Trax E-logbook. With these systems, the client is provided a tablet, such as an iPad, to retrieve and view all records. Binders with paper documentation are eliminated or at the very least, not required.

The road to the incorporation of electronic technology for pest management began in the 1990s when pest management firms started using PDAs and barcodes to record trap inspections and results. Previously, traps were inspected and manually dated on a sticker or special card using a pen or a hole punch. Not only was this system time consuming but it was less accurate in terms of recording and transferring trap capture data. The pest management professional was required to write notes regarding the pest captured and transfer those notes to paper forms held in a binder at the end of the service. Legibility was and is a problem for any handwritten documents and can affect the ability to satisfactorily view the information by clients, quality assurance staff members, regulators, and auditors. As a result, the trend has been for less handwritten documentation and at least some electronic records. The initial process and conversion to electronic data capture was streamlined through the use of the PDA. Other information such as pesticide application and conditions conducive to pest development are also recordable on the PDA and more easily read as handwritten notes have become more obsolete.

Electronic Documentation Benefits

The new tablet based documentation eliminates the need for two different record keeping systems. All documents are available electronically. When only some documents are stored electronically, those overseeing programs remotely can only see the electronic data. Site visits are required to see the complete package. Programs of the past where some of the documentation was housed in binders and some electronically often required additional steps and effort to access all of the data. Trending for example wasn't always easily accessible, even on the computer. The conversion to one system has eliminated this hassle. All is accessed from the touchscreen of a tablet.

The demand for more detailed and diverse recorded information has extended beyond outlining services performed. Updating documents such as equipment maps, licenses, certificates of insurance, labels, and SDS (safety data sheets) are one of the most challenging documentation compliance related issues and lend themselves well to an electronic format. Failure to keep these documents updated can result in poor food safety audit scores, regulatory issues, and difficulty in finding and tracking all installed equipment. Under the tablet systems of Logit and Rapid Trax E-logbook, these documents are sourced electronically. This provides easy access for those needing to review the documents as well as remote access for updating. Just like with the service documents, quality assurance departments for both the food facility and pest management company can electronically review the documents without visiting the food facility site. The documents can also be remotely updated via computer when needed. Documents like SDS and pesticide labels can be changed and updated by the product manufacturer at any time. Having the ability to quickly react to those changes in an efficient manner is a major advantage and can now be performed offsite. In addition, if a new product has been used, systems like Logit will automatically add the label and SDS to the client records. Once a pesticide is applied, the label and SDS are automatically added to the client's records. This helps ensure that the labels and SDS are present and available for all products used.

Trending reports of pest activity are more accessible under electronic programs. These can download automatically through the iPad or other tablet and are readily accessible for reference to both the pest management professional and client on the tablet. This ease of access allows for quicker response to pest activity and trends. Some programs will show pest trends directly on a facility map to allow for a visual conceptualization of where the pest hot spots are located and the type of pest and size of the population. The pest management professional can then focus on finding and eliminating the pest sources based on the highlighted map.

Additional benefits include the ease at which documents can be entered. A single record keeping system reduces the duplication of effort required when information is electronically entered and then recorded or tallied in written form. Examples of this duplication of effort can be found in forms such as pesticide usage logs (used to record pesticide use), pest sighting logs (used to document pests observed by the client or staff), pest activity logs (used to record captures in monitors and traps), and trending reports. New software allows the information to be tallied electronically, as the service is completed. Less time on documentation means more time for inspection and pest remediation services. It is a win for both the food facility and pest management professional in increasing efficiency and accuracy.

Although most of these systems are fairly intuitive and easy to use, some client training is advised. Instruction may be needed to learn how to access the documents but even more valuable can be learning about all the features and benefits of the system. It may be advisable, depending on the comfort level of the client, to have the pest management firm be present during the first time a third-party auditor audits the documentation in order to train the auditor. These systems are intuitive but auditors may appreciate having the support available. The pest management professional presence during an audit can help ensure a smooth transition to this new form of documentation.

The Future

What does the future hold? The graphics and features of the systems will certainly continue to improve over time. In addition, although pest management firms are typically targeting larger food processors and warehouses for this technology, we will see the tablets and other forms of electronic documentation offered more broadly to a wider range of clients. There can be clear advantages for all types of facilities to embrace this technology. Large retail food chains, for example, could utilize the system to provide greater access and oversight to the services performed at multiple regional sites on a corporate level. ■

Hottel is technical director at McCloud Services, based in South Elgin, Ill. She can be reached at pathottel@mccloudservices.com.

How to Fit Training Into Your Production Schedule: Part 3

Providing managers with tools to help them strengthen the learning culture after employees leave the classroom and venture onto the processing floor | BY **IAIN WRIGHT** AND **MARIE LEFAIVE**

Editor's Note: *This is the third in a five-part series of articles that will explore each concept behind the five moments of need in training.*

The first two moments of need that we explored in previous articles, learning for the first time and learning more, focused heavily on traditional classroom training. With this next learning moment, remembering or applying, we leave the classroom and venture onto the processing floor.

In a perfect world, a learner faced with a task or project will capably retrieve the needed knowledge and skill to get the job done. In the real world, the process is rarely that smooth. What seemed so straightforward in the classroom has suddenly acquired a few twists, and the learner realizes there are some things forgotten, some things never learned, and some misunderstood.

Enter the world of performance support. In its simplest form, performance support provides specific task guidance to the user at the moment of need. Notice the word *task*—this is not a review of theory or a summary of learned topics. This is direct, applied intervention.

There are many occasions for performance support. Use it when:

- There is too much information to remember,
- The task is complex or has many steps,
- The task is infrequent,
- Errors are unacceptable, and
- The worker is new to the task.

There are two main categories of performance support: job aids and peer coaching. We'll explore each in this article.

Job Aids

In many instances, performance support takes the role of a job aid. Examples include:

- Posted laminated instructions or laminated pocket cards,
- Graphics, pictures, or short videos to help with changes, new equipment, or other at line re-enforcement,
- Workstation reminders and production whiteboards,
- Common area posters and notices,
- Checklists for line start-up,
- At line or offline computer access to standard operating procedures,
- Highlighted, bolded, or color-coded print on forms to emphasize new or changed information,
- Pre-shift briefings, and
- Inserts with punch cards to remind employees on the day of change implementation.

The advantage of today's workplace is you can choose from myriad delivery options: desktop, laptop, tablet, phone, or good old-fashioned print. Technology allows for immediate access and updating. It can also be mobile, allowing a worker to access needed instructions from anywhere on the floor. Print is often more economical; colorful posters or work instructions are easily placed where they are needed.

Whichever option you choose, remember that simply creating a job aid is not enough. There has to be a supported integrated approach to its introduction. This may require instruction on its use, supervision, or metrics to see that it is making a difference.

There might also be a cultural shift required. Some see job aids as cheating—only a newbie or an incompetent would use them. It is crucial to replace this notion with one of pragmatic responsibility. Few of us bake a cake without following a recipe, travel to new places without a GPS, or assemble an IKEA bookcase without instructions. Completing any of these tasks by memorizing the steps is simply not an effective use of our time. The same holds true for job aids.

Peer Coaching

A second key option for performance support is a buddy system. Formally known as peer coaching, it can prove invaluable throughout an organization, and nowhere more so than with line personnel, where the need for just-in-time information is greatest.

As with any initiative, there are best practices for implementation. They provide safeguards to prevent one of several unwanted consequences.

The confident slip-up. Consider the case where a new learner, filled with confidence in her new skills, returns to work to apply this new knowledge. Now consider that she got it wrong, and that every time she performs the task, she makes a mistake. Worse yet, think about what could happen when she teaches others.

With training, as with so much else in our industry, verification is critical. You must ensure that your employee doesn't

(Continued on p. 36)

(Continued from p. 35)

demonstrate a task to a buddy until you are confident in her abilities. Make sure that she properly demonstrates the skill. This is particularly important for mission-critical tasks.

In cases where learners are expected to share the knowledge with their work group, a training debrief is in order. Bring together the learner group and go over the main points of the training. Quiz them for understanding, or ask for a demonstration. This will help you identify potential problem areas, and provide you the opportunity to tailor task procedures to the specifics of your operation.

The degradation effect. Have you heard the one about the British message sent up the line during the World War I? What started as "Send reinforcements, we're going to advance" was eventually received as "Send three-and-fourpence, we're going to a dance." It is probably apocryphal, but it illustrates an important truth: Knowledge passed down from person to person loses accuracy with each transfer.

It is in our nature to adapt any task procedure to our needs and personalities. How many of us, for example, regularly alter recipes? This may not have disastrous effects, but veering from food safety practices can. To guard against this, buddies must be regularly calibrated, either through supervisory oversight, retraining, or skills demonstrations. Create a formalized process and document the results. Most important, be sure to include accountability for competency assessment within the process.

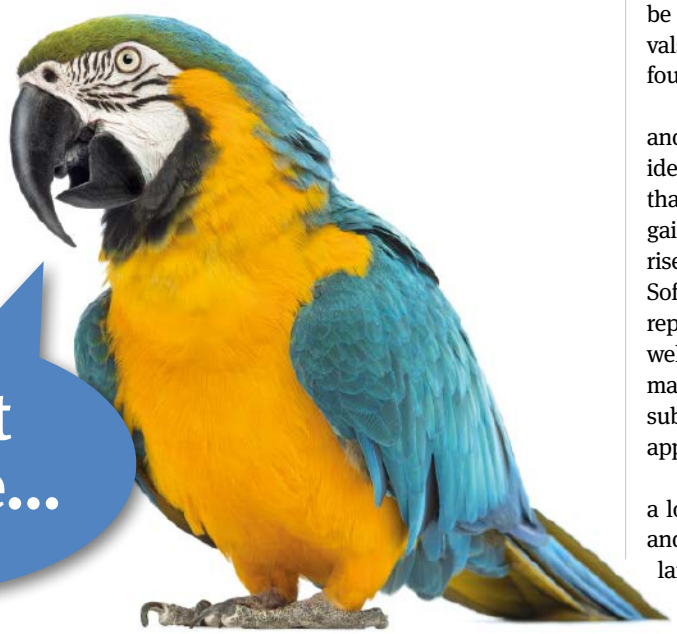
The amateur expert. Not everyone can train. This is true whether in a classroom setting or one-on-one. Some are naturals, while others move into full lecture mode so quickly a learner is left in a state of dazed confusion. The buddy might be the acknowledged topic expert, but he's an amateur when it comes to sharing that knowledge.

Remember that you want buddies who can demonstrate how to perform a task at the moment of need. Their job is to help someone move toward competence. Buddies can be trained—and we most emphatically recommend that you have a training program in place—but what you do not want is someone who is overbearing, dismissive, or critical. In the final analysis, the buddy selection process is as much a matter of personality assessment as it is competency evaluation.

We do a disservice to learners when we do not support their performance after a learning session. Whether using a job aid or a coaching buddy, the goal is the same: to provide workers all the supports possible to help them be the best that they can. It will enhance job satisfaction, reduce workplace errors, and improve productivity. Bottom line: On-the-job performance will help you meet your business objectives. What's not to like about that? ■

Wright is manager technical training at NSF-GFTC. Reach him at iwright@nsf.org. **Lefaive** is manager instructional design at NSF-GFTC. Reach her at mlefaive@nsf.org.

Repeat After Me...



How spaced repetition can enhance employee training in the food and beverage industry | BY **PHIL SIMMONDS**

It might be argued that those working in the food and beverage industry have to comprehend more crucial information than many other professions. After all, the health and happiness of the general public is at stake and any omissions or oversights may have consequences.

However, while recognizing the significance of consumer safety is one thing, managing to remember and apply best practices to business insights such as quality control is another thing entirely. This can lead to some food and beverage training falling well short when trying to educate employees about complex themes and complicated subjects.

The main reason for this is because traditional corporate training usually consists of uninteresting PowerPoint presentations narrated by uninspiring lecturers. What's more, these courses often take place in windowless classrooms or conference centers, which are completely detached from actual working environments.

Thankfully, there is an alternative and it's called spaced repetition.

What is Spaced Repetition?

In many respects, spaced repetition is fairly self-explanatory. It involves repeating the teaching of a subject again and again, but spaces this out over a prolonged period of time. The intervals between each teaching are gradually increased when the student gains a greater understanding of the subject in question. For example, you could start a fire safety topic and the interval time would be one day. Once you start to understand the topic and have a greater knowledge of fire safety, then the interval time would increase over time, to around one month.

Dating back to the 1930s when Professor C.A. Mace discussed the notion in the book *Psychology of Study*, this process takes advantage of the psychological spacing effect that is also known as expanding rehearsal, graduated intervals, or repetition scheduling. Spaced repetition has the power and potential to increase the human brain's ability to learn, memorize, and apply new information.

As the book states, "Perhaps the most important discoveries are those which relate to the appropriate distribution of the periods of study...Acts of revision should be spaced in gradually increasing intervals, roughly intervals of one day, two days, four days, eight days, and so on."

While various researchers, scientists, and psychologists began to explore the idea more fully, it wasn't until the 1980s that spaced repetition really started to gain traction, thanks largely in part to the rise in popularity of personal computers. Software could be developed that adjusted repetition spacing intervals based on how well the student was performing. Harder materials would come up more often, but subjects that were thoroughly understood appeared less frequently.

Since then, spaced repetition has come a long way and those with smartphones and tablets will find that the most popular language learning apps are invariably based on this technique, as they require individuals to recognize, remember, and recall pieces of information they have never come across before. For this reason, it can be incredibly effective with food and beverage training.

Food and Beverage Training Challenges

Despite the fact that educating employees is of utmost importance, which most members of staff will recognize, there are challenges the food and beverage industry faces with corporate training.

First, it is easy to become overwhelmed with the sheer number of industry regulations and government laws. These exist for the right reasons but are sometimes defined or explained in a way that isn't particularly obvious. On top of that, guidelines and requirements change all the time, which forces companies to change or adopt new ways of working. This is in addition to their own values, practices, and procedures, which will also need adhering to.

Secondly, there is the issue of staff turnover. Numerous job roles in the food and beverage industry, particularly hospitality, will be occupied by temporary or part-time workers who are not pursuing long-term careers. Training these members of staff may be viewed a wasted effort if they decide to leave after only a few months on the job.

Other challenges and obstacles are true of every industry, such as time con-

(Continued on p. 38)

(Continued from p. 37)

straints and employees' willingness to learn, but it is obvious that the need for effective training is paramount in food and beverage circles as so much rests on protecting the public. However, can spaced repetition really tackle and overcome these problems?

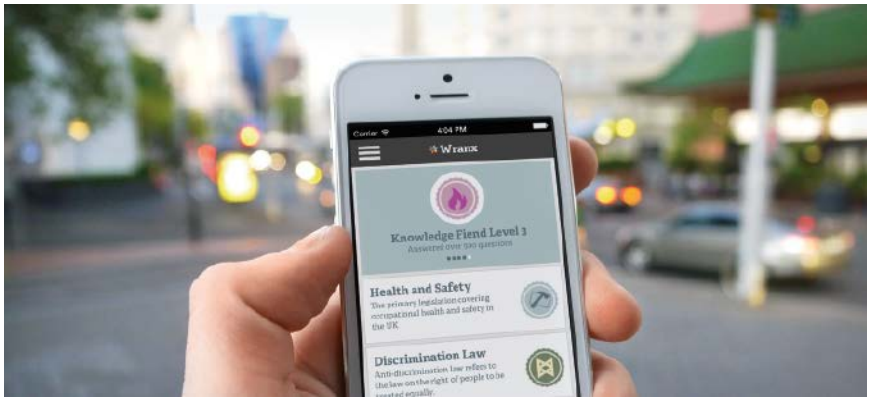
The Need for Different Approaches

Food Quality & Safety has already highlighted the need for fresh approaches to training. In July 2013, an article concerning food safety for grocers stated that storeowners and managers should not assume that training has been successfully completed because an employee has signed an attendance document or barely passed a test. Furthermore, the article found that training has to be presented, repeated, and updated so that employees can develop a sense of commitment to recognize and avoid cross-contamination, maintain cleanliness of hands and equipment, and promote a safe workplace.

> The intervals between each teaching are gradually increased when the student gains a greater understanding of the subject in question.

In addition, another piece from 2013 called for allergen training to be given greater importance, but this would only be viable if food companies changed their whole outlook on the subject. The article says that with the number of people with food allergies and the number of recalls due to undeclared allergens increasing, a company's culture in terms of how it handles allergens has taken on a whole new importance.

Through the right training, it is within the realms of possibility to continually teach staff about critical issues like the ones in these examples. By the same token, organizations can also change the behaviors and attitudes staff have towards subjects such as allergies or dietary requirements, thus reworking the company culture at the same time.



WRANX

There are a variety of spaced repetition solutions that are available online and can be accessed through a range of devices.

But once again we must ask whether spaced repetition is the answer? And if so, how can it be introduced and implemented?

Implementing Spaced Repetition

In today's tech-orientated world, spaced repetition is extremely easy to implement and can work around stumbling blocks that the food and beverage industry faces without too much disruption or interference.

Primarily, spaced repetition can fit in with the existing training requirements of any organization. Work schedules do not need to be interrupted and employees can complete their responsibilities without having to attend lengthy and ultimately pointless training courses.

This is due to various spaced repetition solutions that are available online and can be accessed through a range of devices. Although this means learning can take place in the working environment, it also allows for studying at a time that is convenient for each employee. The employee can potentially learn about new legislation on the way to work or while relaxing at home, whichever is more effective for the individual.

You'll also find that some spaced repetition applications are hosted remotely in the cloud, which doesn't require the installation of expensive software. Along with being cost-effective, this also allows for greater control too, as employers can update or revise learning materials whenever they want.

Another benefit is finding out if employees are actually benefitting from training, as spaced repetition software usually comes with some sort of reporting tool. In the past, it would take a mistake to discover that your employees didn't learn about a critical subject. But with feedback and data about performance, you'll know for certain whether the workforce is increasing its knowledge and understanding.

The Final Word

As we have previously seen, training is a constant requirement in regards to implementing food safety. From understanding the allergies of customers to avoiding contamination through human contact with food, the average employee has countless things to remember, which cannot be memorized and applied through standard teaching techniques.

But while this can strike fear into grocery owners, restaurant managers, quality control operatives, and laboratory technicians, there is a viable solution. Spaced repetition has been proven to increase an individual's ability to learn new information and apply it effectively.

In addition, software solutions can fit around the requirements of nearly every organization working within the food and beverage industry. It can be integrated into daily operations, continually adjusted to meet changing legislation, and help to engage employees more than classroom-based courses.

It also provides member of staff with control over their learning, but gives companies that ability to monitor performance. For these reasons, space repetition can noticeably enhance food and beverage training. ■

Simmonds is the founder of Wranx. Reach him at phil-simmonds@wranx.com.

eppendorf

Visit us at IAFP Booth #452

"Light" Beer, Redefined

Eppendorf BioSpectrometer and the brewing process

Spectroscopy allows brewers to analyze the concentration and quality of substances in beer by measuring absorbance at wavelengths within the UV/Vis spectrum.

Eppendorf's BioSpectrometer is a scanning spectrophotometer with flexibility for easy integration into the brewing process.

> The BioSpectrometer establishes specifications to maintain consistency and quality in brews
> Allows the brewer to test throughout the brewing process; removes the need to outsource testing
> Protocols for beer analysis using the BioSpectrometer are available

www.eppendorf.com/beer • 800-645-3050

Hepatitis A in Produce: Risk and Prevention

Because the virus can spread via fecal contamination in food and water, proper sanitation practices are keys to preventing outbreaks | BY **ANDREA CIPRIANI, MS**

The Hepatitis A virus (HAV) is a non-enveloped, single stranded RNA virus that is classified in the Picornaviridae family. HAV is a liver disease that results from exposure to virus particles. The virus is primarily spread via the fecal-oral route—when an uninfected person ingests water or food that is contaminated with the feces of an infected person. HAV can be spread through contaminated water, inadequate sanitation, or poor personal hygiene by food handlers.

Severity of illness from HAV can range from a mild illness lasting a few weeks to a severe illness lasting several months. Symptoms of Hepatitis A include: fever, fatigue, abdominal discomfort, nausea and vomiting, joint pain, loss of appetite, jaundice, clay-colored bowel, and dark urine.

According to the World Health Organization, HAV is one of the most frequent causes of foodborne infection, with a yearly estimate of 1.4 million cases worldwide. The largest foodborne outbreak of HAV occurred in Shanghai in 1998, affecting 300,000 people. The source of that outbreak was determined to be clams harvested from sewage-polluted waters.

The most common sources of foodborne HAV contamination are oysters, mussels, fruits, and vegetables. Fresh produce, such as salad, strawberries, raspberries, blueberries, and vegetables, have increasingly been implicated in foodborne outbreaks of Hepatitis A.

Risk

Individuals who have not been vaccinated or previously infected are at risk to contract HAV. In developed countries, such as the U.S., good sanitation and hygiene conditions keep HAV infection rates low. However, in developing countries, HAV is endemic and a majority of infections occur during childhood. Once infected with the virus, individuals develop antibodies to the virus, resulting in a lifelong immunity from contracting HAV again.

Hepatitis A in foods is a result of fecal contamination. Individuals infected with HAV excrete large numbers of virus particles in their feces, which may continue for several months even after symptoms have subsided. The long duration of virus particle shedding is the main source of spreading HAV via the fecal-oral route or through water contaminated with sewage.

Foodborne contamination with HAV typically occurs when the produce is grown in a region of the world where there is a high incidence of Hepatitis A. Any food that is handled using poor hygienic practices or harvested under poor sanitation conditions could potentially become contaminated.

Fruits and vegetables are typically consumed raw and can become contaminated with fecal matter at any point during the growing, harvesting, packing,

or serving of fresh produce. Therefore the regions of the world where produce is grown as well as potentially infected food handlers with poor hygiene practices can be potential sources of foodborne HAV contamination.

In the last decade, documented HAV outbreaks have been linked to lettuce, strawberries, blueberries, raspberries, and green onions. Since 2012, frozen berries have been linked to several outbreaks in Europe, totaling 601 cases with three deaths. In 2013, pomegranate seeds from Turkey were linked to an outbreak that affected 159 people.

> Any food that is handled using poor hygienic practices or harvested under poor sanitation conditions could potentially become contaminated.

As recently as February of this year, a HAV outbreak occurred in Australia affecting at least 14 people. Once again, frozen berries were identified as the most likely source of the contamination. The implicated product contained raspberries that were packed in China; however, the exact source of the contamination has not yet been identified.

Prevention

Strategies designed to reduce or prevent the risk of foodborne outbreaks of Hepatitis A should focus on preventing foods from becoming contaminated during growing, harvesting, and packaging. In developing countries, clean water should be used for the irrigation, washing, and processing of produce.

Food handlers should be trained on proper hygiene, such as washing hands frequently and wearing gloves when handling ready to eat foods. The application of good agricultural practices is needed to improve hygiene in primary production areas. Providing workers in the fields with basic employee hygienic needs, such as toilet paper and handwashing facilities, can contribute to reducing the risk of contamination.

Moreover, in developing countries, it is important to keep young children, who may be asymptomatic carriers of HAV, away from areas where fresh produce is being grown and harvested.

The spread of HAV can be reduced by irrigating, growing, and processing produce in safe water using proper sewage disposal and training workers on proper personal hygiene. Food companies should be aware of the risk of HAV and knowledgeable about how they source fresh produce. It is recommended that businesses confirm that suppliers have proper hygiene measures in place and monitor the supply chain of their fresh fruits and vegetables. Monitoring can be done by periodically testing their produce for HAV using the current rapid detection methods available to screen for HAV. ■

Cipriani is research project leader for Merieux NutriSciences. Reach her at andrea.cipriani@mxns.com.

Manufacturing & Distribution

HACCP

Moving Your Lubrication Program in the Right Direction

Implementing lubrication practices as a prerequisite program goes beyond simply purchasing food grade lubricants

BY **BENJAMIN A. BRISEÑO**

Developing industry requirements, such as Food Safety Modernization Act rules, increase emphasis on contamination prevention as opposed to reaction after the fact. To address these ever increasing requirements, food and beverage companies continuously review all components of their Hazard Analysis and Critical Control Points (HACCP) systems to ensure their process facilities remain in compliance. Lubrication programs, and the various tasks and methods used for proper implementation, are one such component.

In general, machinery lubrication practices are considered prerequisite programs within an HACCP system. The World Health Organization defines prerequisite programs as "Practices and conditions needed prior to and during implementation of HACCP and which are essential for food safety." According to the USDA, prerequisite programs provide support for hazards not reasonably likely to occur and justification for not adding a potential hazard to the HACCP plan, which is designed to address issues that are likely to occur.

Prerequisite programs within HACCP, such as machinery lubrication, are typi-

cally facility-wide programs, as opposed to process- or product-specific. They deal with "good housekeeping" concerns and help reduce the likelihood of certain hazards by managing specific processes. While prerequisite programs fall outside of the detailed HACCP plan, they are still part of the overall HACCP system. Besides machinery lubrication, other examples of prerequisite programs include sanitation, maintenance, and pest control.

For all prerequisite programs, the USDA requires procedures and controls documentation, as well as records and results demonstrating program effectiveness. Noncompliance exists if unsanitary conditions are created such as a food safety hazard. Repeat failures within a prerequisite program may indicate a need to add or update the process in question into the HACCP plan. Mitigating those failures can begin by identifying hazards, developing a survey, training employees, and implementing proper storage.

The objective for the lubrication program is to implement it as a successful prerequisite program. The following are a few suggestions to help accomplish this.

Identify Contamination Risks

The first consideration is where potential contamination related to lubrication may occur. It is important to know if lubricants will come in contact with food as a normal part of the process, as is the case for release agents; or under conditions that are normally not part of the process, such as a developed machine leak.

The reason to note this distinction is that lubricants for food processing facilities are identifiable for their intended use through industry classification systems. For example, NSF 3H (meeting FDA 21 CFR 172.878) is intended for direct contact uses such as release agents, pan oils, and divider oils; and NSF H-1 (meeting FDA 21 CFR 178.3570) is intended for incidental contact uses such as conveyors, hydraulic systems, and gear drives. Identifying and classifying possible food contamination points is crucial.

Perform a Lubrication Survey

A detailed lubrication survey is essential in constructing the required prerequisite program documentation. The survey, along with procedure documentation and work records should identify important details including where food grade lubricants are needed, required use classification, responsibility assignments for applying the lubricants correctly, correct lubrication intervals, and best practices for storage and handling. The survey should inventory all lubricated equipment, lubricant products, applications, and identify criti-

(Continued on p. 44)

Repeat failures within a prerequisite program may indicate a need to add or update the process in question into the HACCP plan.

(Continued from p. 43)

cal machines and operations. If replacing lubricants, do not simply cross-reference without confirming applications.

Train Employees

For successful food grade lubricant use, those responsible for machinery lubrication should receive proper training. Training should include knowledge of product classification differences, application methods, handling and storage procedures, and correct amounts and intervals. This will mitigate potential problem areas that include, but are not limited to, the following instances.

- Misapplication of lubricant classifications. For example, using a product that is classified only as NSF H-1 (incidental contact) where an NSF 3H (direct contact) lubricant is required.

Mixing will compromise lubricant food classification grade credentials and can also weaken equipment protection.

- Over-lubrication can cause seal rupture due to excessive grease or overflow and/or foaming due to excessive oil level increases the likelihood of food contact.
- Under-lubrication can cause foaming and/or compromise equipment life. Subsequently, more frequent machine teardown increases the possibility of contamination.
- Improper handling and/or fill practices such as improper pump handling techniques and/or use of dirty containers can lead to lubricant contamination.
- Improper storage practices can lead to contamination as water, dirt, and other lubricants can make their way into food-grade lubricants.

Implement Proper Storage

Lubricants should be stored under cover, preferably indoors. To limit moisture contamination, situate products so water does not pool on container tops and avoid areas with wide temperature fluctuations. As you may have heard before, temperature fluctuation can cause containers to "breathe" and suck in moisture from the environment, even if they are sealed.

My recommendations for avoiding lubricant cross-contamination while also protecting equipment include:

- Convert as many lubricant applications as possible in your manufacturing process;
- Mixing will compromise lubricant food classification grade credentials and can also weaken equipment protection—to avoid accidental lubricant mixing or misapplication, keep food grade lubricants separate from nonfood grade lubricants;
- Color code or clearly label lubricant filling containers and dispensers by their use classifications; and
- Control access by having storage under lock and key.

Optimize Lubricant Inventory Turnover

The goal for lubricant inventory turnover is for everything in inventory to be used in a timely manner. All products in inventory should have a purpose. Having products in storage that have no use allows for a buildup of dormant stock and unnecessarily increases misapplication or risk of mixing. You should properly dispose of any product that is no longer in use, especially if nonfood grade. Be sure to check the manufacture date of lubricant products and use older product first.

Prerequisite programs can offer a foundation for implementation of HACCP systems and plans and ultimately help in the overall goal of contamination prevention. ■

Briseño is product line manager at Clarion and Industrial Lubricants, CITGO Petroleum Corp. Reach him at babrise@citgo.com.

AOAC

EDUCATE
NETWORK
COLLABORATE

ANNUAL MEETING & EXPOSITION

Leading the Industry
in Food Science and Safety

AOAC's Annual Meeting & Exposition offers scientific sessions, roundtables, workshops, and poster presentations to discuss best-practice research from many areas within food science and safety.

From the public to academia to private sectors of analytical science and innovation, **AOAC 2015** brings you science-based research from the top scientists in the world; technical information about changes and advances in methodology; and access to cutting-edge techniques and applications being used with success around the world. Nowhere else can you find access to this level of reliable knowledge and proven caliber of attendees than **AOAC's 2015 Annual Meeting & Exposition**.

For more information and to reserve your place at this important industry event visit **www.aoac.org** today.

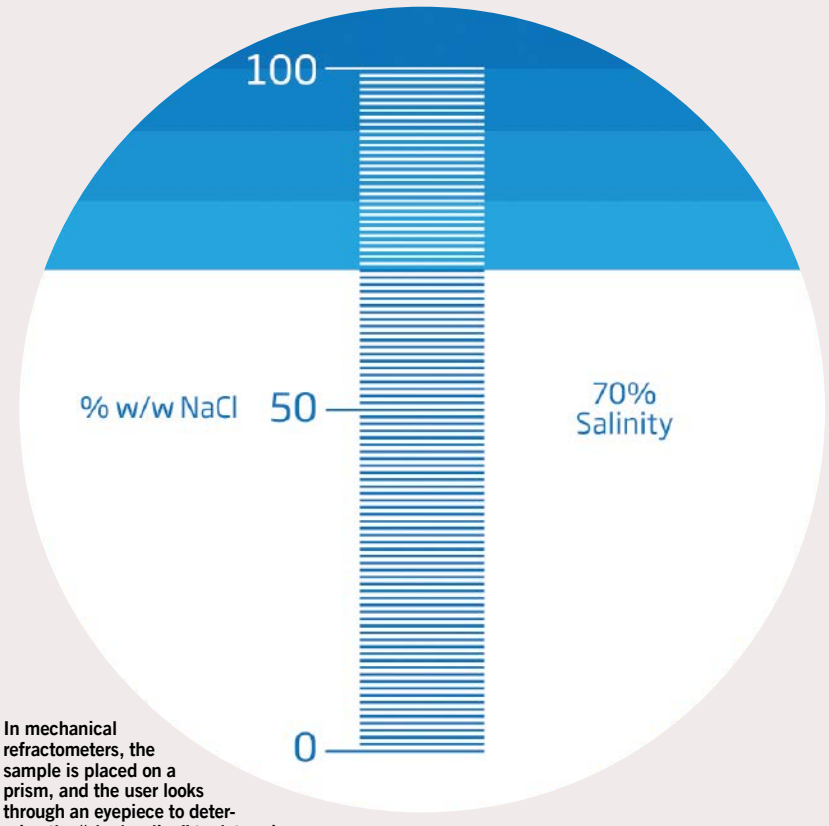
129th Annual Meeting & Exposition

September 27–30, 2015
Los Angeles, California

AOAC INTERNATIONAL
The Scientific Association Dedicated to Analytical Excellence®

In The Lab

MEASUREMENTS



In mechanical refractometers, the sample is placed on a prism, and the user looks through an eyepiece to determine the "shadow line" to determine this critical angle.

Determining Salt in Food

Guidelines and considerations that serve as a starting point in quality control protocol for measuring salt in foodstuffs

BY **DAVID MASULLI**

Sodium occurs naturally in virtually all foods, albeit in relatively small amounts. Table salt, in the form of sodium chloride (NaCl), is a common additive to food products and is used as a preservative and a flavor enhancer. Traditionally, salt was added to food as a form of preservation. Since the advent of refrigeration, salt is more commonly used to enhance flavor but its ability to reduce microbial growth, improve texture, and increase shelf life are still utilized. Sodium may be added in forms other than table salt, such as sodium nitrate, sodium bicarbonate (baking soda), and monosodium glutamate. Sodium can also be added during food production from more complex sources, such as in soy sauce, garlic salt, or other condiments.

Effects on Health

Sodium is an essential nutrient in the human body, but is only needed in relatively small quantities. It plays a critical role in the body's ability to control blood pressure and blood volume. However, as sodium intake increases, health risks such as high blood pressure increase. Monitoring and maintaining healthy blood pressure levels reduces the risk of cardiovascular disease, congestive heart failure, and kidney disease. The major source of our daily sodium intake is from table salt (sodium chloride). The Institute of Medicine states that for individuals age 9 to 50, the Adequate Intake (AI) level for sodium is 2,300 milligrams per day. The AI levels are recommended daily average intake amounts of a specific nutrient. For infants, whose calorie requirements differ widely from adults, the sodium AI level is significantly lower. Individuals with pre-existing hypertension or other cardiovascular conditions are also generally advised to limit sodium content below the recommended AI as well.

As more research describing the potential health risks of a high sodium diet became published, manufacturers have made increased efforts to reduce sodium content of foodstuffs without compromising the quality of the finished product. Although low-sodium products are appealing to health-conscious consumers, there is risk of under-seasoning products, which may compromise flavor, texture, or shelf stability. As a result, strict control over low-salt formulations throughout the production process is necessary, from research and development to QC.

Methods of Sodium Analysis

Selection of a method of analysis for salt content in food is a significant decision to make when designing a quality assurance plan. There are several different technologies and methods available for determining salt content of food; each method has their own advantages and limitations. Some of the most obvious advantages and limitations include the cost of investment, accuracy, and turnaround time for each test. However, ease of use, cost per test, and the amount of technical expertise required to perform each analysis are often significant concerns. Based on these parameters, QC departments typically u se industry standard technologies for assessing salt content: refractometry, ion-selective electrodes, and titration.

HANNA

Refractometry. This method determines the salt content of a substance based on its refractive index. Refractive index is determined by passing a light through a prism into a sample and measuring how the light bends and establishing the critical angle. The critical angle is the angle at which no light is refracted and all light is internally reflected.

Refractometry can be used to determine a wide variety of parameters including sugar, propylene glycol, gelatin, and salt. Based on the types of dissolved solids in a sample, a refractive index is generated and converted to a measurement unit such as % Brix (sucrose) or % salt. It is important to note that refractometers are not specific, and only measure total light refraction. This makes them ideal for quantitative use in binary solutions, such as a salt brine solution, or for qualitative measurements in a finished product as a measure of consistency from batch to batch.

In mechanical refractometers, the sample is placed on a prism, and the user looks through an eyepiece to determine the "shadow line" to determine this critical angle. Since temperature greatly affects refractive index, temperature compensation is achieved using bimetal strips that move the lens or scale as they expand or contract due to changing temperature. Manual refractometers are a low cost investment, but have limited accuracy due to subjectivity of determining the "shadow line," variations in ambient light wavelengths, and limited temperature compensation.

Digital refractometers utilize an internal light source at a fixed wavelength. This internal light passes through a prism and into the sample and an internal light detector identifies the critical angle and therefore, the refractive index. Digital refractometers eliminate the subjectivity of determining the shadow line manually and have improved temperature compensation due to the use of programmed algorithms. As a result, digital refractometers can perform measurements in wider temperature ranges at a low-moderate price investment.

Refractometers are beneficial due to their low startup cost and lack of chemical reagents required to perform tests. However, this method is not specific to salt, and therefore prone to interferences from substances present in the sample that alter refractive index. These substances include fats, sugars, and salts other than sodium chloride. If salt is the only variable present in a complex sample, refractometers can be useful for qualitative measurements.

Ion-selective electrode. Another method used for determining salt content in food is through the use of an ion-selective electrode, more commonly referred to as an ISE. An ISE is a chemical sensor with a sensing tip used to determine the concentration of a specific ion in a solution. In sodium ISEs, the sensing tip is a specially formulated sodium-specific glass bulb. ISEs obey the Nernst Equation, which allows us to correlate a millivolt (mV) reading to a proportional concentration value. However, much like refractometry, changes in temperature can also affect measurement accuracy. This is mitigated one of two ways: by monitoring temperature and applying a temperature correction using the electrode's isopotential point or by maintaining a constant temperature between standards and samples during calibration and measurement.

© RENAMARIE - FOTOLIA.COM

In both manual and potentiometric titrations, sodium content is inferred from chloride concentration.

Like a pH meter, ISEs require care to ensure accurate measurements. The glass bulb of the sodium ISE must be hydrated at all times in an electrolyte solution. In addition, the electrode bulb needs periodic etching to ensure that a fresh layer of sensing glass is exposed prior to measurement. Proper function of the electrode can be validated by performing a slope check using sodium standards. The slope check ensures that the electrode conforms to Nernstian behavior and is operating correctly.

The ISE must be calibrated daily in order to ensure accurate measurements. Calibration standards should bracket the expected concentration of the sodium content of the food measured. For example, one calibration standard should have a higher concentration than the expected concentration, and another standard should have a lower concentration than your expected value. The standards should also be a decade apart from one another (i.e. 100 parts per million, or ppm, and 1,000 ppm).

Ionic strength adjuster (ISA) must also be added in a fixed ratio to both calibration standards and samples for accurate readings. Electrode response is affected both by ion concentration, as well as ion activity. The ISA standardizes ion activity between calibration standards and samples, therefore ensuring changes in the electrode response are based on changes in ion concentration, rather than ion activity. Once calibration is complete, measurements on liquid or solid samples can be performed. Solid samples can be extracted with water. The amount of water used to extract the solid samples must be accounted for so that a dilution factor may be applied.

Sodium ISEs are very specific to sodium measurement, and are prone to little interference. The startup cost of measurement with an ISE is moderate. However, the care involved with ISE tends to require a trained technical staff and a longer startup time before measurements may be taken.

Titration. This is the most common method of analysis in in-house laboratories for determining salt in foods. Titrimetric methods have been adopted as the

(Continued on p. 48)

(Continued from p. 47)

reference method by organizations such as the Association of the Official Analytical Chemists (AOAC) for a variety of food matrices, which include cheeses, meats, and vegetables. A titration is a procedure where a solution of a known concentration (titrant) is used to determine the concentration of an unknown solution (analyte). Results are calculated based on the amount of titrant used to reach the endpoint. Endpoint can correspond to a color change of an indicator, or detected with a potentiometric sensor.

Titration: Mohr method. One way to determine salt content using titration is with the Mohr method. The Mohr method is a manual titration method using silver nitrate. In this titration, a burette is used to manually add silver nitrate to a sample, allowing for a reaction to occur between silver ions in the titrant and chloride in the sample between each dose. The pH of the sample must be buffered to around 7.0 in order for the reaction to occur. This reaction between silver and chloride produces an insoluble silver chloride (AgCl) precipitate.

Silver nitrate is added until chloride is no longer present in the sample solution. When silver nitrate is added to the sample in excess, it binds with a chromate ion indicator to produce a red color in solution, signifying the endpoint. Chloride concentration is calculated, which can then be used to infer sodium or sodium chloride content. This method has the benefit of high accuracy when performed by skilled operators, although determining when the color indicator has sufficiently changed makes this method prone to overestimation of salt content. The investment for manual titration is very low for silver nitrate titrant, color indicator, a manual burette, and other necessary volumetric glassware.

HANNA

An example of an ISE meter.

Titration: potentiometric method. Titration with silver nitrate may be automated with a potentiometric titration system. The titration system can be equipped with an ISE sensitive to the concentration of chloride or silver ions. However, this electrode would not be used to directly determine concentration during a titration. Instead, the electrode would monitor the solution for a change in the mV potential as a result of silver ions being in excess, or depletion of chloride ions in solution. As a result, calibration of ISEs is not necessary for titration, making the startup time for analysis immediate.

> The amount of water used to extract the solid samples must be accounted for so that a dilution factor may be applied.

These titration systems automatically control titrant dosing and endpoint detection. Automatic endpoint detection increases titration precision by eliminating human subjectivity associated with manual titration. Instead of a visual color change indicator, the titrator will determine the endpoint by measuring changes in mV potential. Also, the automated dosing system dispenses smaller, more precise doses than a technician using a manual burette. Dynamic dosing is available on many titration units, which permits the unit to control how much titrant is dosed based on the progress of the titration. Dynamic dosing allows for larger doses to be dispensed in the beginning of the titration, with progressively smaller doses being dispensed as the endpoint is approached. This saves time and reduces the likelihood of overshooting the endpoint. Automatic titrators require a moderate to large investment.

Conclusions

Method selection is among the most important steps in establishing a protocol for monitoring salt in foods.

Refractometers can be the easiest to use with low equipment cost and no chemicals required, but are not selective to sodium chloride and therefore, can only be used for quantitative measurements in binary solutions.

The sodium ISE is can be beneficial to a QC protocol due to its high accuracy and direct determination of sodium. Several other methods, including titration and refractometry, infer sodium from another measurement. The sodium ISE is the only method truly specific for sodium, making it ideal for foodstuffs with complex matrices. However, the required daily prep time for calibration and electrode care is high, and requires excellent laboratory technique in order to obtain accurate measurements.

In both manual and potentiometric titrations, sodium content is inferred from chloride concentration. This can be problematic for complex samples that contain other chloride salts or other sources of chloride that are not sodium chloride. For example, magnesium chloride and calcium chloride are commonly added to tofu as coagulants, therefore rendering a chloride titration infeasible at determining sodium content.

Manual titrations may be insufficient in accuracy and repeatability due to the subjectivity of determining the titration endpoint from a color change, and the coarse dosing resolution of manual burettes. Automatic titrators can be the easiest to use with the potential for the most accurate methods, with typical %RSD of <1% to 2%. Potentiometric titration is also recommended for many of the titrimetric methods contained within the AOAC standard methods of analysis. However, the capital investment can be the highest among the other mentioned methods.

The ideal method can change depending on the specific product, but in all cases, all available methods should be reviewed for their ease of use, accuracy, and costs. ■

Masulli is application engineer at HANNA instruments. Reach him at dmasulli@hannainst.com.

What Do Microbiology Test Results Really Mean?

When striving for an accurate status of plant hygiene and product quality, results must be interpreted with care and recognition of limitations | BY **MARTIN EASTER, PHD**

To quote one of the founding fathers, "In this world nothing can be said to be certain, except death and taxes." Though not a microbiologist by trade, Benjamin Franklin's wise words resonate all the way to the interpretation of your microbiology test results. It is academically and universally recognized that no microbiological measurement is perfect due to statistical and practical uncertainty. In fact, acknowledging the uncertainty of a measurement is as important as the measurement itself.

Uncertainty is even more complex in food microbiology due to the particulate nature of bacteria and their ability to reproduce by binary fission. This results in localized pockets of higher concentrations of bacteria where each individual represents a unique variable entity. Consequently, there is an uneven distribution of microbes even in well-mixed samples that create problems not only for test methods but sampling in order to get a meaningful result for the batch. The working group of the International Laboratory Accreditation Cooperation states "it is virtually impossible to know the exact microbial concentration in any sample, natural or artificial."

The vagaries of microbial measurement are often conveniently forgotten, resulting in unreasonable expectations of both laboratories and the methods deployed. So what do microbiological test results *actually* mean? What can be expected and do expectations apply equally to both product *and* environmental samples?

Food products are generally well controlled and manufactured to a consistency where microbial specifications are established. Conversely, there are no agreed standards for microbes for environmental surface samples that are less controlled and more variable. Each facility is expected to do "the best it can" for monitoring cleaning processes due the uniqueness of each manufacturing facility. Thus food manufacturers strive for high hygienic standards to protect their products, brands, and ultimately consumers.

Sources of Variation and Considerations

The unit of measurement for the enumeration of microbes is a colony forming unit (CFU) derived from plate count methods. This technique has remained largely unchanged since the pioneering days of Pasteur and Koch in the 19th century. It is defined as "a rough estimate of the number of viable bacteria or fungal cells in a sample" because it relies on the false assumption that each colony is derived from a single bacterium. Microbes exist as clumps or chains and are often difficult to separate into single cells. Hence, there is a large natural variation in CFU results from plate counts particularly if single replicate samples are used and single tests are conducted.

There are several steps in the plate count method where additional variation can be introduced. To obtain the optimum number of colonies for counting (30 to 300 CFU), dilutions of the sample

(Continued on p. 50)

(Continued from p. 49)

have to be prepared. Since the distribution of microbes in the sample is not uniform, each series may produce different numbers of CFUs. More variation occurs if there are fewer than 30 colonies per plate. The normal expected variation from plate counts is typically 0.2 to 0.5 Log units, so for a target 1,000 CFU (Log 3.0), an actual result can be anywhere between 300 to 3,000 CFU and still be considered microbiologically equivalent.

Such variation is well known and regularly examined among accredited testing laboratories. Under the proficiency testing scheme, laboratories using standard methods are provided with several replicates of stable, homogenous samples. Results are expected to show a 10 fold (1 Log) variation between laboratories. Sometimes this variation is exceeded by >2 Logs for plate counts such as coliforms or *Enterobacteriaceae*.

Mathematical models can be applied to statistically assess confidence of results. Measurement Uncertainty is used to calculate the dispersion of the values attributed to a measured quantity. The uncertainty reflects the doubt in the result of the measurement. In the case of a standard method for total bacterial count in milk, this has been calculated as 39.6 percent, i.e. the "true value" of the obtained result (within 95 percent confidence limits) can be expected in a range ±39.6 percent of the result. This means the actual value is not known for certain, and for a sample expected to contain 10,000 CFU, the true value lies somewhere within the range 6,000 to 14,000 CFU on 95 percent of occasions but can also be outside this range 5 percent of the time.

Microbial stress and survival are other factors that can affect test results. In dry, nutrient-poor environments microbial viability declines rapidly in a matter of hours such that there is a large variation in observed contamination levels. Literature shows examples of total counts <2 to 5.0 x 10^5 CFU/centimeter (cm)^2 with *E. coli* detected on 15.8 percent of the samples with a range of 0.2 to 12 CFU/cm^2.

Inoculating surfaces is known to result in large losses of viability with hugely variable residual contamination levels. Inoculating surfaces with a suspension containing 1 million bacteria can give a final residual contamination of 10 to 100 bacteria with 100 to 500 fold variation between five replicates from the same inoculum. Re-suspending and recovering contaminants from the surface swab into a diluent prior to testing also introduces another source of variation. Therefore, great care needs to be exercised when assessing the results of environmental tests and also when comparing methods for the assessment of environmental contamination. Accordingly, the enumeration of microbes in environmental samples yields little meaningful information. A qualitative (presence/absence) approach is more appropriate. General guidelines have been suggested by some authors and auditors, e.g. acceptable ≤80 CFU/cm^2 and unacceptable ≥1,000 CFU/cm^2. Trend analysis is more suitable and gives better management information about risks and emerging problems. The benefits of regular testing, preferably with a simple method giving rapid results for prompt corrective actions, are well established.

The vagaries of microbial measurement are often conveniently forgotten, resulting in unreasonable expectations of both laboratories and the methods deployed.

Alternative Rapid Method

An example of a new test method that uses traditional microbiology with an end detection system is Hygiena's MicroSnap. This two-step test procedure has a total time to result of 7 to 8 hours. The sample can be a surface swab, a 1 milliliter (ml) liquid sample, or a food suspension. Samples are mixed with a proprietary enrichment broth in an all-in-one device, and then incubated for 7 to 8 hours. After incubation, a 0.1 ml aliquot is transferred (using the device itself) to a specific end-detection device and measured with the EnSURE luminometer, which also measures adenosine triphosphate sanitation monitoring tests, among other food quality indicators. MicroSnap is formulated for a variety of bacteria and is currently available for Total Counts, *Enterobacteriaceae*, coliform, and *E. coli*.

The output of MicroSnap is directly related to inoculum size, i.e. the greater the number of bacteria the shorter the time to detection. Typical results for Total Counts and *Enterobacteriaceae* have been known to show excellent agreement and a high coefficient of correlation (>0.90) when compared with traditional plate counts. The dynamic range of the single test device is 10 to 10,000 bacteria per ml (or swab), thus negating the need for serial dilutions. A shorter detection time can be set according to the desired specification. For example, 100 *Enterobacteriaceae* can be detected in 5 hours.

All viable bacteria collected on the swab are cultured and detected within the system. This permits maximum recovery and minimal losses. A study of 300 surface samples showed an 89 percent agreement with the traditional plate count methods for both Total Counts and *Enterobacteriaceae* and the limit of detection was calculated as 50 to 100 CFU per swab, or ~1 CFU/cm^2. In a small proportion of cases (7 percent), samples were positive when tested with MicroSnap and negative when tested with traditional methods.

In summary, the results of microbiological methods are naturally very variable and must be interpreted with care and recognition of limitations. Pragmatism and practical solutions are required to establish "reasonable expectations" for the results from microbiological methods. Results from environmental samples are subject to even greater variation. Therefore, qualitative measurements and trend analysis can provide the most meaningful information. ■

Words of Wisdom

"Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it."—*Quality guru H. James Harrington*

Dr. Easter is general manager of Hygiena International and has over 30 years of experience in food safety and rapid testing solutions. Reach him at martin.easter@hygiena.net.

Lab Chiefs Assess Current State of Testing

Survey provides an inside look at the standards employed by today's food laboratories | BY ROBIN E. STOMBLER

A revolution in the accountability and quality of food laboratory testing may be underway due to the Food Safety Modernization Act. Already, proposed regulations acknowledge the significant role laboratory testing plays in the detection and identification of microbiological and chemical hazards. They call for the use of verification testing, environmental monitoring, and product testing, and outline procedures to account for these activities. A section of the law calls for the recognition of laboratory accreditation and the development of model laboratory standards, all of which may set a new benchmark that all food laboratories must strive to meet.

Microbiologics, a global provider of biological reference materials used in laboratory quality control processes, commissioned a third-party survey to ascertain the level of laboratory standards currently employed by food laboratories. The survey offered 186 food laboratory directors, quality assurance managers, and technical supervisors the opportunity to participate in an online survey. Surveys were sent to individuals working in laboratories within food manufacturing companies and to independent food laboratories. Individual responses are anonymous and Microbiologics only received results reported in the aggregate.

Lab Demographics

When asked where testing is conducted for their facility, 37 percent stated an onsite laboratory is used while 15 percent used a contract laboratory. A majority of respondents, 63 percent, used both an onsite and contract laboratory to meet their food testing needs.

These laboratories fulfill a wide range of testing needs. A majority of respondents, greater than 60 percent, indicated each of the following testing types are conducted by their laboratories: environmental monitoring, finished product testing, ingredient testing, raw material testing, verification testing, and validation testing.

Survey participants using onsite laboratories noted that only 42 percent of those laboratories are accredited, with the majority, 58 percent, not accredited. For those respondents using contract laboratories, 90 percent said that those laboratories are accredited, with 5 percent not accredited, and the remaining 5 percent unsure of the accreditation status.

Seventy-seven percent of the laboratory leaders stated that having laboratories accredited to an internationally-recognized standard, particularly ISO 17025, was important to them. Fifteen percent of the respondents were unsure if this was an important credential, and 8 percent stated that it was not important to them.

Upholding Quality Standards

Quality controls are used as part of a food laboratory's processes and procedures to assure that its test methods are reliably detecting specific pathogens. Of survey respondents using onsite laboratories, 81 percent stated that their laboratory uses quality control materials as part of its testing processes and procedures. Twelve percent said that quality control materials were used sometimes, 4 percent stated that no quality control materials were used, and 4 percent did not know.

Of survey participants using contract laboratories, 67 percent stated that quality control materials were used. Almost a third (29 percent) were unsure if the contract laboratory used quality control materials, and 5 percent indicated that quality controls were used sometimes.

Proficiency testing, where a laboratory will receive and perform testing on unknown specimens from an impartial third-party source, is a form of external quality control.

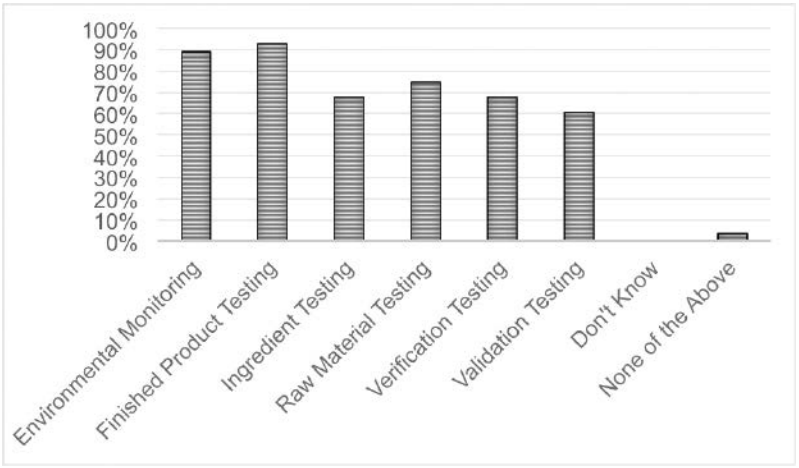
Eighty-five percent of respondents stated that their onsite laboratory participated in proficiency testing, while about half (52 percent) of the contract laboratories did. The other half of the respondents (48 percent) stated that they did not know if their contract laboratory participated in proficiency testing. Fifteen percent of the onsite laboratories did not participate in proficiency testing.

Survey participants were asked what percentage of their laboratory staff is certified as food scientists or technologists. Certification of food scientists and tech-

(Continued on p. 52)

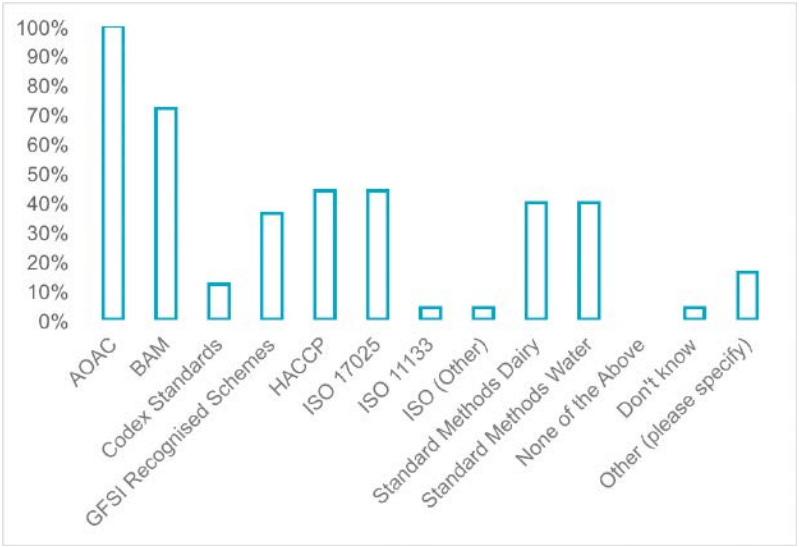
(Continued from p. 51)

Please indicate the type of testing conducted by your laboratory. (Check all that apply.)



AUBURN HEALTH STRATEGIES

Which standards or processes does your laboratory follow? (Check all that apply.)



AUBURN HEALTH STRATEGIES

nologists is offered as a credential from a limited number of professional societies and trade associations.

For onsite laboratories, nearly a third of survey participants stated that none of their laboratory staff are certified, another third indicated that about 20 percent of their staff are certified, and about 20 percent of respondents stated that they did not know if their laboratory personnel are certified. For contract laboratories, 90 percent of survey participants did not know if their laboratory staff are certified.

When asked to select each of the standards or processes their laboratory follows, participating laboratory leaders had a range of responses. All respondents (100 percent) follow AOAC, and 72 percent use the BAM (Bacteriological Analytical Manual). Between 30 to 50 percent of survey respondents use Hazard Analysis and Critical Control Points (44 percent), ISO 17025 (44 percent), Global Food Safety Initiative-recognized schemes (36 percent), Standard Methods Dairy (40 percent), and/or Standard Methods Water (40 percent). A handful of respondents indicated the use of Codex Standards (12 percent), ISO 11133 (4 percent), or ISO (other) (4 percent). Four percent indicated that they did not know which standards or processes are followed by their laboratory, and 16 percent noted "other" standards or processes, not listed.

A section of the law calls for the recognition of laboratory accreditation and the development of model laboratory standards, all of which may set a new benchmark that all food laboratories must strive to meet.

Report Conclusions

Fifteen percent, or 28, of the laboratory leaders contacted responded to the survey. No two respondents are from the same laboratory. The aggregate results provide a glimpse into the level and knowledge of laboratory standards currently employed by food laboratories.

Among the overall results, it is notable that over 60 percent of respondents utilize both onsite and contract laboratories for what appears to be a wide range of testing needs.

Although more than three-quarters of these laboratory professionals state that laboratory accreditation to an internationally-recognized standard is important to them, only 42 percent of onsite laboratories are reported as accredited. In contrast, 90 percent of the respondents' contract laboratories are reported as accredited.

Among respondents using onsite laboratories, 81 percent stated that their laboratory uses quality control materials, and 85 percent reported using a proficiency testing program.

There is some uncertainty reported among respondents on the practices of contract laboratories. Twenty-nine percent were unsure if their contract laboratory used quality control materials, and almost half reported uncertainty as to if their contract laboratory participated in proficiency testing. Ninety percent of survey participants did not know if contract laboratory staff were certified. ■

Stombler is president of Auburn Health Strategies, LLC in Arlington, Va. Reach her at Rstombler@auburnstrat.com.

AUTHOR NOTES: Percentages presented in this report are rounded to the nearest whole number. This survey was made possible by Microbiologics and was produced by Auburn Health Strategies.

PURE GENIUS

REVOLUTIONIZING FOOD SAFETY

Our patented **Silver Dihydrogen Citrate** molecule has revolutionized food safety because it is one of the most powerful antimicrobials in the industry. Our EPA registered PURE® Hard Surface is an SDC-based food contact surface sanitizer and disinfectant. The electrolytically generated antimicrobial provides an environmentally responsible solution to food safety challenges.

- SDC quickly eliminates a broad spectrum of bacteria, fungi and viruses
- Destroys germs by attacking their protective membrane
- Appears as food to microbes, destroying their metabolism and stopping reproduction

- Provides 24 hour residual protection
- SDC products are odorless and non-irritating and can be used on food contact surfaces in food preparation, processing and food service operations

FOR CONSULTATION AND TEST PRODUCTS, CALL 619.596.8600 EXT.101 OR EMAIL SALES@PUREBIO.COM

WWW.PUREBIO.COM

Preventing the smallest things from damaging your biggest asset...your brand!

POWERED BY SDC Ag+

A Holistic Approach to Traceability

Companies can share specific product information more efficiently and accurately by using the same standards to identify and capture product data

BY **ANGELA FERNANDEZ**

Increasing consumer confidence in food safety is a collaborative effort among businesses, trade associations, industry groups, and regulatory agencies. Driven by impending government regulations and increased consumer pressure for accurate and complete product information, food supply chain stakeholders are seeing past their differences and building consensus toward improved traceability using consistent, interoperable processes based on global standards.

Driving Traceability's Evolution

Traceability is the ability to verify the identity, history, or location of an item by means of documented information as it moves through supply chain. Ever since the Bioterrorism Act of 2002, all trading partners have been asked to step up their ability to trace products "one up" and "one back" in the supply chain, and traceability will also be a key factor in the FDA's implementation of the Food Safety Modernization Act later this year and into 2016.

These regulatory forces ensure the safety of our food supply and are influenced by important cultural trends the country has experienced over the last few decades. Consumers are more vigilant about food than ever before and are demanding more transparency on nutritionals, allergens, and information about local sourcing and sustainability processes. Also with major food recalls still fresh in their minds—such as cantaloupe, peanut butter, and spinach recalls of the early 2000s—Americans are asking more questions about the food supply chain. Overall, the consumer's thirst for knowledge is pushing the food industry to shift from simply responding to food safety events to preventing them before they start.

While traceability is being prioritized, there is more that can be done to streamline traceability. Today, only five out of 40 food products purchased for a traceability study conducted by U.S. Department of Health and Human Services could actually have all of their individual ingredients traced back through supply chain to their origins. Several disconnects might be at play—ingredients from different farms are mixed into one case, or some businesses may not maintain specific lot information.

Regardless of the situation, findings like these expose a clear opportunity to improve traceability, as well as the collaboration that facilitates it.

What is Whole-Chain Traceability?

To better track and trace food, the industry needs better collaboration and a more holistic or "whole-chain" approach to the food supply chain. Whole-chain traceability is achieved when a company's internal data and processes used within its own operations to track a product are integrated into a larger system of external data exchange and business processes that take place between trading partners.

Enabling whole-chain traceability involves linking internal proprietary traceability systems with external systems through the use of one global language of business—the GS1 System of Standards—across the entire supply chain. GS1 Standards enable trading partners in the global supply chain to talk to one another through the identification encoded in the various types of barcodes. By using the same standards to identify and capture data about products, companies can share specific product information more efficiently and accurately, which ultimately benefits both businesses and consumers.

GS1 Standards enable companies to globally identify products in the supply chain in order to optimize visibility and efficiencies, as well as overcome limitations of proprietary solutions and systems. Using GS1 identification numbers, including Global Trade Item Number, companies can identify products and dynamic information (expiration date, lot number) to fa-

cilitate the communication of product-specific data when a barcode is scanned.

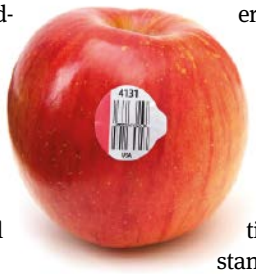
Main Benefits of Better Traceability

More widespread, whole-chain traceability will have a positive impact on the food supply chain in numerous ways, but there are four main benefits that can mean good news for suppliers, distributors, retailers, and food service operations alike.

1. Being able to precisely locate potentially harmful products through supply chain visibility. Perhaps the most critical piece of traceability is supply chain visibility. By breaking down the barriers that come with using proprietary systems, food industry trading partners benefit from the common language of standards by gaining unprecedented visibility into their supply chains. Companies can achieve internal process improvements, but the most important element of supply chain visibility is the ability to accurately and quickly pinpoint a potentially harmful product.

Implementing supply chain visibility shows a strong commitment to traceability and that a company is taking a proactive approach instead of simply reacting to a specific event. Recalls or withdrawals are caused by various reasons—undeclared allergens, foodborne illness, cross-contamination, or particles from equipment ending up in the final product. With enhanced traceability procedures, businesses can prepare for emergencies and avoid the damage a widespread recall can inflict for months or even years afterward. Even if a company has never been linked to a food safety emergency before, standards-based traceability practices provide customers reassurance and contribute to an optimal crisis management plan.

2. Ensuring trustworthy product information and data quality. When the GS1 US Retail Grocery Initiative launched in mid-2014, a major discussion point among retailers, suppliers, and other industry stakeholders was the need for improved product information and images online. By bringing together industry leaders from grocery, fresh foods, and consumer packaged goods, the Retail Grocery Initiative identifies specific industry challenges and develops potential solutions to continue the progress toward more efficiencies, enhanced risk management, and business growth.



Right now, the state of product data is inconsistent and the need to provide trustworthy information to consumers scanning a product barcode or searching for a product online is one of the top challenges the industry will tackle in 2015.

The diversity of requests for sharing product information and images with trading partners, consumers, and regulators has created a challenging landscape where a large number of suppliers are also aiming to meet various demands in other industry verticals (such as food service). With online grocery shopping on the rise, the urgency is only intensifying. Looking at the entire retail industry, grocery leads in sales via mobile devices, according to PricewaterhouseCoopers. Its data shows mobile accounted for 37 percent of grocery e-commerce sales last October and outpaced such industries as furniture, health and beauty, apparel, and electronics. The online grocery market is expected to grow at a rate of 21 percent annually through 2018, according to BI Intelligence.

3. Reducing food waste. More than 50 million Americans struggle to put food on the table, according to the Institute for America's Health. Yet, as a country, we also throw out roughly 35 million tons of food, according to the Environmental Protection Agency. In the face of these imbalanced statistics, there is tremendous pressure placed on the food industry, especially fresh foods where products are more prone to spoilage, to reduce waste. The traceability processes based on GS1 Standards can provide a solid operational foundation to facilitate less food waste.

Adopting standards-based traceability procedures—or expanding upon the ones already in place—will lead to more precise inventory planning and category management. GS1 Standards encompass many different types of barcodes that are used based on industry needs. Specific barcodes such as the GS1-128 for cases and the GS1 DataBar for individual items allow for dynamic information (such as batch/lot numbers and "use by" dates) along with the globally unique product identification.

A standards-based approach facilitates a more effective "first in, first out" inventory management philosophy. Retailers can more efficiently manage automatic price markdowns as expiration dates grow near, and prevent expired food from being sold at the point-of-sale. In the event of a recall, instead of wiping out the entire product from retail shelves, standards-based traceability procedures allow for a more specific isolation of the affected product, better identifying the product not affected and available for consumption.

4. Enhancing operational efficiencies. While whole-chain traceability is about better collaboration with external trading partners, the internal gains are abundant as well. By leveraging standards and achieving supply chain visibility, companies benefit from enhanced operational efficiencies, such as better inventory management, more accurate ordering, and improved product availability. Shipping and receiving accuracy may also be another area optimized by implementing standards-based traceability programs.

There is also a current need to reduce supply chain inefficiencies by decreasing total delivered costs (TDCs) in order to remain competitive and successful. TDCs are important in optimizing supply chain planning and decreasing them can maximize a company's profitability. The industry is currently collaborating on the best approach for utilizing new technologies and revamping specific business practices to improve operational efficiencies by identifying gaps and opportunities where leveraging GS1 Standards can lead to a positive impact on TDCs.

While most companies have some level of traceability in place, some industry sub-sectors are further along in implementing traceability processes than others. Through industry collaboration and education, companies using proprietary or outdated paper-based systems will see the benefits of improved traceability—rather than leave themselves vulnerable to human error and the potential for dangerous and costly mistakes. Ultimately, adopting standardized traceability processes means a more sustainable business outlook, and a way to continue moving forward. ■

Fernandez is the vice president of retail grocery and food service for GS1 US. She can be reached at afernandez@gs1us.org.

NEW PRODUCTS

Brewery Quality and Sanitation Program

The Zep Craft Brewing Solutions program provides products, services, and support for every step of the brewing process and includes plant sanitation programs, antimicrobial treatments, microbial control systems, drain maintenance, and janitorial maintenance. Zep's equipment line offers central foaming and sanitation systems, computerized dispensing equipment, and CIP/COP systems. Other services include brewery service visits, written service reports, training programs, sanitation procedures, and cost-control reports. **Zep Inc., www.zepbrew.com.**

Tree Nut Detection

Reveal for Multi-Treenut detects 5 to 10 ppm of almond, hazelnut, pecan, walnut, cashew, and pistachio residues on environmental surfaces, as well as in rinses. The test can aid food manufacturers in cleaning validations or verification of existing procedures to prevent cross-contamination of tree nuts within their manufacturing facilities. Users simply dip the test's device in an extracted sample and wait 10 minutes. If two lines develop, the test is positive for one or more of the six tree nuts. If only one line develops, the test is negative. **Neogen Corp., 800-234-5333, www.neogen.com.**

Histamine Detection in Fish and Fishmeal

MaxSignal Histamine ELISA Test Kit, for the screening of histamine in fish and fishmeal, uses a 15-minute aqueous extraction method that doesn't require heating or organic extraction steps, and an assay protocol that only requires 25 minutes to simplify histamine detection. The kit can specifically detect as little as 3 ppm of histamine in fresh or frozen fish samples and 30 ppm in fishmeal. It can provide detection over a range of histamine concentrations, 3 to 270 ppm for fish samples. **Bioo Scientific, 888-208-2246, www.biooscientific.com.**

Bulk Pasteurization Systems

Macrowave Pasteurization Systems are ideal for batch or conveyorized applications for bagged or bulk product. In a Macrowave heating system, an RF generator creates an alternating electric field between two electrodes. The material to be treated is conveyed through an electrode array where this alternating energy causes polar molecules in material to continuously reorient them to face opposite poles. The resulting friction causes the material to heat both rapidly and uniformly throughout its entire mass. **Radio Frequency Co., 508-376-9555, www.radiofrequency.com.**

X-Ray Inspection System

The Eagle Bulk 415 PRO system features a cupped conveyor, the raised edges of which can promote a more uniform product depth across the belt as well as reduce waste by preventing product spilling onto the floor. This, combined with Eagle's Material Discrimination X-ray technology, which discriminates materials by their chemical composition rather than relying on busy grey scale images, can optimize the detection of contaminants, from glass, metal, and some plastics, to mineral stones and rocks. The system is ideal for production lines processing nuts, grains, granola, sugar, cereals, coffee, and other high-volume bulk products. **Eagle Product Inspection, 877-379-1670, www.eaglepi.com.**

In Other Product News

Morgan Advanced Materials receives a favorable U.S. FDA letter of opinion for a variety of products from its Seals and Bearings business to be used in food processing applications.

Butler Automatic, provider of automatic splicing solutions, receives ISO 9001:2008 Quality Management System certification.

Hygiena has been awarded AOAC-RI Performance Tested Methods Validation for MicroSnap Total, its 7-hour total aerobic bacteria test.

YOU'RE INVITED

TO JOIN US FOR THE

14TH ANNUAL

Food Quality & Safety

FARM TO FORK SAFETY

AWARD CEREMONY

AT THE IAFP ANNUAL MEETING

Sunday, July 26, 2015

Oregon Convention Center • Ballroom 252
6:15–7:30 pm PST

This prestigious award honors the dedication and achievement of a food quality and safety assurance team that has made exceptional contributions to food safety with a positive impact on business results.

www.foodqualityandsafety.com/award.htm

Advertiser Directory

ADVERTISER	PAGE
AOAC International	45
Bio-Rad Laboratories	4
Bunting Magnetics	25
Diamond V.	29
DuPont Nutrition & Health	60
EMD Millipore	3
EtQ	19
Eppendorf North America	39

ADVERTISER	PAGE
IAFP	59
LECO	41
McCloud Services	33
Merck Millipore	22, 23
Nasco	31
Nelson-Jameson	49
Neogen	26, 27
PURE BioScience	53

ADVERTISER	PAGE
Roka Bioscience	11
Romer Labs	17
RQA	43
Sigma-Aldrich	2
Steritech	9
Union Jack Tools	58
Waters	7

EVENT: FOOD QUALITY & SAFETY AWARD PREVIEW

Celebrating the Leaders in Food Safety

The 14 annual Food Quality & Safety Award to be presented at IAFP

Presented by *Food Quality & Safety* magazine, the annual Food Quality & Safety Award honors the dedication and achievement of a food processor, food service, or food retailer that has made significant improvements in safety and consumer satisfaction with positive impact on business results.

The 14th annual Award marks the first time the competition is open to companies worldwide, as opposed to previous years where it was restricted to North America. The trophy will be presented to this year's winner on July 26, 2015 at a special reception during the International Association for Food Protection (IAFP) Annual Meeting in Portland, Ore., scheduled from July 25 to July 28. IAFP is attended by more than 2,800 of the top industry, academic, and governmental food safety professionals from six continents. To view the entire conference schedule, go to www.foodprotection.org/annualmeeting.

EDDIE ARROSSI PHOTOGRAPHY

Backyard Farms team members at 2014 Award ceremony, from left to right: Arie van der Giessen, head grower; Mark Queenan, director of quality assurance and food safety; Missy Blackwell, food safety and quality coordinator; Tim Cunniff, executive VP of sales; and Paul Mucci, COO and president.

Last year's Award winner Backyard Farms, a tomato grower in Madison, Maine, was selected for its dedication to quality combined with its technology, cleaning, and employee training initiatives. Its tomatoes are checked regularly from the time the seeds are grown at the external plant propagator through the shipment of the young plants to the company's greenhouses, then at the greenhouses as they grow and are harvested, and through them then being boxed and shipped.

"We have a tradition of 'food quality first' that is woven into the fabric of everything we do at Backyard Farms," says Mark Queenan, director of quality assurance and food safety. "From our management team to pickers and packers, we embrace and are committed to continuous evaluation and improvement in the areas of food safety and quality practices."

To congratulate this year's winner and celebrate the good work being done in the food industry, be sure to go to the July 26 reception, which is open to all registered IAFP attendees.—*FQ&S*

JOIN US FOR IAFP 2015

July 25–28

The Leading Food Safety Conference

IAFP 2015
PORTLAND
JULY 25-28 OREGON

Vibrant. Vital. Viable.

Valuable Information.

Stirring Your Vision.

Grow Your Knowledge

Grow Your Network

Register Today at
www.foodprotection.org

International Association for Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, Iowa 50322-2864, USA
+1 800.369.6337; +1 515.276.3344
Fax +1 515.276.8655


LISTERIA RESULTS IN JUST 22 HOURS
ALMOST MAKES YOUR MOUTH WATER JUST THINKING ABOUT IT
Thanks to the combined testing method of DuPont™ BAX® System Real-Time PCR Assays and FoodChek™ Actero™ Listeria Enrichment Media, you can now detect *Listeria* species and *L. monocytogenes* from environmental samples in about 22 hours. It's one of the fastest time to results for this pathogen in the food industry today.
This method is AOAC certified for detecting *Listeria* species (PTM #081401) and *L. monocytogenes* (PTM #121402) in a variety of food and environmental samples.
Getting results faster than conventional testing can mean faster product release decisions, reduced labor costs and an improved bottom line.
FoodChek™
Food safety, simplified.
DUPONT®
foodcheksystems.com
1.877.298.0208
IAFP Booth #725
fooddiagnostics.dupont.com
1.800.863.6842
IAFP Booth #645
Copyright © 2015 DuPont. All rights reserved. The DuPont Oval Logo, DuPont™ and BAX® are trademarks or registered trademarks of E.I. du Pont de Nemours and Company or its affiliates. FoodChek™ and Actero™ are trademarks of FoodChek Systems Inc.